

**From:** gerard siney <[REDACTED]>  
**Sent:** 31 March 2017 15:14  
**To:** National Planning Framework  
**Subject:** Spatial Planning / Implications of Irish Water's Shannon Abstraction Proposal.  
**Attachments:** 1 pager - second version.pdf - 25-10-16.pdf; Inshore Ireland Article - 29011-16.pdf; IWSS.pdf

**Follow Up Flag:** Follow up  
**Flag Status:** Flagged

Sirs,

I write to you on behalf of The River Shannon Protection Alliance (RSPA) [www.rivershannonprotectionalliance.ie](http://www.rivershannonprotectionalliance.ie), regarding our concerns about Irish Water (IW) proposal to extract hundreds of millions of litres of water per day from the Shannon for piping to Dublin for domestic, commercial and industrial consumption. The proposed mega scheme would require investment substantially in excess of one billion euros of tax payers money, and take at least ten years to complete before any new water would arrive in Dublin.

Extraction at these levels, which of course will increase over time, will have a detrimental affect on the integrity and water levels of the river, resulting in major collateral damage economically, environmentally and socially, affecting the people (over 1 million along the catchment) and communities along the full length (240 kilometres) of the Shannon. Over the years, organisations and people have invested finance, effort and time building up sustainable economies based on tourism, boating, angling, hospitality enterprises, and educational facilities, and all of these can suffer major decline and loss in the event of a compromised river course. Despite claims by IW that "it will have no affect on the Shannon", the proposal has given scant regard or consideration to the rights of the stakeholders whose vital economic and social interests depend on the integrity of the Shannon.

This scheme is being seen as Dublin yet again seizing the assets of the regions beyond the pale to ensure FDI and economic development of the greater Dublin area and its east coast settelite counties, leaving rural regions with mere crumbs with which to attract the same economic benefits.

Irish Water are pressing ahead undeterred by any persuasion, despite the fact that Shannon water is not needed in Dublin and that in fact it has and will have more than adequate water beyond its target date of 2050 and further. The Kennedy Report (attached) in a forensic examimation of IW's own figures exposed the extraction proposal as based on incorrect assumptions, flawed claims, mathematical errors, inappropriate methodology, and concluded that the proposal is based on a falsehood.

The regions of the country are relying on a new spatial strategy that recognises that there is a country outside of Dublin 'called Ireland', and they will settle for nothing less.

Thank you for the opportunity to put forward these views on behalf of the RSPA. and those who seek to avoid the plunder of the Shannon.

I have attached three documents in support of the arguments pur forward in this letter.

Yours sincerely,

Gerry Siney - Chairman, RSPA

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## THE SHANNON PROJECT: A SUMMARY

**Irish Water is proposing to spend up to EUR1.2billion<sup>i</sup> (EUR724 for every Irish household<sup>ii</sup>) on the Shannon project - an ill-conceived scheme to pump water 172km from the Shannon to Dublin. This project will almost certainly prove to be an unnecessary White Elephant and a huge waste of the Irish people's money - at which point the many errors made in this process will come into sharp focus and those individuals who (explicitly or implicitly) rubber-stamped the project will be answerable to the Irish public.**

- Irish Water predicts that, by 2050, Dublin will have a water *deficit* of 214.7Ml/d <sup>iii</sup>(million litres per day) but the report on which this is based contained basic and fundamental errors, inappropriate methodology, and flawed assumptions. In fact, by 2050, there will almost certainly be a water *surplus* of over 100Ml/d without having to increase existing raw water supplies at all.
- Dublin has no shortage of *raw* water. Its problems (and its recent water crises) have been due to Victorian-era water infrastructure with a history of under-investment resulting in insufficient capacity to *treat/deliver* water. Irish Water is finally investing in Dublin's water infrastructure - recent upgrades at two water treatment plants have drastically (and inexpensively) improved their water treatment capacity and more improvements are underway. Dublin has a total leakage rate in its water network of over 40% (comparable to Mexican cities<sup>iv</sup>) so for every litre of precious treated water put into Dublin's water pipes almost half of it ends up in the ground. Leaks are now infinitely easier to identify/fix post- the introduction of meters. Focus needs to remain on improving Dublin's ability to treat and deliver its plentiful supply of raw water: this scheme to source extra water from the Shannon is an unnecessary waste of money.
- If, at some point in the future, Dublin does need more raw water then local groundwater is the best option. Groundwater is inexpensive, can be developed incrementally as needed (whereas the Shannon project is "all-or-nothing" - not a drop of water can be delivered until the EUR1.2billion ten-year mega-project is completed), reduces contamination risk (sources are diversified, rather than all coming from one source as with the Shannon project) and drilling wells is something in which we have hundreds of years of experience. Even the Geological Survey of Ireland (Ireland's main authority on groundwater) made a submission during consultation for this project that "*the use of groundwater should not be overlooked...it has a number of advantages over the use of surface water. It is a viable and widely available resource that would be relatively inexpensive to develop at a local level*"<sup>v</sup> and yet during this process groundwater was dismissed as an option without a single test borehole having been drilled and Irish Water's review of the groundwater report contained basic mathematical errors that rendered its main conclusion wrong by 33%.

**The Shannon project needs to be put on hold immediately and re-assessed on the basis of a correctly framed "demand" prediction taking account of improvements to Dublin's water infrastructure and thorough, accurate investigation of groundwater.**

## THE SHANNON PROJECT

Irish Water is proposing to embark on a mega-project costing up to EUR1.2billion (**EUR 724 for every Irish household**) to pump 330 million litres of water every day (million litres per day is abbreviated to “Ml/d”) from the River Shannon (at Parteen Basin) along 172km of enormous pipes to Dublin<sup>vi</sup>.

### **Dublin has plenty of raw water – insufficient treated water is the problem**

Dublin has no shortage of raw water. Dublin’s recent water crises were not caused by insufficient *raw* water availability, but rather by Dublin’s limited capacity to produce and deliver *treated* water. At the time of the Ballymore Eustace crisis in 2013 (which imposed “*very severe*” water restrictions on Dublin) Irish Water stated: “*It should be stressed that there is no problem...with storage levels of untreated/raw water*”<sup>vii</sup> and the Irish Times made the point even clearer: “*The problem when water isn’t flowing from the tap is rarely one of a lack of water. The Poulaphouca reservoir [at Ballymore Eustace] stores enough water to last for between 120 and 180 days depending on rainfall, which rates well by international standards. It is in the capacity to treat that water that Dublin’s problems lie.*”<sup>viii</sup>

Dublin’s water treatment plants and supply infrastructure are extremely old (many pipes and treatment plants date back to Victorian times) and have been subject to a history of under-investment. Upgrading water treatment plants is a comparably inexpensive thing to do. Since the Ballymore Eustace crisis, upgrades at two of Dublin’s water treatment plants (Ballymore Eustace and Leixlip) have drastically improved their capacity to *treat* water at a cost of just **EUR130million for an additional 162Ml/d of treated water**<sup>ix</sup> - vastly less expensive than the Shannon option costing up to **EUR1.2billion for 330Ml/d**. Among other ongoing/proposed improvements to Dublin’s water infrastructure Irish Water is in the process of carrying out major upgrades of the Vartry water treatment plant and the Vartry/Stillorgan reservoirs and is planning a strategic watermain link between Leixlip and Saggart. All of this vital investment addresses the need to improve Dublin’s capacity to produce and deliver *treated* water.

### **Dublin leakage**

Dublin has a total leakage rate in its water system of over 40% on Irish Water’s figures. So for every litre of treated water that is put into Dublin’s water supply system almost half of it ends up wasted in the ground. London is currently undertaking a major replacement of its Victorian water mains - its leakage rates of 26% in 2012 were still deemed unacceptable.

In 2016 the OECD reported leakage rates in 43 cities (not including Dublin) worldwide: only 4 were over 40% (all of them in Mexico)<sup>x</sup>.

Previous commitments on addressing leakage have not been met. In 2006 Dublin County Council (DCC) predicted that distribution leakage would be reduced by 9Ml/d over six years (from 169Ml/d in 2005 to 160Ml/d in 2011) and described

this as a “*realistic achievable target*”<sup>xi</sup> – instead, by 2011 the leakage had *increased* by 9Ml/d to 178Ml/d<sup>xii</sup>.

Identifying and fixing leaks is now infinitely easier post- the introduction of meters. Before meters were introduced it was very hard to know that a leak actually existed unless it was visibly obvious – meters have completely changed that. However, while Irish Water claims that it will reduce leaks going forward, they state simultaneously that doing so will “*require a significant level of asset replacement and funding, which may not be available within this timeframe*”<sup>xiii</sup> – **funding should be made available for fixing leaks as a priority.**

**Irish Water’s predicted 2050 water “deficit” is wrong**

This project is being justified on the basis of Irish Water’s 2015 Need Report which attempted to predict the Dublin water supply area’s water demand to 2050. The “water supply area” encompasses most of county Dublin, 82% of Kildare (by population), half of Wicklow (by population) and 12% of Meath (by population). It predicted a 2050 “production requirement” of 872.7Ml/d but only a production capacity of 658Ml/d, and as such a deficit of 214.7Ml/d. However, key parts of the calculations were wrong.

This table shows the breakdown of the components used for Irish Water’s prediction of the 2050 deficit, alongside corrected (for peaking allowance/existing sources capacity) and more realistic (for domestic demand, non-domestic demand and strategic industrial allowance) predictions as explained below.

**So, just by correcting two errors and making three adjustments to Irish Water’s predictions (and these adjustments are arguably still very aggressive) there would be a predicted water surplus of 115.9Ml/d in 2050 without having to increase existing raw water capacity at all.**

<b>Component</b>	<b>Irish Water Need Report predicted 2050 figures (in Ml/d)</b>	<b>Adjusted predicted 2050 figures (in Ml/d)</b>
Domestic demand	260.7	194.6
Non domestic demand	181.1	164.2
Strategic industrial allowance	100.0	50.0
Customer side leakage	29.6	29.6
Supply side leakage	130.0	130.0
Operational water	4.7	4.7
Peaking allowance	95.2	0
Headroom and outage (15% on domestic demand, non domestic demand, customer side leakage and operational water)	71.4	59.0
<b>Production requirement</b>	<b>872.7</b>	<b>632.1</b>
Less existing sources	658.0	748.0
<b>Demand/supply deficit</b>	<b>214.7 DEFICIT</b>	<b>115.9 SURPLUS</b>

### **Inappropriate “peaking factor” was included**

The demand predictions made by Irish Water in 2015 included a 20% “peaking factor” (amounting to 95.2Ml/d in 2050). The concept of a peaking factor in future raw water demand calculations is to ensure that sufficient raw water is available not just on days of average demand but also on days of extremely high demand, such as during very hot spells. This is important where treated water capacity is constrained by raw water availability – e.g. in areas where water is treated directly from raw water sources (rivers/wells) from which only a restricted amount of water can be extracted per day. However, in areas where raw water is stored in large reservoirs before being treated (as is the case in Dublin) *no* peaking factor should be included in predictions of future raw water need – in situations of higher than usual water demand there is always plenty of raw water available in the reservoir and the limiting factor is the water treatment capacity at the water treatment plant.

Thames Water (which supplies water to London among other places) makes this clear: *“We do not report on ADPW [average day peak week] demand for London. This is because peak demands in London can be met through the relatively large volume of surface water storage (reservoirs). The ability to meet peak demands is therefore not a resource availability issue...but dictated by treatment and transmission capabilities”<sup>xiv</sup>.*

The majority of the Dublin supply network is already backed-up by huge raw water reservoirs. If it emerges that, after infrastructure improvements, there remain some small pockets of the network that are not backed-up by raw water reservoirs then an *appropriate* peaking factor should be calculated for those limited areas *alone* - adding a blanket 20% peaking factor to the entirety of Dublin’s raw water demand, as Irish Water have done, is totally inappropriate. **This 95.2Ml/d “peaking factor” should never have been included in the 2015 demand calculation.**

### **Recently increased water treatment capacity was not taken into account**

The recent upgrade of the Ballymore Eustace water treatment plant took its maximum production capacity from 318Ml/d to be 400Ml/d<sup>xv</sup>. For some reason, when calculating the existing and predicted maximum production capacity of Dublin’s water treatment plants, the Need Report included a maximum production capacity of only 310Ml/d at Ballymore Eustace<sup>xvi</sup>. **Once this additional 90Ml/d of maximum water treatment capacity is taken into account the 2050 production capacity increases from 658Ml/d to 748Ml/d.**

### **Domestic demand prediction**

To calculate predicted domestic demand Irish Water multiplied the predicted population in 2050 by the predicted water use per head:  
Population: Eurostat (the European Union’s statistics body) predict that from 2015 to 2050 Ireland’s total population will increase by 362,000 people<sup>xvii</sup>; Irish Water predict that from 2011 to 2050 the population of the Dublin water supply area *alone* will increase by 638,000 people<sup>xviii</sup>. This would require all of

Eurostat's predicted Irish population growth to take place in the Dublin water supply area – zero growth in the rest of the country – *and* 276,000 people from around the country (roughly equivalent to the populations of Cork, Limerick and Galway) to migrate to the Dublin area.

