

The Kennedy Analysis Overview (November 2017)

Find the [Appendices to this Kennedy Analysis Overview at www.kennedyanalysis.com/irish-water-shannon-project](http://www.kennedyanalysis.com/irish-water-shannon-project) and contact Kennedy Analysis at www.kennedyanalysis.com

Part A of this Kennedy Analysis Overview sets out the findings of the Kennedy Analysis; **Part B** gives details of Irish Water's *highly defensive* reaction to the Kennedy Analysis and its failure to address the issues identified in the Kennedy Analysis.

Irish Water is proposing a mega-project to pump water 172km from the River Shannon to Dublin, costing up to EUR1.2billion – **EUR724 for every Irish household**. A forensic review of Irish Water's "need" projections for the Shannon Project and of Dublin's water leakage, undertaken by Kennedy Analysis, found that after just three of Irish Water's *basic errors* are corrected its "need" projections establish that **there is no need at all for the Shannon Project**.

What is the Kennedy Analysis of the Shannon Project?

See **Appendix 1a** for details of the Kennedy Analysis interactions with Irish Water and the **Kennedy Analysis reports on the Shannon Project**: (i) the **Kennedy Report**, (ii) the **Kennedy Response**, and (iii) the **Second Kennedy Response**. Kennedy Analysis was founded by Emma Kennedy whose background is in carrying out forensic analysis of companies and projects - she was a corporate lawyer at Clifford Chance and worked in finance at a major global bank. She heard about the Shannon Project because the proposed pipeline crosses her husband's family farm. Despite concerns that her involvement might prove detrimental to them personally she has pursued this matter out of principle. **The Kennedy Analysis of the Shannon Project has been produced *pro bono* in the public interest – the team that produced it have all worked on an *unpaid* basis in their free time because the Shannon Project is simply **WRONG****. For more about Emma Kennedy and Kennedy Analysis, see **Appendix 1b**.

Summary of key findings

The **ancient and corroded** state of Dublin's water mains is the key factor undermining its water supply. Dublin's problem is not a lack of water: **only around 43% of the water put into Dublin's water supply system each day is actually used**. Dublin's problem is that its water mains are in a **third world state of decay** having been neglected for decades. 57% of the water put into the supply system pours through holes in its pipes into the ground and never reaches the taps. **57% leakage is astonishing and far from normal**: comparable cities identified by Irish Water's predecessor in this project have leakage below 10%. The state of Dublin's water mains also means (i) **water outages and floods** caused by mains bursts are a *certainty* as pressure in the system is normalised, and (ii) in low-pressure situations there is a risk of **contaminated groundwater** from the water-logged ground around the pipes *re-entering the pipes* carrying clean water to Dubliners' taps, requiring **extra disinfection** of the water before it is put into the supply system to counteract the **risk to public health**.

London's leakage levels are *less than half* those in Dublin and have been deemed "*unacceptable*" by its regulator - it is currently replacing its *entire* Victorian water mains. Irish Water has no such plan: its leakage reduction targets are (contrary to its claims) *extremely unambitious* given the scale of the problem and its own report questions the level of funding that will be made available. An overhaul of Dublin's water mains will become inevitable in the coming years and demands a truly significant focus and investment. The Shannon Project would not negate this: it would be a very expensive sticking plaster.

Irish Water is proposing to pump yet more water into Dublin's cripplingly compromised, leaking water supply system. The Shannon Project would be one of Ireland's biggest infrastructure projects, but the analysis on which it was based was littered with **mathematical and analytical errors**. Corrected analysis (using Irish Water's own selected methodology and its *current* leakage targets) shows that, technically, **no new raw water source is needed at all** although Kennedy Analysis notes that Dublin would benefit from diversification away from its current reliance on *almost exclusively surface-water* sources - a much smaller and less expensive alternative to the Shannon Project could provide this (*note*: the Shannon Project would be yet another surface-water source). **The Shannon Project would be a reckless waste of scarce financial resources**.

Kennedy Analysis has notified Irish Water of the **errors in its analysis** and that many of its **public statements about the need for this project have been false** or highly misleading. **Irish Water's reaction to the Kennedy Analysis has been highly defensive**. Instead of addressing the issues head-on, Irish Water makes **unrelated and irrelevant statements**. Its responses **deny the most undeniable of errors** and even **backtrack on issues that it had conceded during its face-to-face meeting with Emma Kennedy in February 2017**. Instead of even *attempting* to justify its position on many issues Irish Water gives itself a clean bill of health without providing any substance, stating simply: "*Irish Water do not accept this observation*".

The proposed Shannon project has ominous parallels with the Kielder water project built in the UK in the 1970s and widely criticised as an unnecessary White Elephant. This should sound alarm bells for all who will rubber-stamp the Shannon project, particularly its economic regulator (the CRU): they are on notice about the errors in Irish Water's analysis and must challenge Irish Water before it is too late. If they have doubts about the merits of the Kennedy Analysis they should seek independent review of the two sets of analysis (Irish Water's "need" analysis and the Kennedy Analysis). The risk is too high to ignore.

Part A: The Kennedy Analysis Conclusions

The Kennedy Analysis of the Shannon Project concluded:

1. **Irish Water has used false claims to promote the Shannon Project** to the public, the media and the government.
2. The Shannon Project is being **pushed through on the basis of mathematical errors and incorrect data**. Once these errors are corrected Irish Water's own analysis methodology shows there is no need for a project of this scale.
3. **This project has outlived its need** – the trajectory of water demand in Ireland has shifted dramatically in the 20 years since this project began but, **contrary to its claims and to international best practice, Irish Water's analysis failed to take account of this**.
4. Irish Water's analysis was constrained by the nonsensical notion that **only a single-source solution was acceptable**, despite the overwhelming advantages of using several smaller and less expensive solutions in conjunction.
5. The **"benefit corridor" concept is being misrepresented** to justify the Shannon project.
6. **Dublin's ancient water mains are the single key factor undermining its water supply system**. An overhaul of Dublin's water mains will become *unavoidable* in the coming years regardless of how much water is pumped to Dublin from the Shannon: **the Shannon project would be a very expensive sticking plaster**. If Irish Water was to adopt a genuinely ambitious mains-replacement programme *now* it would recover such huge volumes of water that Dublin would have a huge "spare capacity" and a highly resilient water supply system, **eliminating the need for the EUR1.2billion Shannon project**.
7. The parallels between the Shannon project and the UK's **"White Elephant"** Kielder project should sound alarm bells.

(1) Irish Water has used false claims to promote the Shannon Project to the public, the media and the government

If the messages that Irish Water is disseminating about Dublin's water situation were accurate it would indeed make the case for urgent and drastic action. Irish Water's message can be summarised as follows (each of these is a direct quote from Irish Water): "There is currently less than 2% spare drinking water capacity in Dublin".... "The present infrastructure is struggling to meet current need as evidenced by a number of significant and costly outages in Dublin over the past 5 years".... "The Project Need Report identified that projected demand for water in Dublin alone is expected to increase by over 50% by 2050".... "The water demand projections in the Project Need Report include ambitious leakage targets which have been adopted by Irish Water, resulting in a very conservative approach to overall demand. This has resulted in a revision of the projected water requirement from 350Mld by 2040 to 330Mld by 2050. As such, the requirement to ensure that only water which is truly needed is sought from a new source has been met".... **Every one of these statements is FALSE** as demonstrated in part C(2) and part D of the [Kennedy Response](#) and in **Appendix 2** to this Kennedy Analysis Overview.

(2) The Shannon Project is being pushed through on the basis of mathematical errors and incorrect data

The Kennedy Analysis identified undeniable calculation errors in Irish Water's analysis. **Irish Water's incorrect analysis concluded that, in 2050, Dublin will have a water deficit of 215Mld; however, after just three of its calculation errors are corrected, that 215Mld deficit becomes a 55Mld surplus**. The corrected analysis, together with an explanation, is set out in **Appendix 3a**.