Per Capita Consumption: On the basis of two prior studies, using data from Dublin's recent Domestic Metering Programme, Irish Water's consultants found that Dublin's *average* per capita consumption (PCC) of water in litres per head per day (l/hd/d) was in the range 90.6 l/hd/d to 104.1 l/hd/d<sup>xix</sup>. The middle of this range is 97.4 l/hd/d - however, for its predictions, the Need Report used a PCC of 125.5 l/hd/d (29% above the middle of the range).

If we take a slightly more realistic assumption of population growth (we use Irish Water's 2011 population figure as a base and add Eurostat's entire 2015-2050 predicted population growth for Ireland (so this assumes all of that growth takes place in the Dublin water supply area alone: zero growth in the rest of the country) - *and* that the equivalent of the entire population of Limerick (90,000 people) will migrate to the Dublin area) to give us a 2050 population figure of 1,968,247 then, using the *top* of the range for average PCC (104.1 l/hd/d) and using Irish Water's assumed 5% reduction in demand due to conservation measures (applied to the 2050 demand prediction) then the **predicted 2050 domestic demand would be 194.6Ml/d. Irish Water is predicting a 2050 domestic demand of 260.7Ml/d.**

### **Non-domestic demand prediction**

Irish Water is predicting a large increase in water demand for existing non-domestic sectors PLUS it is assuming that there will be an additional 100Ml/d of water demand from entirely new industries that it predicts will set up in Dublin between now and 2050.

Irish Water is predicting that non-domestic demand (covering the area's existing agricultural, commercial and industrial sector) will grow in line with projected population growth – i.e. that it will increase by 43% (from 126.5Ml/d in 2011 to 181.1Ml/d in 2050). It is interesting to note that, having undertaken a detailed econometric analysis, London's water supplier is predicting that London's non-domestic demand will actually *decrease* between now and 2040<sup>xx</sup> - they state: "*increases in water use from service industries (e.g. offices, call centres) are being offset by reductions in demand from non-service industries (e.g. industrial sites, breweries)*". High water demanding industries are constantly improving their water usage as can also be seen in Dublin - the St James Gate Brewery in Dublin, for example, has won multiple environmental awards in recent years for, among other things, its more efficient water use. However, even if we use Irish Water's methodology of growing non-domestic demand in line with population growth, but apply the more realistic predicted 2050 population figure of 1,968,247, the **predicted 2050 non-domestic demand would be 164.2Ml/d. Irish Water is predicting a 2050 non-domestic demand of 181.1Ml/d.**

On top of this prediction of significant growth in water demand from existing industries, Irish Water is *additionally* assuming that 100Ml/d will be needed for *entirely new* "high water demand" industries that it predicts will set up in Dublin

between now and 2050. This is a huge assumption – it assumes that the equivalent of **12 brand new St James Gate Guinness breweries will set up in Dublin in the next 34 years<sup>xxi</sup>**. We are not aware of any other water supplier in the British Isles that has made a provision like this in its water demand predictions. Arguably this provision should be removed altogether as being entirely inappropriate. However, if we assume that the equivalent of 6 entirely new St James Gate Guinness breweries will set up in Dublin in the next 35 years (which is still an ambitious assumption) then **the 2050 predicted demand for this element of the calculation would be 50MI/d (as opposed to the 100MI/d that Irish Water is predicting)**.

### **There are a plethora of other aggressive predictions in the 2015 Need Report**

For example, the prediction that by 2050 Dublin will contain almost twice as many households as it does today<sup>xxii</sup> and that each of those new homes will leak to the same degree as Dublin's existing (much older) housing stock. This disregards the facts that in order to build so many new homes a vast majority of them would need to be in apartment blocks which inherently have much lower leakage (one delivery pipe serves multiple properties so leakage is a fraction of that in homes served by their own delivery pipe) and that they would be built to much more water-efficient standards.

### **This project has a history of over-estimating future water demand due to incorrect data/methodology – and yet the current 2015 predictions use an even more aggressive calculation model than the previous ones**

In 2006 consultants for DCC (Irish Water's predecessor in this project) also published predictions of future water demand. This included the prediction that average day demand would increase from 515.1MI/d in 2005 to 623.8MI/d in 2011<sup>xxiii</sup>. According to Irish Water, in 2011 the average demand was still only 539.3MI/d<sup>xxiv</sup> - so **there was an increase in demand of only 24.2MI/d (compared to the 108.7MI/d they had predicted). To put it another way, the actual growth was only 22% of the growth that they had predicted**. Tempting as it may be to explain away this huge discrepancy by pointing to the economic slowdown, it was primarily because the *methodology* (on non-domestic demand) and *input data* on PCC turned out to be incorrect. They used an estimated PCC of 145l/hd/d - 49% above Dublin's actual average PCC of 97.4 l/hd/d – which rendered the domestic demand forecast incorrect and used a bizarre “zoning” approach to predict non-domestic demand (which was later discarded at the time of the 2015 Need Report).

Irish Water's 2015 demand predictions address some of the errors made in DCC's 2006 predictions: by 2015 accurate data was available for PCC as opposed to the estimates that had to be used in the past, and the 2015 report abandoned the bizarre “land-zoning” approach. However, instead of assuming the same basic model for calculating projected water demand as the 2006 report, the **2015 Need Report introduced additional “demand” elements to the calculation that had not been included in 2006**. For example, the 2006 predictions (i) included a 12.5% “peaking factor” and a 50MI/d “security of supply” (outage) provision, and (ii) noted that, alongside predicted growth in existing non-domestic demand

(covering the area’s agricultural, commercial and industrial businesses) entirely new “high water demand” industries might move to Dublin – but concluded that water demand from such possible new industries was already provided for within the 12.5% peak and 50Ml/d provisions. By contrast the 2015 Irish Water predictions for 2050 (i) include a 20% “peaking factor” and a 71.4Ml/d “headroom and outage” provision, and (ii) provide (in addition to predicted growth in existing non-domestic demand in line with population growth) 100Ml/d for the possibility of entirely new major “high water demand” industries moving to Dublin – see below.

DCC 2006 prediction model	Irish Water’s 2015 prediction model
<ul style="list-style-type: none"> <li>• 12.5% peaking factor</li> <li>• 50Ml/d “security of supply”</li> <li>• No separate provision for new “high water demand” industries</li> </ul>	<ul style="list-style-type: none"> <li>• 20% peaking factor</li> <li>• 71.4Ml/d “headroom and outage”</li> <li>• 100Ml/d provision for “high water demand” industries</li> </ul>

**So, despite its predecessor having hugely overestimated future water demand back in 2006, Irish Water is now taking an even more aggressive approach to calculating future water demand – only time will tell how wrong their current predictions will be.**

**Irish Water misled the media, the Dail and the public about Dublin’s future water need**

When the Need Report was published in March 2015, Irish Water issued press releases (to newspapers, television, radio and online media), published advertisements inviting the public to take part in the public consultation process, and wrote letters/emails to ministers, senators, TDs and councillors. Every single one of these contained the statement: “*Irish Water has published a report which sets out the pressing need for a new water supply source for the Eastern and Midlands Region of the country. The report identifies that projected demand for water in Dublin alone is expected to increase by over 50% by 2050*”<sup>xxv</sup>. This statement was baseless. On the contrary, the report had concluded that projected demand for water in Dublin was expected to increase by 31% by 2050 (from 539.3Ml/d in 2011 to 706.1Ml/d in 2050 assuming average demand, or from 611.5Ml/d in 2011 to 801.3Ml/d in 2050 assuming the 20%-increased “peak” demand – using either of these demand scenarios the increase is 31%). **Irish Water misled the public, the media, ministers, senators, TDs and councillors about the need for this project.**

The prior public consultation period is therefore invalid and fresh consultation is required.

**Shannon vs groundwater**

In a country with more wet days than dry<sup>xxvi</sup> one would assume, if Dublin does at some point in the future need a supplementary raw water source, that groundwater (i.e. wells) would be at the top of the list. Groundwater supplies between a quarter and a third of Ireland’s tap water<sup>xxvii</sup> – and 30% of London’s tap water<sup>xxviii</sup> - and yet in Dublin groundwater is barely used as a water source.

However, in the early stages of this process, Irish Water disregarded groundwater as a supplementary water source option on the basis of incorrect maths among other things (see below).

Having dismissed groundwater (along with all other options) Irish Water is now pushing ahead with the Shannon scheme under which not a drop of water can be delivered until the mega-project is completed in up to 10 years time<sup>xxix</sup>. Execution risk (on build-time and cost) will be high – London’s water supplier recently stated: “*the uncertainty and hence risk associated with a resource option generally increase with the size and complexity of the project*”. If, at the end of that time, it emerges that Irish Water’s forecasted “water demand” was indeed too high then up to EUR724 per Irish household will have been wasted on a cross-country mega-pipeline that was never needed.

*By contrast, groundwater sources can be developed incrementally if and when the need develops. Groundwater extraction is far less expensive than the Shannon option, brings **reduced exposure to water contamination risks** as water sources are diversified rather than all coming from one supply as is the case with the Shannon project, and drilling wells is something in which we have hundreds of years of experience.*

### **Groundwater was dismissed on the basis of incorrect maths**

The only report into groundwater was a *desktop* report (i.e. office-based, not field-based) commissioned by DCC back in 2008<sup>xxx</sup>. The author was forced to rely on other peoples’ previous (and not-directly-relevant) studies. Not a single borehole (test or otherwise) has been drilled. The report was bizarrely constrained in many ways, including that it was only allowed to consider groundwater sources within an 80km *radius of central Dublin* (as opposed to within an 80km range of the supply area, which would have been logical: water only needs to be piped as far as the nearest water pipe network in order to be available to consumers).

The report itself stated more than once that it was making “*conservative*” estimates of groundwater availability in the study area, and even the Geological Survey of Ireland (Ireland’s main authority on groundwater) made a submission during consultation for this project that “*the use of groundwater should not be overlooked...it has a number of advantages over the use of surface water. It is a viable and widely available resource that would be relatively inexpensive to develop at a local level*”<sup>xxxi</sup>.

When Irish Water took this project on from DCC not only did it fail to commission a fresh groundwater report but further, in its own review of the old report<sup>xxxii</sup>, it failed to notice that interim events (among other things) had resulted in the report’s original conclusion being factually incorrect. A “*resource and distance threshold*” test set out in the report<sup>xxxiii</sup> (to assess whether an aquifer was sufficiently large/local to provide water to the supply area) was applied incorrectly: one of the limbs of the test required calculation of the distance from the aquifers to the “*source of demand*” or “*point of distribution/use*” – i.e. the distance from the aquifer to the supply area/distribution network.

Instead, when it did its calculations for that limb of the test, it accidentally measured the distance from the aquifers to the *centre of Dublin*. So aquifers that were close to and even within the proposed supply area were incorrectly dismissed because they were not close enough to downtown Dublin. Indeed, one “regionally important” aquifer that actually lay *within* the supply area and pipe network, close to Kildare, was dismissed after application of the threshold test partly as a result of being 53km from central Dublin.

This error led to the conclusion that only 6 out of the 19 aquifers it was considering were appropriately positioned to be used for the supply area - those aquifers could only produce 125Ml/d worth of water<sup>xxxiv</sup>. If Irish Water had done its review correctly (including taking account of the now-expanded proposed supply area and the proposed Meath/Louth water trade) it would have realised that 11 aquifers satisfied the threshold test (not just 6) taking the “developable resources” from 125Ml/d to 166Ml/d (an extra 33%). **Instead, it concluded that only 125Ml/d was available and groundwater was dismissed on this factually incorrect basis.**

### **Future new water supply options**

If at some point in the future Dublin does need a supplemental supply of raw water there are likely to be options available that weren’t available for consideration in this process – the technology and options in this sector are evolving rapidly, for example:

- Environmental flow replacement: this innovative concept was proposed to Irish Water during consultation as an option to increase raw water supply at Leixlip water treatment plant. It was dismissed mainly because (i) it was considered only on the (unrealistic) basis of replacing the entirety of the flow, and (ii) to execute would have involved pumping wastewater (from a nearby wastewater treatment plant) 8km to an alternative sewage system “*at very significant capital and operational cost*” (unquantified). Irish Water may consider revisiting this in future on the basis of (i) replacing part (rather than all) of the flow - even 50% would provide 87Ml/d which is significant, and (ii) real cost estimates for sewage redirection.
- Aquifer Storage and Recovery (ASR): Thames Water (London’s water supplier) is currently carrying out a £3.2million trial of ASF, an innovative groundwater option whereby water is pumped into, and stored in, an aquifer when water is plentiful and then recovered in times of need.
- Water re-use: The European Commission is actively encouraging member states to adopt water reuse and is currently working on legislative/other instruments to increase its use. It stated (in 2016): “*The potential role of treated wastewater reuse as an alternative source of water supply is now well acknowledged and embedded within European and national strategies. Water reuse is a top priority area ...*”<sup>xxxv</sup>. Feasibility studies into water reuse are currently being carried out by multiple UK water suppliers.
- Desalination: The costs of desalination are coming down all the time – Irish Water already concluded that desalination would have been cheaper to build (capital expenditure or CAPEX) than the proposed Shannon option<sup>xxxvi</sup>, and the operating expenditure (OPEX) is constantly being

reduced as technology improves – Professor Raphael Semiat, one of the world’s leading experts in desalination, stated in 2015 that “*pumping a cubic metre of fresh water distances of more than 200km requires more energy than desalinating the same amount of seawater. In addition, many [desalination] plants produce the bulk of their water at night when there is less demand for electricity, and thus utilize power that would otherwise go to waste*”<sup>xxxvii</sup>. It is possible that Irish Water’s assessment of desalination is already out of date, and that it might now be cheaper than the Shannon option on both CAPEX and OPEX.