Note the corrected analysis at Appendix 3a **retains Irish Water's chosen analysis methodology and all of Irish Water's other assumptions** (e.g. on population and economic growth, average household size and household number) some of which are very aggressive. It assumes nothing more than Irish Water's own *unambitious* leakage targets. It also retains the **three considerable "safety-buffers" (peaking, headroom and outage) which total 35%** - they are cumulative. Irish Water's analysis requires that this 35% of **extra water** over and above its (incorrect) projected *average* demand must be available in the form of *freshly extractable raw water every day* – unlike the approach in the UK, Irish Water's analysis does not offset any of its peaking requirement against the *tens of billions* of litres of raw water that is stored in Dublin's enormous raw water reservoirs¹. For a commentary on whether Irish Water's assumptions and its requirements in relation to the 35% safety-buffer are appropriate, see the [Kennedy Report](#) and part B(6) of the [Kennedy Response](#).

In its twenty-year life, **this project has a history of drastically over-estimating future water demand** yet the latest projection method is *even more aggressive* than those used in the past. This is summarised at **Appendix 4**. Irish Water has repeatedly failed to address the facts spelled out in the Kennedy Analysis to establish this point – instead, Irish Water simply states: *"Irish Water do not accept the observation"*.

(3) This project has outlived its need

20 years ago, when this project began, there was serious cause for concern about Dublin's water supply and as recently as 2010 talk of Dublin's water supply being on a "knife edge" was justified – see **Appendix 5**. However, since then, **Dublin's water treatment infrastructure has received a long-overdue overhaul and the trajectory of water demand in Ireland has shifted significantly**.

¹ Thames Water, London's water supplier, does not include peaking in its raw water requirement because, it states: *"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"*.

Since 1996 (the year this project began) industrial water intensity in Ireland has been on a consistent downward trend. This is a global trend and is accounted for in water “need” projections. Irish Water claims that its “need” analysis took account of the decline in industrial intensity of water demand. **This is FALSE:** it took *NO* account of this because it used the wrong set of data (see **Appendix 3b**). As a result, while London’s industrial demand is projected to **DECLINE** between now and 2040, Irish Water projects that Dublin’s industrial demand will **MORE THAN DOUBLE**². Simultaneously, in recent years, domestic consumers have become more aware of the value of water and the need for conservation (the threat of water charges has changed the way that the man on the street perceives water) and regulations have required that new-builds and household appliances are more water efficient. **Declining/ plateauing demand for water is being observed in many cities across the world - see Appendix 5 - and Dublin is no different: for an entire decade since 2007 Dublin’s total water demand has averaged around 540Mld.**

Irish Water repeatedly makes reference to Dublin’s water crises of 2010/2013 as justification for the Shannon mega-project. This is very disingenuous: those crises were not caused by a lack of *raw* water (the press releases spelled that out at the time) but rather by the fact that Dublin’s neglected water treatment plants had insufficient treatment capacity to convert the plentiful supply of *raw* water into drinkable *treated* water. Dublin’s ancient water treatment plants had almost no spare treatment capacity over their licenced raw water extraction limits to cover “outages” at the plants. **Fortunately, since Dublin’s water crises, hundreds of millions of Euros have been invested upgrading almost all of its water treatment plants and Dublin’s water treatment capacity has been increased by 202Mld which is extremely significant. Irish Water’s attempt to justify the proposed Shannon project through repeated reference to an historic position which no longer prevails is highly inappropriate.**

In most cities, another factor driving the reduction in “demand” for water has been a *major focus on leakage reduction*. “Demand” for water includes “**true**” demand (i.e. water actually *used* by domestic and business consumers) and “**leakage**” demand (i.e. water that is put into the supply system but leaks out of the pipes before it reaches the taps). As “leakage” demand is reduced so a city’s overall water demand is reduced. **In Dublin, where leakage reduction has been extremely poor, this has barely had an impact. Going forward, the active recovery of water through plugging Dublin’s leakage demand will reduce Dublin’s total water “demand”, creating the equivalent of an enormous new “source” of water.**