### **“Benefit corridor”**

The Need Report (and particularly the Water Demand Review at Appendix C to the Need Report) introduced the notion of what it termed a “benefit corridor”. This concept was misrepresented, the data used was variously incomplete and incorrect and many of the calculations made were fundamentally flawed (in some cases, yet again, involving basic mathematical errors)<sup>xxxviii</sup>. Just a few of the flaws of the “benefit corridor” analysis are set out here.

Detailed analysis was provided in relation to the predicted 2050 water deficit (i.e. predicted water demand minus predicted water available from existing sources) for the Dublin water supply area<sup>xxxix</sup>. No such analysis was provided for the benefit corridor and no attempt was even made to calculate a predicted deficit. Instead, for the benefit corridor, the report calculated only the potential 2050 water demand and “assumes total retirement of existing sources”<sup>xl</sup> notwithstanding that (a) many of them were perfectly good sources, and (b) at the very moment that the Need Report was published Irish Water was investing in several of those very schemes. Indeed of the three North Tipperary supply schemes identified two were, at the time, at the “continue in construction” phase of capital investment by Irish Water (see the Irish Water Capital Investments 2014-2016 list<sup>xli</sup>). Irish Water’s investment programmes at three of the water supply schemes that the Need Report purportedly proposes to retire have since been completed, at a cost of over EUR12million<sup>xlii</sup>.

Notwithstanding that the figures calculated for the Dublin area and those for the benefit corridor related to entirely different things - for the Dublin area it was a water deficit (of 214.7Ml/d); for the benefit corridor it was a potential total water demand (of 99Ml/d assuming a Shannon source) - they were added together to come to a misleading “total production requirement of a new source” of 313.7Ml/d<sup>xliii</sup>.

The benefit corridor analysis identified a handful of water supply schemes in each of five counties (North Tipperary, Offaly, Westmeath, Laois and Meath) that it considered could possibly be supplied by water from the new source. The total number of people supplied by those schemes in 2012 was 168,050<sup>xliv</sup>. However the Need Report repeatedly cites the population of the benefit corridor at 2011 as being 533,984 and makes various predictions and calculations on the basis of this number<sup>xlv</sup> – however, this misleading number is in fact the *total populations of the five counties*, not the number of people being supplied by the schemes that it proposes to replace, as is implied.

Many water supply schemes across Ireland still have very serious problems: 472 drinking water plants fail WHO water safety risk tests, 180,000 households are considered at risk of lead exposure, 23,000 people are on “boil water” notices<sup>xlvi</sup>. The EPA produces a regularly updated “remedial action list” of water supplies across the country known to be “at risk” in relation to which EPA is requiring Irish Water to take corrective action (the most common action required is upgrade of water treatment plant). Of the 119 schemes on the EPA’s 2016 Q1 remedial action list (11 of which are on a full or partial boil water notice or a water restriction) not a single one is slated to be replaced as part of the “benefit corridor”. Not a single one of the schemes identified for inclusion in the benefit corridor has a raw water deficit once local water sources are taken into account.

If Irish Water choose not to proceed with the Shannon project it will have a significant portion of the EUR 1.2billion budget available to invest in/consolidate water infrastructure in the places that actually need it most.

### **Conclusion**

**The Shannon project needs to be put on hold immediately and re-assessed on the basis of a correctly framed “demand” prediction taking account of improvements to Dublin’s water infrastructure and thorough, accurate investigation of groundwater.**

**It is an ill-conceived project that will almost certainly in retrospect turn out to be a White Elephant and a huge waste of money – at which point the calculation errors made in this process will come into sharp focus indeed.**

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<sup>i</sup> Water Supply Project Eastern and Midlands Region Preliminary Options Appraisal Report November 2015 (“POAR”) Main Report page 102 – constituting CAPEX of up to EUR900m, OPEX of up to EUR300m amounting to a TOTEX of up to EUR1,200m.

<sup>ii</sup> There are 1,658,243 households in Ireland (2011 census, as per [www.cso.ie](http://www.cso.ie)); EUR1.2billion divided by 1,658,243 is EUR724 per household.

<sup>iii</sup> Water Supply Project Eastern and Midlands Region Project Need Report February 2015 (“Need Report”) page 26.

<sup>iv</sup> OECD (2016), *Water Governance in Cities*, OECD Studies on Water, OECD Publishing, Paris.

<sup>v</sup> Water Supply Project – Eastern and Midlands Region, Water Supply Options Working Paper June 2015 (“WSOWP”) Appendix F, page 12.

<sup>vi</sup> The area proposed to be supplied is “the metropolitan area of Dublin and surrounding environs” frequently referred to in the reports as the “Water Supply Area” and encompassing most of county Dublin, 82% (by population) of Kildare, half of Wicklow by population and 12% of Meath by population. This “water supply area” does NOT encompass the mooted “benefit corridor”.

<sup>vii</sup> <http://www.dublincity.ie/main-menu-services-press-and-news-read-press-release-press-releases-2013-press-releases-october-2-12>

<sup>viii</sup> <http://www.irishtimes.com/news/environment/restrictions-due-to-wrong-kind-of-water-1.1578295>

<sup>ix</sup> approx. EUR30m on Leixlip and EUR100m on Ballymore Eustace, increasing capacity by 80Ml/d at Leixlip and by 82Ml/d at Ballymore Eustace:

<https://www.epa.ie/pubs/advice/drinkingwater/epadrinkingwaterauditreports/Ballymore%20Eustace.pdf>

<http://www.engineersjournal.ie/2015/11/24/development-of-irelands-largest-water-treatment-plant-facilitates-future-growth-for-the-dublin-region/>

<http://www.water.ie/news/irish-water-welcomes-open/>

<sup>x</sup> OECD (2016), *Water Governance in Cities*, OECD Studies on Water, OECD Publishing, Paris.

<sup>xi</sup> Greater Dublin Water Supply – Major Source Development, 31/05/2006 (the “2006 Report”), Appendix A (Demand/Supply projections 2005/2011/2031 – Greater Dublin Area), page 13.

[http://s3.amazonaws.com/zanran\\_storage/www.epa.ie/ContentPages/2908383.pdf](http://s3.amazonaws.com/zanran_storage/www.epa.ie/ContentPages/2908383.pdf)

<sup>xii</sup> February 2015 Water Demand Review (Appendix C to the Need Report) (“Water Demand Review”), page 35.

<sup>xiii</sup> See page 26 of the Water Demand Review.

<sup>xiv</sup> See page 15 Section 3 (Current and Future Demand for Water) of the Main Report, Thames Water Final Water Resources Management Plan 2015-2040

[http://www.thameswater.co.uk/tw/common/downloads/wrmp/WRMP14\\_Section\\_3.pdf](http://www.thameswater.co.uk/tw/common/downloads/wrmp/WRMP14_Section_3.pdf)

<sup>xv</sup> Environmental Protection Agency (Office of Environmental Enforcement)

<https://www.epa.ie/pubs/advice/drinkingwater/epadrinkingwaterauditreports/Ballymore%20Eustace.pdf>

Also:

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<http://www.engineersjournal.ie/2015/11/24/development-of-irelands-largest-water-treatment-plant-facilitates-future-growth-for-the-dublin-region/>

<sup>xvi</sup> See page 30 of the Need Report which contains a table setting out the production capacity at the various water treatment plants serving the Water Supply Area of Dublin and which states that this “*assumes that raw water conditions, treatment facilities, pumping plant and transfer pipework, are all functioning at full capacity*”.

<sup>xvii</sup>

<http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=tps00002&plugin=1>

<sup>xviii</sup> See page 35 of the Water Demand Review.

<sup>xix</sup> See page 14 of the Water Demand Review: “*Jacobs-Tobin also undertook an exercise to sense check these findings for average PCC. This consisted of identifying validated water meter locations, aligned with small residential areas in North Dublin and Kildare, and utilising information on population numbers, occupancy rates and numbers of households from the CSO’s Small Area Population Statistics and calculating the average PCC based on the total average water consumption for each area. The average PCC figures were found to be in the range of 90.6 - 104.1 l/hd/d...*”.

<sup>xx</sup> See pages 6 and 39 of Section 3 (Current and Future Demand for Water) of the Main Report, Thames Water Final Water Resources Management Plan 2015-2040.

[http://www.thameswater.co.uk/tw/common/downloads/wrmp/WRMP14\\_Section\\_3.pdf](http://www.thameswater.co.uk/tw/common/downloads/wrmp/WRMP14_Section_3.pdf)

<sup>xxi</sup> See page 51 of Diageo’s Proposed Brewery Development St. James’s Gate Environmental Impact Statement Volume 2 – Main Report, December 2011.

<sup>xxii</sup> See page 35 of the Need Report: number of households predicted to increase from 618,460 in 2011 to 1,184,839 in 2050.

<sup>xxiii</sup> See Table 12.1 of Appendix A to the 2006 Report.

<sup>xxiv</sup> See page 35 of the Need Report.

<sup>xxv</sup> See the appendices to Appendix A to the WSOWP.

<sup>xxvi</sup> <http://www.met.ie/climate/rainfall.asp>

<sup>xxvii</sup> <http://www.dcenr.gov.ie/natural-resources/en-ie/Geological-Survey-of-Ireland/Pages/Groundwater.aspx>

<sup>xxviii</sup> <http://www.thameswater.co.uk/media/press-releases/18509.htm>

<sup>xxix</sup> <http://www.irishtimes.com/news/environment/dublin-area-faces-ten-more-years-of-water-shortages-1.1578441>

<sup>xxx</sup>

<https://www.dublincity.ie/sites/default/files/content/WaterWasteEnvironment/WaterSupplyProjectDublinRegion/WaterSupplyProjectDublinRegion/Documents/The%20Plan%20Appendix%20C.pdf> (“Groundwater Report”).

<sup>xxxi</sup> WSOWP Appendix F, page 12.

<sup>xxxii</sup> See Appendix B1 contained within Appendix B to the WSOWP.

[http://www.watersupplyproject.ie/wp-content/uploads/2015/05/150525WSP1\\_AppendixBSource\\_A011.pdf](http://www.watersupplyproject.ie/wp-content/uploads/2015/05/150525WSP1_AppendixBSource_A011.pdf)

<sup>xxxiii</sup> See page 57 of the Groundwater Report.

<sup>xxxiv</sup> See page 58 of the Groundwater Report.

<sup>xxxv</sup> <http://ec.europa.eu/environment/water/reuse.htm>

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xxxvi See page 102 of the POAR: the anticipated CAPEX for desalination was EUR500m-700m versus an anticipated CAPEX for the Shannon option of EUR700m-900m.

xxxvii <https://www.theguardian.com/technology/2015/may/27/desalination-quest-quench-worlds-thirst-water>

xxxviii See the tables at Appendix A to the Water Demand Review which contain blank fields, question marks indicating incomplete analysis, the words “no information available” and multiple inconsistencies with the analysis in the report itself (see, for example, the table entry for “scheme demand (future)” for Laois, with reference to the report itself).

xxxix See the Water Demand Review.

xl See Note 8 to Appendix A to the Water Demand Review.

xli [http://www.cer.ie/docs/000979/CER14417%20-%20B14%20-%20CIP%20Water%20Projects%20\(1\).pdf](http://www.cer.ie/docs/000979/CER14417%20-%20B14%20-%20CIP%20Water%20Projects%20(1).pdf)

xlii The completed programmes are Tullamore Water Supply Scheme Phase 5 (water treatment plant upgrade (Clonaslee)), Newport Regional Water Supply Scheme (water treatment plant and network upgrade) and Thurles Regional Water Supply Scheme (Contract 1(Network)). See also <https://www.water.ie/about-us/project-and-plans/our-projects/>

xliii See page 48 of the Water Demand Review.

xliv See the second table at Appendix A to the Water Demand Review – the total for the “population served” column is 224,895 from which must be deducted 36,200 (Louth) and 20,645 (South Westmeath (Athlone)) which the report concluded would NOT be supplied.

xlv See pages 14, 15 and 16 of the Need Report.

xlvi <http://www.wwt-ireland.net/wp-content/uploads/sites/97/2016/04/Gerry-Galvin.pdf>

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# Proposed Shannon water pipeline deemed a 'white elephant' and waste of tax payers' money



**Gillian Mills**

**Irish Water has published a *Final Options Appraisal Report* that identifies the 'Preferred Scheme' for a new source of water supply for the Eastern and Midlands Region. Parteen Basin on the Lower River Shannon has been identified as the 'emerging' preferred abstraction option with a '2km wide least constrained pipeline corridor' between the basin and Peamount in south County Dublin.**

A report commissioned by the River Shannon Protection Alliance however says the project is a 'white elephant' and a waste of money (see below).