(4) Irish Water’s analysis was constrained by the flawed premise that only a single-source solution was acceptable

Having significantly over-stated Dublin’s projected 2050 water deficit, Irish Water’s consideration of potential new raw water sources was then restricted by the inexplicable premise that **only a single-source solution was acceptable**, ruling out the conjunctive use of several smaller solutions. This meant that **only extremely large stand-alone water sources could be considered. The logic of this was flawed:**

- (1) with the proposed one-water-source/one-treatment plant/one-pipeline Shannon project **the entire supply would be lost in the event of a contamination event or supply interruption.** By contrast, in the event of a contamination or major outage event at *one of a number* of smaller water sources, that *single* contaminated supply could be shut down temporarily without impacting the remainder of the supply sources;
- (2) Dublin’s projected water demand is highly uncertain on many measures and **the Shannon project is “all or nothing”:** not a single drop of water can be delivered until the entire pipeline has been built - and it will cost the best part of EUR1.2billion regardless of whether, in the end, it needs to supply Dublin with 215Mld of water, 50Mld of water or indeed no water at all. **The investment costs of the Shannon project are heavily front-ended: unlike with smaller sources in combination, the Shannon project offers almost no scope for phasing of investment expenditure or bringing the project online in increments.**

Irish Water claims to have considered **ten** new water source options. This is very misleading: **seven of the ten were simply different variations of pumping water from the River Shannon to Dublin** (from different abstraction locations and via different routes). **An aggressive mains replacement programme was not even one of the ten options considered, which was a grave omission given that this is the key issue undermining Dublin’s water supply system.** The other three options were:

- (1) **groundwater**, which was dismissed for a number of flawed reasons, including that it **could not provide the full projected water requirement standalone.** The [Kennedy Response](#) (at part B(9) and Appendix 6) and the [Second Kennedy Response](#) (at Appendix 4) spelled out in significant technical detail the mathematical and logical errors contained in the original 2008 groundwater report and in Irish Water’s 2015 review of the original report. See **Appendix 6** for an overview of those many errors, which **Irish Water’s latest response yet again failed to address.** Even on its constrained and (self-proclaimed) conservative analysis, that groundwater report concluded that there are significant groundwater resources close to Dublin. It estimated that two of these aquifers alone are likely to yield 78Mld if developed,
- (2) **conjunctive use of the River Barrow**, which was dismissed primarily because it **could not provide the full water requirement standalone**, and
- (3) **desalination**, which was dismissed primarily on the **nonsensical** basis that it could not provide water to communities in the “benefit corridor” – see the “benefit corridor” section below for why this was so flawed.

² See page 5 of Appendix 1 to the Kennedy Response.

Irish Water did not give detailed consideration to the many other smaller alternatives that are available, such as new reservoirs, environmental flow replacement, mine dewatering and rainwater harvesting. None of these would have been capable of supplying the entire (incorrect) projected 2050 deficit standalone, but combinations of them would have been a far more logical solution. Irish Water's November 2016 Final Options Appraisal Report stated: "*the potential for using multiple sources was also investigated at various stages in the WSP. However it was found that while many sources, such as groundwater, rainwater and greywater, could be attractive secondary resources.... they are not sustainable primary water sources.*" This statement makes no sense: naturally if you have classified them as "secondary" they are not, by your own definition, "primary" – but **this does not negate their value when used in combination.** Two or three water sources operating *in conjunction* could be brought online *incrementally* (alongside an aggressive mains replacement programme) if and when the need does indeed arise and would reduce the risk of exposure to a contamination of any one supply in the future.

Dublin currently relies almost exclusively on surface water from rivers – and the Shannon would be yet another surface water source, offering no diversification protection. Surface water has its own inherent problems: surface water contains organic materials (e.g. from leaves that fall into the water) and trihalomethanes ("THMs") are produced as a by-product during the water treatment process when chlorine reacts with organic matter. River water is the most prone to producing THMs during the treatment process; deep wells present the lowest THM risk as the water from deep wells is not contaminated by organic matter. **THMs are believed to be linked to serious health risks including cancer, miscarriages and birth defects.** It has been reported that Ireland has the highest reported non-compliance for THM exceedances across the EU member states - even Erin Brokovich has flagged the issue of THMs in Ireland's drinking water.

The conjunctive use of several smaller water sources would allow for increased water supply to be brought online incrementally if and when it is actually found to be needed (unlike the all-or-nothing Shannon project). It would offer protection against a contamination event or supply interruption at an individual water source (unlike the one-source, one treatment plant, one-pipeline Shannon project) and would allow for diversification of Dublin's water sources away from surface water, with its inherently high THM risk (unlike the surface-water Shannon source).

(5) The "benefit corridor" concept is being misrepresented to justify the Shannon project

When Irish Water took this project over from Dublin City Council in 2014 it introduced the uncertain and vague concept of a "benefit corridor". Public details of this "benefit corridor" concept have been scant, but the analysis that was published in the 2015 Project Need Report was littered with errors (see pages 10/11 of the [Kennedy Report](#)). The concept has since shifted significantly – the version presented in the 2016 Final Options Appraisal Report was unrecognisable, yet very few details were provided and those provided were, yet again, highly questionable – see **Appendix 7a**.

Irish Water claims that the Shannon project will serve **over 40% of the population** – but **39.99% of these live in Dublin or within a contiguous area** and within supply networks that, according to Irish Water's own report, could easily be connected into the Dublin water supply network. **The "benefit corridor" is better described as a "benefit blob" around Dublin.** According to the Final Options Appraisal Report, the only people slated to receive water from the Shannon source *outside* of this "benefit blob" are *around 4,000 people in Clare - these 4,000 people in Clare constitute just 0.01% of Ireland's population yet Irish Water repeatedly claims that the Shannon project brings a benefit to communities along the entire length of the pipeline.*

Notwithstanding its *extremely questionable validity*, the "benefit corridor" has been one of the key justifications provided by Irish Water for selecting the Shannon solution over other sources that are *local to Dublin* on the **nonsensical** notion that the Shannon source can provide water to more people than sources located *in the heart of the Dublin water supply area* (such as desalination). **This justification is wholly illogical: a water source located within the Dublin water supply area would supply the "benefit blob" without the need for hundreds of kilometers of pipeline.**

Irish Water states repeatedly that the Shannon source is better placed to supply the "benefit corridor" than a Dublin-centric solution and that the Shannon Project would bring a benefit to the communities along the entire length of the pipeline: this is nonsensical and extremely disingenuous.

(6) Dublin's ancient water mains and third world leakage levels are the key factors undermining its water supply system - yet Irish Water's mains replacement and leakage targets are unambitious

The Kennedy Analysis team has undertaken a forensic analysis of Dublin's leakage and Irish Water's self-proclaimed "*ambitious*" leakage reduction targets. A summary is contained at **Appendix 8** or click on this link for a copy of the full [Kennedy Analysis of Dublin's Leakage](#).

Dublin's problem is not a lack of water: Dublin's problem is that around 57% of the water put into its water supply system pours straight through holes in its ancient supply pipes into the ground and *never reaches Dubliners' taps*. **Only around 43% of the**

water put into Dublin's water supply system every day is actually used – the rest of the water is lost through leakage. The **ancient, corroded state of Dublin's water mains is the single key factor undermining its water supply system.**

Dublin's historic mains replacement rates have been highly inadequate: London has replaced its water mains at a **rate 2,000% faster than that in Dublin** despite the fact that **London's leakage rates were less than half those in Dublin.** Dublin City Council stated a decade ago: "...these mains are so ancient that leaving them alone is not an option" yet **over the past ten years an average of only EUR10million per year has been spent on fixing leaks NATIONALLY (not in Dublin alone) - this equates to only 0.8% of the projected EUR1.2billion cost of the Shannon project.**