While 'significant progress' has been made to water savings from leakage reductions and water conservation issues, the savings alone will not meet the long-term needs of the region that will require an additional 330 MI/d of water per day by 2050, it says.

'The maximum sustainable production of treated water from existing water sources and infrastructure within the Region do not have the capacity, resilience or connectivity to meet future demand.'

The Water Supply Project will deliver 'secure and sustainable

water' for over 40% of the country's population up to 2050.

'It will stimulate and facilitate new home developments and new job creation enabling construction and investment across the Eastern and Midlands Region.'

The project comprises 'sustainable' water extraction on the eastern shore of the Parteen Basin, Co Tipperary with water treatment at Birdhill. Treated water would then be piped 170km to a termination point reservoir at Peamount in south county Dublin.

During public consultation in late 2015, Irish Water examined options before proposing the preferred scheme, including seawater desalination from the Irish Sea at Fingal.

This proposal was rejected on the grounds that almost double the estimated costs; would require very high energy use, and have significant negative environmental impacts. In addition, desalination would not benefit towns and communities throughout the Region, states Irish Water:

Irish Water is holding a fourteen week public consultation (ends 14/02/17) for feedback and on the scope of what is being proposed for consideration in the Environmental Impact Statement.

**Details:**  
[www.watersupplyproject.ie](http://www.watersupplyproject.ie)

## River Shannon Protection Alliance responds

**Irish Water has signalled its intention to apply for planning permission to divert River Shannon water to Dublin for domestic, commercial and industrial consumption. It proposes to construct a 172 kilometre pipeline from the Parteen Basin to Dublin at a cost of €1.2bn, to transfer hundreds of millions of liters of water per day.**

The River Shannon Protection Alliance and other organisations, stakeholders

and interested parties are pledged to strongly oppose this extravagantly priced, and needless mega scheme, and are determined to expose it as a reckless, high risk and outmoded method of providing water to consumers.

In a forensic examination of Irish Water's plan, the *Kennedy Report* found that the project *will almost certainly prove to be an unnecessary White Elephant and a huge waste of Irish people's money.*

**Gerry Siney**

## SUMMARY OF THE KENNEDY REPORT COMPILED BY EMMA KENNEDY, SOLICITOR

[Full report at www.shannonprotectionalliance.ie](http://www.shannonprotectionalliance.ie)

**For some time Irish Water has been proposing to spend up to €1.2 billion (€724 for every Irish household) on the Shannon project - an ill-conceived scheme to pump water 172km from the Shannon to Dublin. This project will almost certainly prove to be an unnecessary White Elephant and a huge waste of the Irish people's money - at which point the many errors made in this process will come into sharp focus and those individuals who (explicitly or implicitly) rubber-stamped the project will be answerable to the Irish public.**

Irish Water predicts that, by 2050, Dublin will have a water deficit of 214.7MI/d (million litres per day) but the report on which this is based contained basic and fundamental errors, inappropriate methodology, and flawed assumptions. In fact, by 2050, there will almost certainly be a raw water surplus of over 100MI/d without having to increase existing raw water supplies at all.

Dublin has no shortage of raw water. Its problems (and its recent water crises) have been due to Victorian-era water infrastructure with a history of under-investment resulting in insufficient capacity to treat/deliver water.

Irish Water is finally investing in Dublin's water infrastructure - recent upgrades at two water treatment plants have drastically (and inexpensively) improved their water treatment capacity and more improvements are underway. Dublin has a total leakage rate in its water network of over 40% (comparable to Mexican cities) so for every litre of precious treated water put into Dublin's water pipes almost half of it ends up in the ground.

Leaks are now infinitely easier to

identify/fix post the introduction of meters. Water savings as a result of Irish Water's ongoing First Fix programme have far exceeded expectations, for a fraction of predicted costs.

Focus needs to remain on improving Dublin's ability to treat and deliver its plentiful supply of raw water: this scheme to source extra water from the Shannon is an unnecessary waste of money.

If, at some point in the future, Dublin does need more raw water then local groundwater is the best option. Groundwater is inexpensive, can be developed incrementally as needed (whereas the Shannon project is "all-or-nothing" - not a drop of water can be delivered until the €1.2 billion ten-year mega-project is completed), reduces contamination risk (sources are diversified, rather than all coming from one source as with the Shannon project) and drilling wells is something in which we have hundreds of years of experience.

Even the Geological Survey of Ireland (Ireland's main authority on groundwater) made a submission during consultation for this project that "the use of groundwater should not be overlooked...it has a number of advantages over the use of surface water. It is a viable and widely available resource that would be relatively inexpensive to develop at a local level" and yet during this process groundwater was dismissed as an option without a single test borehole having been drilled and Irish Water's review of the groundwater report contained basic mathematical errors that rendered its main conclusion wrong by 33%.

The Shannon project needs to be put on hold immediately and re-assessed on the basis of a correctly framed "demand" prediction taking account of improvements to Dublin's water infrastructure and thorough, accurate investigation of groundwater.



is that it is very unlikely that anywhere near full capacity would be required for a very long time. A more realistic figure would be that only one third of its capacity or 110 MLD would be required on average over its 25 year lifetime (33.3% load factor). This would mean that the figure above jumps to €9 million/MLD. The equivalent figure in this scenario in terms of cubic meter lifetime costs would be around €1/m<sup>3</sup>. This is extremely high for water treatment.

By way of comparison, the recent stand-alone extension to the Leixlip water treatment plant cost €30 million for 80 MLD or €0.375 million/MLD at full capacity. This is 8 times cheaper than the Shannon Scheme in a best-case scenario (from an Irish Water perspective) and around 16-20 times cheaper in a probable scenario. In documents exchanged with RSPA, Irish Water have stated that the average cost of repairing mains-side leaks is €7-8 million/MLD, while the figure given for customer-side leaks is €0.75 million/MLD. Why one is ten times the other is not explained

and does not seem credible. Regardless of this and according to these figures, fixing customer-side leaks is 4 times cheaper in a best-case scenario and 12 times cheaper in a probable scenario. For additional comparison, a recent 10 MLD groundwater supply scheme in Co. Waterford was carried out at a cost of around €0.65 million/MLD, nearly 5 times cheaper in a best-case scenario and 12-15 times cheaper in a probable scenario.

**GROUNDWATER SUPPLY**

In a previous report, consultants for DCC had identified over 100 MLD of groundwater as being available within an 80km radius of Dublin. One existing well alone in the Curragh aquifer has a documented yield of around 2.5 MLD. As far as RSPA are aware, Irish Water and DCC before them have not even drilled one dedicated exploration borehole to determine the potential yield from new groundwater sources in the GDA region; the supposedly in depth study that was undertaken was a desk study.

**RSPA OPPOSITION**

For a number of reasons ranging from the economic to the environmental, the RSPA opposes this project and will fight it all the way if necessary. Due to the continued operational regime of the ESB hydropower plant at Ardnacrusha, the old River Shannon below the Parteen Basin can already be described as a sick river. Detailed environmental arguments can be put forward against the proposed extraction at very low river levels, which is when the GDA would be requiring their greatest level of abstraction. What is the point of developing these arguments, though, if the economics of the project are so bad? For anyone who thinks that such a scheme would help alleviate the now frequent lower Shannon flooding, the effects of pumping water away through such a scheme would be miniscule, probably much less than 1% of peak river flows, and occurring at a time when the extra water will not be wanted in the system anyway.

**RSPA SOLUTIONS**

- Halt Shannon Scheme development.

- Fix 50 MLD worth of leaks in the GDA at a probable cost of €150 million or less; results within 1 to 3 years.
- Develop 50 MLD groundwater supplies in nearby regions (e.g. Curragh aquifer) at a probable cost of €75 million or less; results within 3 to 5 years.
- Once either of the above has been carried out, undertake the necessary overhaul of the vulnerable Vartry supply system.
- Upgrade any issues in current midland water supply plants as needed.
- Save in the region of €500 million in the medium term and spend this in other areas that are crying out for investment.
- Review the situation in 10 years time with numerous other flexible options available for further future water supplies.

Or, let Irish Water carry on with their current hyper-expensive single solution Shannon Scheme that would be unlikely to deliver one drop of water for at least another 7 years, although more likely 10 years.

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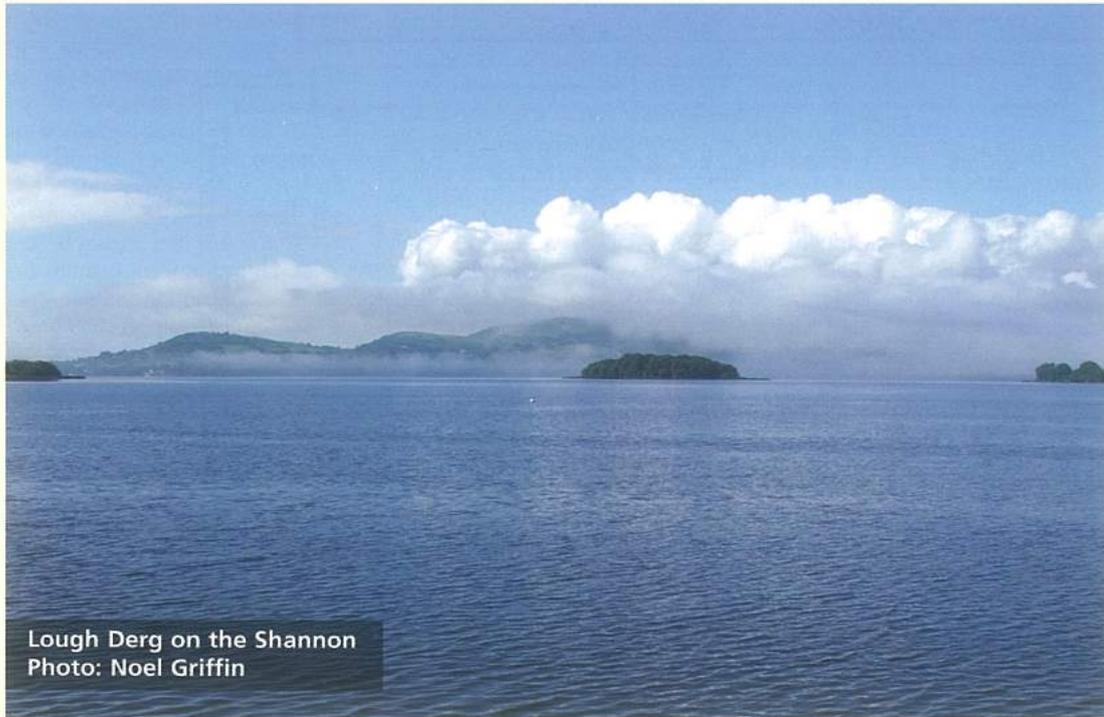
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# IRISH WATER'S SHANNON SCHEME FIGURES DO NOT MAKE SENSE

By River Shannon Protection Alliance (RSPA)



Lough Derg on the Shannon  
Photo: Noel Griffin

## DEFINITIONS

Water supply is measured in megalitres per day (MLD). 1 MLD=1,000 cubic meters. For comparison, a standard Olympic size swimming pool is normally considered to be 2,500m<sup>3</sup>. A combination of capital cost (infrastructure spending plus financing costs) and operational cost, divided by the amount of water delivered in a project lifespan (25 years in this case) gives the lifetime cost of water delivered in €/m<sup>3</sup> or, alternatively, if comparing investment options, €/MLD (delivered). The discount rate used for such public infrastructure projects is 5%. The capacity of a treatment plant refers to its maximum output in MLD, while the load factor refers to how much is actually delivered in percentage terms within a given time frame.

Raw water is the water that enters a treatment plant and treated water is what exits the plant and is fed into the mains distribution network. The treatment process itself is straightforward; involving coagulation, sedimentation, filtration, chlorination, fluoridation, and sometimes UV light. Surface water relates to rivers and lakes while

groundwater is contained within the ground and accessed by wells.

## DEMAND

Demand in the Greater Dublin Area (GDA), including large parts of Kildare is around 540 MLD and it took 1,000 years or so to reach this figure. According to Irish Water's figures about one third of this figure or about 180 MLD is due to leakage from both the distribution (mains) side and customer side. Future water demand studies carried out by consultants acting for Dublin City Council (DCC) greatly underestimated requirements in the early 1990s, and overestimated requirements in the mid 2000s, based on unsustainable Celtic Tiger growth rates.