This failure has resulted in **leakage levels of around 57% - this is astonishing and far from normal or acceptable.** The OECD carried out a study in 2016 observing leakage levels in cities across the world. **Only 4 cities had leakage levels over 40%: all of them were in Mexico** (Dublin did not take part in the study). The UK is known to have very high leakage rates – indeed Thames Water (London's water provider) was fined by its regulator yet again in July 2017 for "unacceptable" leaks – yet UK leakage levels are *well under half* those in Dublin: **"total leakage" rates for water suppliers in the UK in 2012 ranged from 14% to 27%, with an average of 20%**³. It is notable that Irish Water tends to use London, which itself has "unacceptable" leakage levels, as its default comparator when attempting to justify its own unambitious leakage targets. Earlier in the life of the Shannon project, Dublin City Council selected 6 comparable countries/cities and presented data on them for comparison with Dublin – it found that the leakage levels for the countries that it had selected were:

Country/city	Approximate leakage rate
Denmark	6%
The Netherlands	6%
Germany	7%
Sydney, Australia	8.5%
Lithuania	15% (in 2000)
United Kingdom	23%

Reference is often made to Dublin's "spare capacity" which Irish Water states is around 10% (although its published data suggests that, as a result of the major recent upgrades at almost all of Dublin's water treatment plants, its *current* spare capacity is significantly higher than 10%). It is important to understand: **if Dublin had normal leakage levels it would have an absolutely enormous spare capacity.** For example, if Dublin's 2015 leakage levels had been 20% (well above leakage levels in many comparable cities) it would have had **112% spare capacity. THIS IS ABSOLUTELY ENORMOUS.**

Irish Water's own documents identify that Dublin's water pipes are so full of holes that, in low-pressure situations, there is a danger of **contaminated** groundwater leaking from the water-logged ground around the pipes *back into* the pipes carrying *clean* water to Dubliners' taps. This requires **extra disinfection** of the water (with its associated THM risk, as mentioned above) before it is put into the supply system to counteract the risk to public health.

The cripplingly compromised state of Dublin's water pipes also means that **water outages and flooding incidents caused by burst water mains are inevitable** as pressure in the system is normalised. What is more, the extreme extent of corrosion to the pipes means that repairing those bursts is extra complicated and takes far longer than it should. The 2017 Louth/Meath mains burst was an example of this: Irish Water's own press release stated: **"three attempts to fix the 50 year old pipe failed over last weekend as the corrosion and warping of the pipe meant that any available standard fittings were not sufficient. A bespoke piece of pipe and fittings were manufactured in Belfast".**

Irish Water claims that its leakage targets are "ambitious" and it makes reference to **highly misleading statements and invalid comparisons** to justify its claims – see part (C) of **Appendix 8.** In fact, Irish Water's **hard targets** on leakage reduction aim to reduce Dublin's leakage by **only 31% in 39 years.** Its leakage reduction target is **extremely unambitious given the scale of the problem** and when compared with recent leakage reduction achievements in the UK⁴ and across the EU⁵. For example:

- London's leakage was reduced by **30% in only 6 years,**
- Scotland's leakage was reduced by **55% in only 10 years,**
- Lisbon's leakage was reduced by **64% in only 8 years,**
- Leakage in the Reggio Emilia province in Italy was reduced by **50% in 8 years,**
- Malta's leakage was reduced by over **83% in under 20 years.**

For its estimates of the **costs of recovering water through fixing leaks,** Irish Water's analysis used out-dated, over-stated figures: it used cost data from *prior to* the installation of water meters. **This is wholly inappropriate: fixing leaks (on both the customer side and the distribution side of the network) is far less complicated and far cheaper now that meters have been**

³ Source: Irish Water Final Options Appraisal Report Appendix J, "Preliminary Options Appraisal - Consultation Submissions Report", page 35.

⁴ Sources: Thames Water and Scottish Water.