A study in 2006 predicted GDA demand in 2015 would be 615 MLD, when in fact it had plateaued since 2007 at around 540 MLD. In such a short space of time the presumably expensive consultants were out by around 75 MLD in their estimations. A number of the people involved in this now work for Irish Water.

In the meantime, and contrary to what many leading figures are saying, there has been a lot of investment into securing additional supply with a major stand-alone 80 MLD extension to the Leixlip water treatment plant finished in 2014, and also a 40 MLD plant on the River Barrow near Athy finished in 2013. This should bring the total available capacity figure up to around 660 MLD; with the main sources being Ballymore Eustace at 318 MLD, Leixlip at 215 MLD, Varty at 75 MLD, Ballyboden at 16 MLD, and the River Barrow at 40 MLD.

## SHANNON SCHEME

The whole idea for a new River Shannon supply source for the GDA comes from this now discredited work in the mid 2000s where a figure of 300 MLD was considered to be necessary for any new source. As the intervening years have shown, there is no reason for any one particular raw water supply option to have to be able to provide such a high figure – it is nonsensical in the current context. Unperturbed, the powers that be, who now reside in Irish Water, have ploughed ahead on this one option,

ignoring a broad range of more flexible and cost-effective supply-side and demand-side solutions.

A soon-to-be-announced final option chosen by Irish Water is to treat and pipe water around 150km from the Parteen Basin on the River Shannon to the GDA network. The capacity of the scheme is said to be 330 MLD. This will probably have a capital cost in the region of €800M with a 25 year operational cost of €200M, so a lifetime cost of €1 billion or so. In fact, very significant amounts of money are already being spent. According to [www.cer.ie](http://www.cer.ie), Irish Water's allocation to the planning and business case review for the Shannon Scheme between 2014-2016 is €6.96M million, presumably much of which is going on consultancy fees.

In order to justify the scale of the project, Irish Water has decided to think in terms of a 'National Water Spine' and 'Benefitting Corridor'. At present, there is no raw water supply issue in the midlands and any local water treatment issues are due to the poor allocation of resources and historic underinvestment so the RSPA consider this appendage to the overall project to be a red herring. Irish Water have claimed that the Shannon Scheme will reduce water supply risks to these areas but the RSPA does not believe that a singular source for much of the country represents less of a risk than multiple sources. What if something goes wrong with the proposed Shannon Scheme raw water source or plant infrastructure?

## ECONOMICS

If we divide the €1B above by the number of households in Ireland at around 1.6 million, we get a figure close to €600 per household towards this one scheme. This is a major investment, so let us see how the figures compare to other options. If we take the best case scenario of the Shannon Scheme operating at full capacity, the figures work out at around €3 million/MLD. The reality, though,

## THE SHANNON PROJECT: A SUMMARY

**Irish Water is proposing to spend up to EUR1.2billion<sup>i</sup> (EUR724 for every Irish household<sup>ii</sup>) on the Shannon project - an ill-conceived scheme to pump water 172km from the Shannon to Dublin. This project will almost certainly prove to be an unnecessary White Elephant and a huge waste of the Irish people's money - at which point the many errors made in this process will come into sharp focus and those individuals who (explicitly or implicitly) rubber-stamped the project will be answerable to the Irish public.**

- Irish Water predicts that, by 2050, Dublin will have a water *deficit* of 214.7Ml/d <sup>iii</sup>(million litres per day) but the report on which this is based contained basic and fundamental errors, inappropriate methodology, and flawed assumptions. In fact, by 2050, there will almost certainly be a water *surplus* of over 100Ml/d without having to increase existing raw water supplies at all.
- Dublin has no shortage of *raw* water. Its problems (and its recent water crises) have been due to Victorian-era water infrastructure with a history of under-investment resulting in insufficient capacity to *treat/deliver* water. Irish Water is finally investing in Dublin's water infrastructure - recent upgrades at two water treatment plants have drastically (and inexpensively) improved their water treatment capacity and more improvements are underway. Dublin has a total leakage rate in its water network of over 40% (comparable to Mexican cities<sup>iv</sup>) so for every litre of precious treated water put into Dublin's water pipes almost half of it ends up in the ground. Leaks are now infinitely easier to identify/fix post- the introduction of meters. Focus needs to remain on improving Dublin's ability to treat and deliver its plentiful supply of raw water: this scheme to source extra water from the Shannon is an unnecessary waste of money.
- If, at some point in the future, Dublin does need more raw water then local groundwater is the best option. Groundwater is inexpensive, can be developed incrementally as needed (whereas the Shannon project is "all-or-nothing" - not a drop of water can be delivered until the EUR1.2billion ten-year mega-project is completed), reduces contamination risk (sources are diversified, rather than all coming from one source as with the Shannon project) and drilling wells is something in which we have hundreds of years of experience. Even the Geological Survey of Ireland (Ireland's main authority on groundwater) made a submission during consultation for this project that "*the use of groundwater should not be overlooked...it has a number of advantages over the use of surface water. It is a viable and widely available resource that would be relatively inexpensive to develop at a local level*"<sup>v</sup> and yet during this process groundwater was dismissed as an option without a single test borehole having been drilled and Irish Water's review of the groundwater report contained basic mathematical errors that rendered its main conclusion wrong by 33%.

**The Shannon project needs to be put on hold immediately and re-assessed on the basis of a correctly framed "demand" prediction taking account of improvements to Dublin's water infrastructure and thorough, accurate investigation of groundwater.**

## THE SHANNON PROJECT

Irish Water is proposing to embark on a mega-project costing up to EUR1.2billion (**EUR 724 for every Irish household**) to pump 330 million litres of water every day (million litres per day is abbreviated to “Ml/d”) from the River Shannon (at Parteen Basin) along 172km of enormous pipes to Dublin<sup>vi</sup>.

### **Dublin has plenty of raw water – insufficient treated water is the problem**

Dublin has no shortage of raw water. Dublin’s recent water crises were not caused by insufficient *raw* water availability, but rather by Dublin’s limited capacity to produce and deliver *treated* water. At the time of the Ballymore Eustace crisis in 2013 (which imposed “*very severe*” water restrictions on Dublin) Irish Water stated: “*It should be stressed that there is no problem...with storage levels of untreated/raw water*”<sup>vii</sup> and the Irish Times made the point even clearer: “*The problem when water isn’t flowing from the tap is rarely one of a lack of water. The Poulaphouca reservoir [at Ballymore Eustace] stores enough water to last for between 120 and 180 days depending on rainfall, which rates well by international standards. It is in the capacity to treat that water that Dublin’s problems lie.*”<sup>viii</sup>

Dublin’s water treatment plants and supply infrastructure are extremely old (many pipes and treatment plants date back to Victorian times) and have been subject to a history of under-investment. Upgrading water treatment plants is a comparably inexpensive thing to do. Since the Ballymore Eustace crisis, upgrades at two of Dublin’s water treatment plants (Ballymore Eustace and Leixlip) have drastically improved their capacity to *treat* water at a cost of just **EUR130million for an additional 162Ml/d of treated water**<sup>ix</sup> - vastly less expensive than the Shannon option costing up to **EUR1.2billion for 330Ml/d**. Among other ongoing/proposed improvements to Dublin’s water infrastructure Irish Water is in the process of carrying out major upgrades of the Vartry water treatment plant and the Vartry/Stillorgan reservoirs and is planning a strategic watermain link between Leixlip and Saggart. All of this vital investment addresses the need to improve Dublin’s capacity to produce and deliver *treated* water.

### **Dublin leakage**

Dublin has a total leakage rate in its water system of over 40% on Irish Water’s figures. So for every litre of treated water that is put into Dublin’s water supply system almost half of it ends up wasted in the ground. London is currently undertaking a major replacement of its Victorian water mains - its leakage rates of 26% in 2012 were still deemed unacceptable.

In 2016 the OECD reported leakage rates in 43 cities (not including Dublin) worldwide: only 4 were over 40% (all of them in Mexico)<sup>x</sup>.

Previous commitments on addressing leakage have not been met. In 2006 Dublin County Council (DCC) predicted that distribution leakage would be reduced by 9Ml/d over six years (from 169Ml/d in 2005 to 160Ml/d in 2011) and described

this as a “*realistic achievable target*”<sup>xi</sup> – instead, by 2011 the leakage had increased by 9Ml/d to 178Ml/d<sup>xii</sup>.

Identifying and fixing leaks is now infinitely easier post- the introduction of meters. Before meters were introduced it was very hard to know that a leak actually existed unless it was visibly obvious – meters have completely changed that. However, while Irish Water claims that it will reduce leaks going forward, they state simultaneously that doing so will “*require a significant level of asset replacement and funding, which may not be available within this timeframe*”<sup>xiii</sup> – **funding should be made available for fixing leaks as a priority.**

**Irish Water’s predicted 2050 water “deficit” is wrong**

This project is being justified on the basis of Irish Water’s 2015 Need Report which attempted to predict the Dublin water supply area’s water demand to 2050. The “water supply area” encompasses most of county Dublin, 82% of Kildare (by population), half of Wicklow (by population) and 12% of Meath (by population). It predicted a 2050 “production requirement” of 872.7Ml/d but only a production capacity of 658Ml/d, and as such a deficit of 214.7Ml/d. However, key parts of the calculations were wrong.

This table shows the breakdown of the components used for Irish Water’s prediction of the 2050 deficit, alongside corrected (for peaking allowance/existing sources capacity) and more realistic (for domestic demand, non-domestic demand and strategic industrial allowance) predictions as explained below.

**So, just by correcting two errors and making three adjustments to Irish Water’s predictions (and these adjustments are arguably still very aggressive) there would be a predicted water surplus of 115.9Ml/d in 2050 without having to increase existing raw water capacity at all.**

<b>Component</b>	<b>Irish Water Need Report predicted 2050 figures (in Ml/d)</b>	<b>Adjusted predicted 2050 figures (in Ml/d)</b>
Domestic demand	260.7	194.6
Non domestic demand	181.1	164.2
Strategic industrial allowance	100.0	50.0
Customer side leakage	29.6	29.6
Supply side leakage	130.0	130.0
Operational water	4.7	4.7
Peaking allowance	95.2	0
Headroom and outage (15% on domestic demand, non domestic demand, customer side leakage and operational water)	71.4	59.0
<b>Production requirement</b>	<b>872.7</b>	<b>632.1</b>
Less existing sources	658.0	748.0
<b>Demand/supply deficit</b>	<b>214.7 DEFICIT</b>	<b>115.9 SURPLUS</b>

### **Inappropriate “peaking factor” was included**

The demand predictions made by Irish Water in 2015 included a 20% “peaking factor” (amounting to 95.2Ml/d in 2050). The concept of a peaking factor in future raw water demand calculations is to ensure that sufficient raw water is available not just on days of average demand but also on days of extremely high demand, such as during very hot spells. This is important where treated water capacity is constrained by raw water availability – e.g. in areas where water is treated directly from raw water sources (rivers/wells) from which only a restricted amount of water can be extracted per day. However, in areas where raw water is stored in large reservoirs before being treated (as is the case in Dublin) *no* peaking factor should be included in predictions of future raw water need – in situations of higher than usual water demand there is always plenty of raw water available in the reservoir and the limiting factor is the water treatment capacity at the water treatment plant.

Thames Water (which supplies water to London among other places) makes this clear: *“We do not report on ADPW [average day peak week] demand for London. This is because peak demands in London can be met through the relatively large volume of surface water storage (reservoirs). The ability to meet peak demands is therefore not a resource availability issue...but dictated by treatment and transmission capabilities”<sup>xiv</sup>.*

The majority of the Dublin supply network is already backed-up by huge raw water reservoirs. If it emerges that, after infrastructure improvements, there remain some small pockets of the network that are not backed-up by raw water reservoirs then an *appropriate* peaking factor should be calculated for those limited areas *alone* - adding a blanket 20% peaking factor to the entirety of Dublin’s raw water demand, as Irish Water have done, is totally inappropriate. **This 95.2Ml/d “peaking factor” should never have been included in the 2015 demand calculation.**

### **Recently increased water treatment capacity was not taken into account**

The recent upgrade of the Ballymore Eustace water treatment plant took its maximum production capacity from 318Ml/d to be 400Ml/d<sup>xv</sup>. For some reason, when calculating the existing and predicted maximum production capacity of Dublin’s water treatment plants, the Need Report included a maximum production capacity of only 310Ml/d at Ballymore Eustace<sup>xvi</sup>. **Once this additional 90Ml/d of maximum water treatment capacity is taken into account the 2050 production capacity increases from 658Ml/d to 748Ml/d.**

### **Domestic demand prediction**

To calculate predicted domestic demand Irish Water multiplied the predicted population in 2050 by the predicted water use per head:  
Population: Eurostat (the European Union’s statistics body) predict that from 2015 to 2050 Ireland’s total population will increase by 362,000 people<sup>xvii</sup>; Irish Water predict that from 2011 to 2050 the population of the Dublin water supply area *alone* will increase by 638,000 people<sup>xviii</sup>. This would require all of

Eurostat's predicted Irish population growth to take place in the Dublin water supply area – zero growth in the rest of the country – *and* 276,000 people from around the country (roughly equivalent to the populations of Cork, Limerick and Galway) to migrate to the Dublin area.

Per Capita Consumption: On the basis of two prior studies, using data from Dublin's recent Domestic Metering Programme, Irish Water's consultants found that Dublin's *average* per capita consumption (PCC) of water in litres per head per day (l/hd/d) was in the range 90.6 l/hd/d to 104.1 l/hd/d<sup>xix</sup>. The middle of this range is 97.4 l/hd/d - however, for its predictions, the Need Report used a PCC of 125.5 l/hd/d (29% above the middle of the range).

If we take a slightly more realistic assumption of population growth (we use Irish Water's 2011 population figure as a base and add Eurostat's entire 2015-2050 predicted population growth for Ireland (so this assumes all of that growth takes place in the Dublin water supply area alone: zero growth in the rest of the country) - *and* that the equivalent of the entire population of Limerick (90,000 people) will migrate to the Dublin area) to give us a 2050 population figure of 1,968,247 then, using the *top* of the range for average PCC (104.1 l/hd/d) and using Irish Water's assumed 5% reduction in demand due to conservation measures (applied to the 2050 demand prediction) then the **predicted 2050 domestic demand would be 194.6Ml/d. Irish Water is predicting a 2050 domestic demand of 260.7Ml/d.**

### **Non-domestic demand prediction**

Irish Water is predicting a large increase in water demand for existing non-domestic sectors PLUS it is assuming that there will be an additional 100Ml/d of water demand from entirely new industries that it predicts will set up in Dublin between now and 2050.

Irish Water is predicting that non-domestic demand (covering the area's existing agricultural, commercial and industrial sector) will grow in line with projected population growth – i.e. that it will increase by 43% (from 126.5Ml/d in 2011 to 181.1Ml/d in 2050). It is interesting to note that, having undertaken a detailed econometric analysis, London's water supplier is predicting that London's non-domestic demand will actually *decrease* between now and 2040<sup>xx</sup> - they state: "*increases in water use from service industries (e.g. offices, call centres) are being offset by reductions in demand from non-service industries (e.g. industrial sites, breweries)*". High water demanding industries are constantly improving their water usage as can also be seen in Dublin - the St James Gate Brewery in Dublin, for example, has won multiple environmental awards in recent years for, among other things, its more efficient water use. However, even if we use Irish Water's methodology of growing non-domestic demand in line with population growth, but apply the more realistic predicted 2050 population figure of 1,968,247, the **predicted 2050 non-domestic demand would be 164.2Ml/d. Irish Water is predicting a 2050 non-domestic demand of 181.1Ml/d.**

On top of this prediction of significant growth in water demand from existing industries, Irish Water is *additionally* assuming that 100Ml/d will be needed for *entirely new* "high water demand" industries that it predicts will set up in Dublin

between now and 2050. This is a huge assumption – it assumes that the equivalent of **12 brand new St James Gate Guinness breweries will set up in Dublin in the next 34 years<sup>xxi</sup>**. We are not aware of any other water supplier in the British Isles that has made a provision like this in its water demand predictions. Arguably this provision should be removed altogether as being entirely inappropriate. However, if we assume that the equivalent of 6 entirely new St James Gate Guinness breweries will set up in Dublin in the next 35 years (which is still an ambitious assumption) then **the 2050 predicted demand for this element of the calculation would be 50MI/d (as opposed to the 100MI/d that Irish Water is predicting)**.

### **There are a plethora of other aggressive predictions in the 2015 Need Report**

For example, the prediction that by 2050 Dublin will contain almost twice as many households as it does today<sup>xxii</sup> and that each of those new homes will leak to the same degree as Dublin's existing (much older) housing stock. This disregards the facts that in order to build so many new homes a vast majority of them would need to be in apartment blocks which inherently have much lower leakage (one delivery pipe serves multiple properties so leakage is a fraction of that in homes served by their own delivery pipe) and that they would be built to much more water-efficient standards.

### **This project has a history of over-estimating future water demand due to incorrect data/methodology – and yet the current 2015 predictions use an even more aggressive calculation model than the previous ones**

In 2006 consultants for DCC (Irish Water's predecessor in this project) also published predictions of future water demand. This included the prediction that average day demand would increase from 515.1MI/d in 2005 to 623.8MI/d in 2011<sup>xxiii</sup>. According to Irish Water, in 2011 the average demand was still only 539.3MI/d<sup>xxiv</sup> - so **there was an increase in demand of only 24.2MI/d (compared to the 108.7MI/d they had predicted). To put it another way, the actual growth was only 22% of the growth that they had predicted**. Tempting as it may be to explain away this huge discrepancy by pointing to the economic slowdown, it was primarily because the *methodology* (on non-domestic demand) and *input data* on PCC turned out to be incorrect. They used an estimated PCC of 145l/hd/d - 49% above Dublin's actual average PCC of 97.4 l/hd/d – which rendered the domestic demand forecast incorrect and used a bizarre “zoning” approach to predict non-domestic demand (which was later discarded at the time of the 2015 Need Report).

Irish Water's 2015 demand predictions address some of the errors made in DCC's 2006 predictions: by 2015 accurate data was available for PCC as opposed to the estimates that had to be used in the past, and the 2015 report abandoned the bizarre “land-zoning” approach. However, instead of assuming the same basic model for calculating projected water demand as the 2006 report, the **2015 Need Report introduced additional “demand” elements to the calculation that had not been included in 2006**. For example, the 2006 predictions (i) included a 12.5% “peaking factor” and a 50MI/d “security of supply” (outage) provision, and (ii) noted that, alongside predicted growth in existing non-domestic demand

(covering the area’s agricultural, commercial and industrial businesses) entirely new “high water demand” industries might move to Dublin – but concluded that water demand from such possible new industries was already provided for within the 12.5% peak and 50Ml/d provisions. By contrast the 2015 Irish Water predictions for 2050 (i) include a 20% “peaking factor” and a 71.4Ml/d “headroom and outage” provision, and (ii) provide (in addition to predicted growth in existing non-domestic demand in line with population growth) 100Ml/d for the possibility of entirely new major “high water demand” industries moving to Dublin – see below.

DCC 2006 prediction model	Irish Water’s 2015 prediction model
<ul style="list-style-type: none"> <li>• 12.5% peaking factor</li> <li>• 50Ml/d “security of supply”</li> <li>• No separate provision for new “high water demand” industries</li> </ul>	<ul style="list-style-type: none"> <li>• 20% peaking factor</li> <li>• 71.4Ml/d “headroom and outage”</li> <li>• 100Ml/d provision for “high water demand” industries</li> </ul>

**So, despite its predecessor having hugely overestimated future water demand back in 2006, Irish Water is now taking an even more aggressive approach to calculating future water demand – only time will tell how wrong their current predictions will be.**

**Irish Water misled the media, the Dail and the public about Dublin’s future water need**

When the Need Report was published in March 2015, Irish Water issued press releases (to newspapers, television, radio and online media), published advertisements inviting the public to take part in the public consultation process, and wrote letters/emails to ministers, senators, TDs and councillors. Every single one of these contained the statement: “*Irish Water has published a report which sets out the pressing need for a new water supply source for the Eastern and Midlands Region of the country. The report identifies that projected demand for water in Dublin alone is expected to increase by over 50% by 2050*”<sup>xxv</sup>. This statement was baseless. On the contrary, the report had concluded that projected demand for water in Dublin was expected to increase by 31% by 2050 (from 539.3Ml/d in 2011 to 706.1Ml/d in 2050 assuming average demand, or from 611.5Ml/d in 2011 to 801.3Ml/d in 2050 assuming the 20%-increased “peak” demand – using either of these demand scenarios the increase is 31%). **Irish Water misled the public, the media, ministers, senators, TDs and councillors about the need for this project.**

The prior public consultation period is therefore invalid and fresh consultation is required.

**Shannon vs groundwater**

In a country with more wet days than dry<sup>xxvi</sup> one would assume, if Dublin does at some point in the future need a supplementary raw water source, that groundwater (i.e. wells) would be at the top of the list. Groundwater supplies between a quarter and a third of Ireland’s tap water<sup>xxvii</sup> – and 30% of London’s tap water<sup>xxviii</sup> - and yet in Dublin groundwater is barely used as a water source.

However, in the early stages of this process, Irish Water disregarded groundwater as a supplementary water source option on the basis of incorrect maths among other things (see below).

Having dismissed groundwater (along with all other options) Irish Water is now pushing ahead with the Shannon scheme under which not a drop of water can be delivered until the mega-project is completed in up to 10 years time<sup>xxix</sup>. Execution risk (on build-time and cost) will be high – London’s water supplier recently stated: “*the uncertainty and hence risk associated with a resource option generally increase with the size and complexity of the project*”. If, at the end of that time, it emerges that Irish Water’s forecasted “water demand” was indeed too high then up to EUR724 per Irish household will have been wasted on a cross-country mega-pipeline that was never needed.

*By contrast, groundwater sources can be developed incrementally if and when the need develops. Groundwater extraction is far less expensive than the Shannon option, brings **reduced exposure to water contamination risks** as water sources are diversified rather than all coming from one supply as is the case with the Shannon project, and drilling wells is something in which we have hundreds of years of experience.*

### **Groundwater was dismissed on the basis of incorrect maths**

The only report into groundwater was a *desktop* report (i.e. office-based, not field-based) commissioned by DCC back in 2008<sup>xxx</sup>. The author was forced to rely on other peoples’ previous (and not-directly-relevant) studies. Not a single borehole (test or otherwise) has been drilled. The report was bizarrely constrained in many ways, including that it was only allowed to consider groundwater sources within an 80km *radius of central Dublin* (as opposed to within an 80km range of the supply area, which would have been logical: water only needs to be piped as far as the nearest water pipe network in order to be available to consumers).

The report itself stated more than once that it was making “*conservative*” estimates of groundwater availability in the study area, and even the Geological Survey of Ireland (Ireland’s main authority on groundwater) made a submission during consultation for this project that “*the use of groundwater should not be overlooked...it has a number of advantages over the use of surface water. It is a viable and widely available resource that would be relatively inexpensive to develop at a local level*”<sup>xxxi</sup>.

When Irish Water took this project on from DCC not only did it fail to commission a fresh groundwater report but further, in its own review of the old report<sup>xxxii</sup>, it failed to notice that interim events (among other things) had resulted in the report’s original conclusion being factually incorrect. A “*resource and distance threshold*” test set out in the report<sup>xxxiii</sup> (to assess whether an aquifer was sufficiently large/local to provide water to the supply area) was applied incorrectly: one of the limbs of the test required calculation of the distance from the aquifers to the “*source of demand*” or “*point of distribution/use*” – i.e. the distance from the aquifer to the supply area/distribution network.

Instead, when it did its calculations for that limb of the test, it accidentally measured the distance from the aquifers to the *centre of Dublin*. So aquifers that were close to and even within the proposed supply area were incorrectly dismissed because they were not close enough to downtown Dublin. Indeed, one “regionally important” aquifer that actually lay *within* the supply area and pipe network, close to Kildare, was dismissed after application of the threshold test partly as a result of being 53km from central Dublin.

This error led to the conclusion that only 6 out of the 19 aquifers it was considering were appropriately positioned to be used for the supply area - those aquifers could only produce 125Ml/d worth of water<sup>xxxiv</sup>. If Irish Water had done its review correctly (including taking account of the now-expanded proposed supply area and the proposed Meath/Louth water trade) it would have realised that 11 aquifers satisfied the threshold test (not just 6) taking the “developable resources” from 125Ml/d to 166Ml/d (an extra 33%). **Instead, it concluded that only 125Ml/d was available and groundwater was dismissed on this factually incorrect basis.**

### **Future new water supply options**

If at some point in the future Dublin does need a supplemental supply of raw water there are likely to be options available that weren’t available for consideration in this process – the technology and options in this sector are evolving rapidly, for example:

- Environmental flow replacement: this innovative concept was proposed to Irish Water during consultation as an option to increase raw water supply at Leixlip water treatment plant. It was dismissed mainly because (i) it was considered only on the (unrealistic) basis of replacing the entirety of the flow, and (ii) to execute would have involved pumping wastewater (from a nearby wastewater treatment plant) 8km to an alternative sewage system “*at very significant capital and operational cost*” (unquantified). Irish Water may consider revisiting this in future on the basis of (i) replacing part (rather than all) of the flow - even 50% would provide 87Ml/d which is significant, and (ii) real cost estimates for sewage redirection.
- Aquifer Storage and Recovery (ASR): Thames Water (London’s water supplier) is currently carrying out a £3.2million trial of ASF, an innovative groundwater option whereby water is pumped into, and stored in, an aquifer when water is plentiful and then recovered in times of need.
- Water re-use: The European Commission is actively encouraging member states to adopt water reuse and is currently working on legislative/other instruments to increase its use. It stated (in 2016): “*The potential role of treated wastewater reuse as an alternative source of water supply is now well acknowledged and embedded within European and national strategies. Water reuse is a top priority area ...*”<sup>xxxv</sup>. Feasibility studies into water reuse are currently being carried out by multiple UK water suppliers.
- Desalination: The costs of desalination are coming down all the time – Irish Water already concluded that desalination would have been cheaper to build (capital expenditure or CAPEX) than the proposed Shannon option<sup>xxxvi</sup>, and the operating expenditure (OPEX) is constantly being

reduced as technology improves – Professor Raphael Semiat, one of the world’s leading experts in desalination, stated in 2015 that “*pumping a cubic metre of fresh water distances of more than 200km requires more energy than desalinating the same amount of seawater. In addition, many [desalination] plants produce the bulk of their water at night when there is less demand for electricity, and thus utilize power that would otherwise go to waste*”<sup>xxxvii</sup>. It is possible that Irish Water’s assessment of desalination is already out of date, and that it might now be cheaper than the Shannon option on both CAPEX and OPEX.

### **“Benefit corridor”**

The Need Report (and particularly the Water Demand Review at Appendix C to the Need Report) introduced the notion of what it termed a “benefit corridor”. This concept was misrepresented, the data used was variously incomplete and incorrect and many of the calculations made were fundamentally flawed (in some cases, yet again, involving basic mathematical errors)<sup>xxxviii</sup>. Just a few of the flaws of the “benefit corridor” analysis are set out here.

Detailed analysis was provided in relation to the predicted 2050 water deficit (i.e. predicted water demand minus predicted water available from existing sources) for the Dublin water supply area<sup>xxxix</sup>. No such analysis was provided for the benefit corridor and no attempt was even made to calculate a predicted deficit. Instead, for the benefit corridor, the report calculated only the potential 2050 water demand and “assumes total retirement of existing sources”<sup>xl</sup> notwithstanding that (a) many of them were perfectly good sources, and (b) at the very moment that the Need Report was published Irish Water was investing in several of those very schemes. Indeed of the three North Tipperary supply schemes identified two were, at the time, at the “continue in construction” phase of capital investment by Irish Water (see the Irish Water Capital Investments 2014-2016 list<sup>xli</sup>). Irish Water’s investment programmes at three of the water supply schemes that the Need Report purportedly proposes to retire have since been completed, at a cost of over EUR12million<sup>xlii</sup>.

Notwithstanding that the figures calculated for the Dublin area and those for the benefit corridor related to entirely different things - for the Dublin area it was a water deficit (of 214.7Ml/d); for the benefit corridor it was a potential total water demand (of 99Ml/d assuming a Shannon source) - they were added together to come to a misleading “total production requirement of a new source” of 313.7Ml/d<sup>xliii</sup>.

The benefit corridor analysis identified a handful of water supply schemes in each of five counties (North Tipperary, Offaly, Westmeath, Laois and Meath) that it considered could possibly be supplied by water from the new source. The total number of people supplied by those schemes in 2012 was 168,050<sup>xliv</sup>. However the Need Report repeatedly cites the population of the benefit corridor at 2011 as being 533,984 and makes various predictions and calculations on the basis of this number<sup>xlv</sup> – however, this misleading number is in fact the *total populations of the five counties*, not the number of people being supplied by the schemes that it proposes to replace, as is implied.

Many water supply schemes across Ireland still have very serious problems: 472 drinking water plants fail WHO water safety risk tests, 180,000 households are considered at risk of lead exposure, 23,000 people are on “boil water” notices<sup>xlvi</sup>. The EPA produces a regularly updated “remedial action list” of water supplies across the country known to be “at risk” in relation to which EPA is requiring Irish Water to take corrective action (the most common action required is upgrade of water treatment plant). Of the 119 schemes on the EPA’s 2016 Q1 remedial action list (11 of which are on a full or partial boil water notice or a water restriction) not a single one is slated to be replaced as part of the “benefit corridor”. Not a single one of the schemes identified for inclusion in the benefit corridor has a raw water deficit once local water sources are taken into account.

If Irish Water choose not to proceed with the Shannon project it will have a significant portion of the EUR 1.2billion budget available to invest in/consolidate water infrastructure in the places that actually need it most.

### **Conclusion**

**The Shannon project needs to be put on hold immediately and re-assessed on the basis of a correctly framed “demand” prediction taking account of improvements to Dublin’s water infrastructure and thorough, accurate investigation of groundwater.**

**It is an ill-conceived project that will almost certainly in retrospect turn out to be a White Elephant and a huge waste of money – at which point the calculation errors made in this process will come into sharp focus indeed.**

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<sup>i</sup> Water Supply Project Eastern and Midlands Region Preliminary Options Appraisal Report November 2015 (“POAR”) Main Report page 102 – constituting CAPEX of up to EUR900m, OPEX of up to EUR300m amounting to a TOTEX of up to EUR1,200m.

<sup>ii</sup> There are 1,658,243 households in Ireland (2011 census, as per [www.cso.ie](http://www.cso.ie)); EUR1.2billion divided by 1,658,243 is EUR724 per household.

<sup>iii</sup> Water Supply Project Eastern and Midlands Region Project Need Report February 2015 (“Need Report”) page 26.

<sup>iv</sup> OECD (2016), *Water Governance in Cities*, OECD Studies on Water, OECD Publishing, Paris.

<sup>v</sup> Water Supply Project – Eastern and Midlands Region, Water Supply Options Working Paper June 2015 (“WSOWP”) Appendix F, page 12.

<sup>vi</sup> The area proposed to be supplied is “the metropolitan area of Dublin and surrounding environs” frequently referred to in the reports as the “Water Supply Area” and encompassing most of county Dublin, 82% (by population) of Kildare, half of Wicklow by population and 12% of Meath by population. This “water supply area” does NOT encompass the mooted “benefit corridor”.

<sup>vii</sup> <http://www.dublincity.ie/main-menu-services-press-and-news-read-press-release-press-releases-2013-press-releases-october-2-12>

<sup>viii</sup> <http://www.irishtimes.com/news/environment/restrictions-due-to-wrong-kind-of-water-1.1578295>

<sup>ix</sup> approx. EUR30m on Leixlip and EUR100m on Ballymore Eustace, increasing capacity by 80Ml/d at Leixlip and by 82Ml/d at Ballymore Eustace:

<https://www.epa.ie/pubs/advice/drinkingwater/epadrinkingwaterauditreports/Ballymore%20Eustace.pdf>

<http://www.engineersjournal.ie/2015/11/24/development-of-irelands-largest-water-treatment-plant-facilitates-future-growth-for-the-dublin-region/>

<http://www.water.ie/news/irish-water-welcomes-open/>

<sup>x</sup> OECD (2016), *Water Governance in Cities*, OECD Studies on Water, OECD Publishing, Paris.

<sup>xi</sup> Greater Dublin Water Supply – Major Source Development, 31/05/2006 (the “2006 Report”), Appendix A (Demand/Supply projections 2005/2011/2031 – Greater Dublin Area), page 13.

[http://s3.amazonaws.com/zanran\\_storage/www.epa.ie/ContentPages/2908383.pdf](http://s3.amazonaws.com/zanran_storage/www.epa.ie/ContentPages/2908383.pdf)

<sup>xii</sup> February 2015 Water Demand Review (Appendix C to the Need Report) (“Water Demand Review”), page 35.

<sup>xiii</sup> See page 26 of the Water Demand Review.

<sup>xiv</sup> See page 15 Section 3 (Current and Future Demand for Water) of the Main Report, Thames Water Final Water Resources Management Plan 2015-2040

[http://www.thameswater.co.uk/tw/common/downloads/wrmp/WRMP14\\_Section\\_3.pdf](http://www.thameswater.co.uk/tw/common/downloads/wrmp/WRMP14_Section_3.pdf)

<sup>xv</sup> Environmental Protection Agency (Office of Environmental Enforcement)

<https://www.epa.ie/pubs/advice/drinkingwater/epadrinkingwaterauditreports/Ballymore%20Eustace.pdf>

Also:

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<http://www.engineersjournal.ie/2015/11/24/development-of-irelands-largest-water-treatment-plant-facilitates-future-growth-for-the-dublin-region/>

<sup>xvi</sup> See page 30 of the Need Report which contains a table setting out the production capacity at the various water treatment plants serving the Water Supply Area of Dublin and which states that this “*assumes that raw water conditions, treatment facilities, pumping plant and transfer pipework, are all functioning at full capacity*”.

<sup>xvii</sup>

<http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=tps00002&plugin=1>

<sup>xviii</sup> See page 35 of the Water Demand Review.

<sup>xix</sup> See page 14 of the Water Demand Review: “*Jacobs-Tobin also undertook an exercise to sense check these findings for average PCC. This consisted of identifying validated water meter locations, aligned with small residential areas in North Dublin and Kildare, and utilising information on population numbers, occupancy rates and numbers of households from the CSO’s Small Area Population Statistics and calculating the average PCC based on the total average water consumption for each area. The average PCC figures were found to be in the range of 90.6 - 104.1 l/hd/d...*”.

<sup>xx</sup> See pages 6 and 39 of Section 3 (Current and Future Demand for Water) of the Main Report, Thames Water Final Water Resources Management Plan 2015-2040.

[http://www.thameswater.co.uk/tw/common/downloads/wrmp/WRMP14\\_Section\\_3.pdf](http://www.thameswater.co.uk/tw/common/downloads/wrmp/WRMP14_Section_3.pdf)

<sup>xxi</sup> See page 51 of Diageo’s Proposed Brewery Development St. James’s Gate Environmental Impact Statement Volume 2 – Main Report, December 2011.

<sup>xxii</sup> See page 35 of the Need Report: number of households predicted to increase from 618,460 in 2011 to 1,184,839 in 2050.

<sup>xxiii</sup> See Table 12.1 of Appendix A to the 2006 Report.

<sup>xxiv</sup> See page 35 of the Need Report.

<sup>xxv</sup> See the appendices to Appendix A to the WSOWP.

<sup>xxvi</sup> <http://www.met.ie/climate/rainfall.asp>

<sup>xxvii</sup> <http://www.dcenr.gov.ie/natural-resources/en-ie/Geological-Survey-of-Ireland/Pages/Groundwater.aspx>

<sup>xxviii</sup> <http://www.thameswater.co.uk/media/press-releases/18509.htm>

<sup>xxix</sup> <http://www.irishtimes.com/news/environment/dublin-area-faces-ten-more-years-of-water-shortages-1.1578441>

<sup>xxx</sup>

<https://www.dublincity.ie/sites/default/files/content/WaterWasteEnvironment/WaterSupplyProjectDublinRegion/WaterSupplyProjectDublinRegion/Documents/The%20Plan%20Appendix%20C.pdf> (“Groundwater Report”).

<sup>xxxi</sup> WSOWP Appendix F, page 12.

<sup>xxxii</sup> See Appendix B1 contained within Appendix B to the WSOWP.

[http://www.watersupplyproject.ie/wp-content/uploads/2015/05/150525WSP1\\_AppendixBSource\\_A011.pdf](http://www.watersupplyproject.ie/wp-content/uploads/2015/05/150525WSP1_AppendixBSource_A011.pdf)

<sup>xxxiii</sup> See page 57 of the Groundwater Report.

<sup>xxxiv</sup> See page 58 of the Groundwater Report.

<sup>xxxv</sup> <http://ec.europa.eu/environment/water/reuse.htm>

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xxxvi See page 102 of the POAR: the anticipated CAPEX for desalination was EUR500m-700m versus an anticipated CAPEX for the Shannon option of EUR700m-900m.

xxxvii <https://www.theguardian.com/technology/2015/may/27/desalination-quest-quench-worlds-thirst-water>

xxxviii See the tables at Appendix A to the Water Demand Review which contain blank fields, question marks indicating incomplete analysis, the words “no information available” and multiple inconsistencies with the analysis in the report itself (see, for example, the table entry for “scheme demand (future)” for Laois, with reference to the report itself).

xxxix See the Water Demand Review.

xl See Note 8 to Appendix A to the Water Demand Review.

xli [http://www.cer.ie/docs/000979/CER14417%20-%20B14%20-%20CIP%20Water%20Projects%20\(1\).pdf](http://www.cer.ie/docs/000979/CER14417%20-%20B14%20-%20CIP%20Water%20Projects%20(1).pdf)

xlii The completed programmes are Tullamore Water Supply Scheme Phase 5 (water treatment plant upgrade (Clonaslee)), Newport Regional Water Supply Scheme (water treatment plant and network upgrade) and Thurles Regional Water Supply Scheme (Contract 1(Network)). See also <https://www.water.ie/about-us/project-and-plans/our-projects/>

xliii See page 48 of the Water Demand Review.

xliv See the second table at Appendix A to the Water Demand Review – the total for the “population served” column is 224,895 from which must be deducted 36,200 (Louth) and 20,645 (South Westmeath (Athlone)) which the report concluded would NOT be supplied.

xlv See pages 14, 15 and 16 of the Need Report.

xlvi <http://www.wwt-ireland.net/wp-content/uploads/sites/97/2016/04/Gerry-Galvin.pdf>

**From:** gerard siney <gsiney@eircom.net>  
**Sent:** 31 March 2017 15:14  
**To:** National Planning Framework  
**Subject:** Spatial Planning / Implications of Irish Water's Shannon Abstraction Proposal.  
**Attachments:** 1 pager - second version.pdf - 25-10-16.pdf; Inshore Ireland Article - 29011-16.pdf; IWSS.pdf

**Follow Up Flag:** Follow up  
**Flag Status:** Flagged

Sirs,

I write to you on behalf of The River Shannon Protection Alliance (RSPA) [www.rivershannonprotectionalliance.ie](http://www.rivershannonprotectionalliance.ie), regarding our concerns about Irish Water (IW) proposal to extract hundreds of millions of litres of water per day from the Shannon for piping to Dublin for domestic, commercial and industrial consumption. The proposed mega scheme would require investment substantially in excess of one billion euros of tax payers money, and take at least ten years to complete before any new water would arrive in Dublin.

Extraction at these levels, which of course will increase over time, will have a detrimental affect on the integrity and water levels of the river, resulting in major collateral damage economically, environmentally and socially, affecting the people (over 1 million along the catchment) and communities along the full length (240 kilometres) of the Shannon. Over the years, organisations and people have invested finance, effort and time building up sustainable economies based on tourism, boating, angling, hospitality enterprises, and educational facilities, and all of these can suffer major decline and loss in the event of a compromised river course. Despite claims by IW that "it will have no affect on the Shannon", the proposal has given scant regard or consideration to the rights of the stakeholders whose vital economic and social interests depend on the integrity of the Shannon.

This scheme is being seen as Dublin yet again seizing the assets of the regions beyond the pale to ensure FDI and economic development of the greater Dublin area and its east coast settelite counties, leaving rural regions with mere crumbs with which to attract the same economic benefits.

Irish Water are pressing ahead undeterred by any persuasion, despite the fact that Shannon water is not needed in Dublin and that in fact it has and will have more than adequate water beyond its target date of 2050 and further. The Kennedy Report (attached) in a forensic examimation of IW's own figures exposed the extraction proposal as based on incorrect assumptions, flawed claims, mathematical errors, inappropriate methodology, and concluded that the proposal is based on a falsehood.

The regions of the country are relying on a new spatial strategy that recognises that there is a country outside of Dublin 'called Ireland', and they will settle for nothing less.

Thank you for the opportunity to put forward these views on behalf of the RSPA. and those who seek to avoid the plunder of the Shannon.

I have attached three documents in support of the arguments pur forward in this letter.

Yours sincerely,

Gerry Siney - Chairman, RSPA

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is that it is very unlikely that anywhere near full capacity would be required for a very long time. A more realistic figure would be that only one third of its capacity or 110 MLD would be required on average over its 25 year lifetime (33.3% load factor). This would mean that the figure above jumps to €9 million/MLD. The equivalent figure in this scenario in terms of cubic meter lifetime costs would be around €1/m<sup>3</sup>. This is extremely high for water treatment.

By way of comparison, the recent stand-alone extension to the Leixlip water treatment plant cost €30 million for 80 MLD or €0.375 million/MLD at full capacity. This is 8 times cheaper than the Shannon Scheme in a best-case scenario (from an Irish Water perspective) and around 16-20 times cheaper in a probable scenario. In documents exchanged with RSPA, Irish Water have stated that the average cost of repairing mains-side leaks is €7-8 million/MLD, while the figure given for customer-side leaks is €0.75 million/MLD. Why one is ten times the other is not explained

and does not seem credible. Regardless of this and according to these figures, fixing customer-side leaks is 4 times cheaper in a best-case scenario and 12 times cheaper in a probable scenario. For additional comparison, a recent 10 MLD groundwater supply scheme in Co. Waterford was carried out at a cost of around €0.65 million/MLD, nearly 5 times cheaper in a best-case scenario and 12-15 times cheaper in a probable scenario.

**GROUNDWATER SUPPLY**

In a previous report, consultants for DCC had identified over 100 MLD of groundwater as being available within an 80km radius of Dublin. One existing well alone in the Curragh aquifer has a documented yield of around 2.5 MLD. As far as RSPA are aware, Irish Water and DCC before them have not even drilled one dedicated exploration borehole to determine the potential yield from new groundwater sources in the GDA region; the supposedly in depth study that was undertaken was a desk study.

**RSPA OPPOSITION**

For a number of reasons ranging from the economic to the environmental, the RSPA opposes this project and will fight it all the way if necessary. Due to the continued operational regime of the ESB hydropower plant at Ardnacrusha, the old River Shannon below the Parteen Basin can already be described as a sick river. Detailed environmental arguments can be put forward against the proposed extraction at very low river levels, which is when the GDA would be requiring their greatest level of abstraction. What is the point of developing these arguments, though, if the economics of the project are so bad? For anyone who thinks that such a scheme would help alleviate the now frequent lower Shannon flooding, the effects of pumping water away through such a scheme would be miniscule, probably much less than 1% of peak river flows, and occurring at a time when the extra water will not be wanted in the system anyway.

**RSPA SOLUTIONS**

- Halt Shannon Scheme development.

- Fix 50 MLD worth of leaks in the GDA at a probable cost of €150 million or less; results within 1 to 3 years.
- Develop 50 MLD groundwater supplies in nearby regions (e.g. Curragh aquifer) at a probable cost of €75 million or less; results within 3 to 5 years.
- Once either of the above has been carried out, undertake the necessary overhaul of the vulnerable Vartry supply system.
- Upgrade any issues in current midland water supply plants as needed.
- Save in the region of €500 million in the medium term and spend this in other areas that are crying out for investment.
- Review the situation in 10 years time with numerous other flexible options available for further future water supplies.

Or, let Irish Water carry on with their current hyper-expensive single solution Shannon Scheme that would be unlikely to deliver one drop of water for at least another 7 years, although more likely 10 years.

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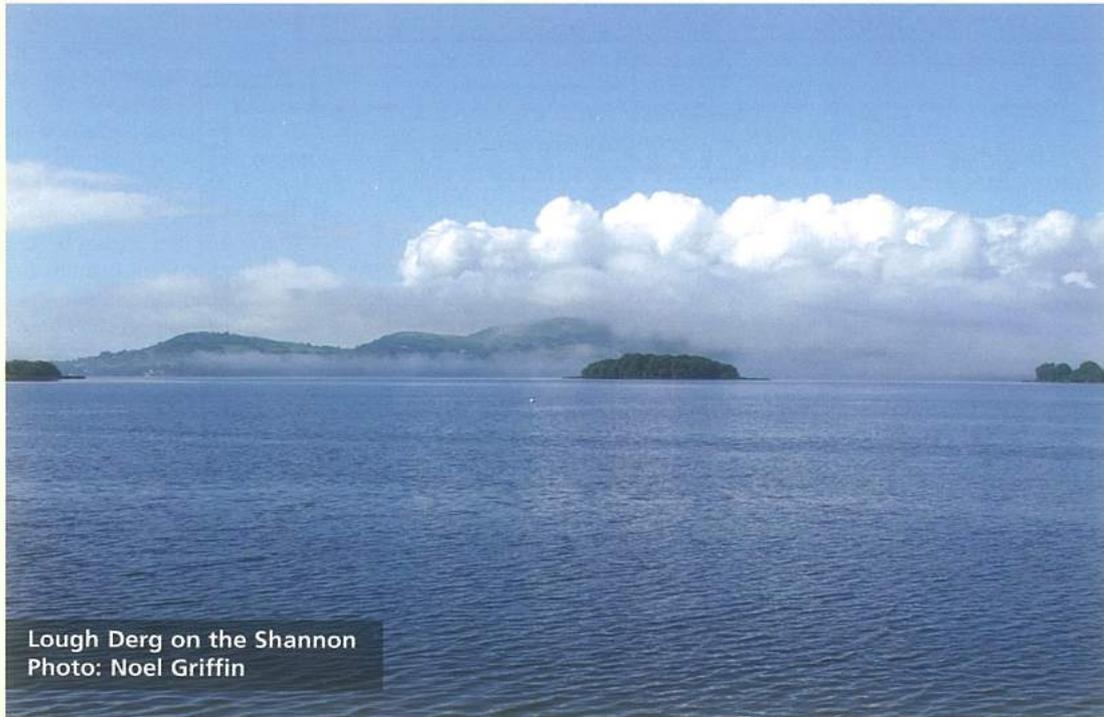
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# IRISH WATER'S SHANNON SCHEME FIGURES DO NOT MAKE SENSE

By River Shannon Protection Alliance (RSPA)



Lough Derg on the Shannon  
Photo: Noel Griffin

## DEFINITIONS

Water supply is measured in megalitres per day (MLD). 1 MLD=1,000 cubic meters. For comparison, a standard Olympic size swimming pool is normally considered to be 2,500m<sup>3</sup>. A combination of capital cost (infrastructure spending plus financing costs) and operational cost, divided by the amount of water delivered in a project lifespan (25 years in this case) gives the lifetime cost of water delivered in €/m<sup>3</sup> or, alternatively, if comparing investment options, €/MLD (delivered). The discount rate used for such public infrastructure projects is 5%. The capacity of a treatment plant refers to its maximum output in MLD, while the load factor refers to how much is actually delivered in percentage terms within a given time frame.

Raw water is the water that enters a treatment plant and treated water is what exits the plant and is fed into the mains distribution network. The treatment process itself is straightforward; involving coagulation, sedimentation, filtration, chlorination, fluoridation, and sometimes UV light. Surface water relates to rivers and lakes while

groundwater is contained within the ground and accessed by wells.

## DEMAND

Demand in the Greater Dublin Area (GDA), including large parts of Kildare is around 540 MLD and it took 1,000 years or so to reach this figure. According to Irish Water's figures about one third of this figure or about 180 MLD is due to leakage from both the distribution (mains) side and customer side. Future water demand studies carried out by consultants acting for Dublin City Council (DCC) greatly underestimated requirements in the early 1990s, and overestimated requirements in the mid 2000s, based on unsustainable Celtic Tiger growth rates.

A study in 2006 predicted GDA demand in 2015 would be 615 MLD, when in fact it had plateaued since 2007 at around 540 MLD. In such a short space of time the presumably expensive consultants were out by around 75 MLD in their estimations. A number of the people involved in this now work for Irish Water.

In the meantime, and contrary to what many leading figures are saying, there has been a lot of investment into securing additional supply with a major stand-alone 80 MLD extension to the Leixlip water treatment plant finished in 2014, and also a 40 MLD plant on the River Barrow near Athy finished in 2013. This should bring the total available capacity figure up to around 660 MLD; with the main sources being Ballymore Eustace at 318 MLD, Leixlip at 215 MLD, Varty at 75 MLD, Ballyboden at 16 MLD, and the River Barrow at 40 MLD.

## SHANNON SCHEME

The whole idea for a new River Shannon supply source for the GDA comes from this now discredited work in the mid 2000s where a figure of 300 MLD was considered to be necessary for any new source. As the intervening years have shown, there is no reason for any one particular raw water supply option to have to be able to provide such a high figure – it is nonsensical in the current context. Unperturbed, the powers that be, who now reside in Irish Water, have ploughed ahead on this one option,

ignoring a broad range of more flexible and cost-effective supply-side and demand-side solutions.

A soon-to-be-announced final option chosen by Irish Water is to treat and pipe water around 150km from the Parteen Basin on the River Shannon to the GDA network. The capacity of the scheme is said to be 330 MLD. This will probably have a capital cost in the region of €800M with a 25 year operational cost of €200M, so a lifetime cost of €1 billion or so. In fact, very significant amounts of money are already being spent. According to [www.cer.ie](http://www.cer.ie), Irish Water's allocation to the planning and business case review for the Shannon Scheme between 2014-2016 is €6.96M million, presumably much of which is going on consultancy fees.

In order to justify the scale of the project, Irish Water has decided to think in terms of a 'National Water Spine' and 'Benefitting Corridor'. At present, there is no raw water supply issue in the midlands and any local water treatment issues are due to the poor allocation of resources and historic underinvestment so the RSPA consider this appendage to the overall project to be a red herring. Irish Water have claimed that the Shannon Scheme will reduce water supply risks to these areas but the RSPA does not believe that a singular source for much of the country represents less of a risk than multiple sources. What if something goes wrong with the proposed Shannon Scheme raw water source or plant infrastructure?

## ECONOMICS

If we divide the €1B above by the number of households in Ireland at around 1.6 million, we get a figure close to €600 per household towards this one scheme. This is a major investment, so let us see how the figures compare to other options. If we take the best case scenario of the Shannon Scheme operating at full capacity, the figures work out at around €3 million/MLD. The reality, though,