⁵ Source: 2015 EU Reference Document "Good Practices on Leakage Management".

installed. Before meters were installed it was almost impossible to know where a distribution-side leak was unless water was actually pouring out of the ground. Meters now allow leaks to be pin-pointed simply by observing the difference in water pressure between two meter points. Irish Water’s analysis assumed that recovering 1Mld of water on the customer-side of the network would cost “**in the order of EUR 0.75million**”, but the results of the First Fix Free scheme (a scheme for repairing customer side leakage relying on “constant flow alarms” in water meters) show that **saving water by fixing customer side leaks has cost an average of just EUR246,000 per 1Mld – this is one third of the amount that Irish Water had assumed and less than 7% per unit of water than the predicted cost of delivering the same volume of water through the proposed Shannon Project.** Irish Water’s nonsensical attempts to dismiss this highly significant fact are discussed at **Appendix 9c.**

The results of the First Fix scheme to date establish that **far more water will be recovered through repairing Dublin’s leakage** than Irish Water’s analysis accounted for (see **Appendix 3c** for more details on the results of the First Fix scheme). In every quarter, the amount of water recovered through the First Fix scheme was approximately DOUBLE the production of *the entire Bog of the Ring wellfield*. The Bog of the Ring wellfield produces 2.5-3Mld of water – the First Fix scheme **has so far recovered a cumulative total of over 38Mld.** That huge volume of “new” water is now available at Dubliners’ taps every day instead of pouring into the ground. **Recovering water by repairing customer leaks is equivalent to adding approximately two new, additional Bog of the Ring wellfields to Dublin’s water supply every three months - but far less expensive.**

Irish Water has cited the inconvenience of traffic disruption in Dublin as a factor against an overhaul of its water mains.

Perhaps Dubliners should be presented with two alternatives - either:

- (1)** accept traffic disruption in rotating areas of Dublin for the coming years while Irish Water aggressively replaces pipes - this will be expensive but will (a) **address Dublin's water volume, quality and pressure issues,** (b) **make Dublin a viable investment proposition for incoming investors** who need confidence in not only the *volume* of water available but also the *quality* of that water, and (c) **eliminate the need to spend EUR724 per household on the Shannon project, or**
- (2)** accept that they will continue to (a) drink potentially **contaminated** water being delivered through ancient and corroding water pipes, and (b) be exposed to **major mains bursts** as water pressure in the system is normalised, while **Irish Water spends a huge amount of money kicking the ball down the road** by piping water from the Shannon, just to delay the expense and disruption of properly addressing Dublin’s mains.

(7) The parallels between the proposed Shannon project and the UK’s “White Elephant” 1970s Kielder project are ominous

The Kielder reservoir and pipeline was built in the UK in the 1970s and has subsequently been widely criticised as having been an **unnecessary White Elephant.** **Appendix 10** contains extracts from a damning 1982 report⁶ of the Kielder project highlighting **alarming parallels with the Shannon Project.** For example, it flags that the Kielder project was partly justified by **potential increases in future water demand from certain major industrial users** that were not appropriately validated at the time. Irish Water’s “need” analysis for the Shannon project includes a huge 100Mld industrial “strategic allowance” (note: Dublin’s *total* industrial demand for water is currently only 110Mld, which the “need” analysis assumes will grow organically alongside the *separate, additional* 100Mld industrial “strategic allowance”) - **a key justification for the 100Mld strategic allowance is “enquiries” from un-named potential industrial users.**

A University of Oxford study of the Kielder Water Scheme⁷ pointed out that the analysis used to justify the Kielder project used inappropriate data, including **the incorrect assumption that non-domestic demand would continue to grow rapidly,** but that in fact: “*the industry it was planned to supply was already reducing its water requirements before construction started*”. The study noted that those who supported the scheme proclaimed: “*the scheme is a bold and imaginative one: the largest single water conservation scheme yet undertaken in this country*” and referred to “*the politics of promotion of mega-projects*”. However, it stated, “*unfortunately, engineering accomplishments were often marred by economic miscalculation. The resulting mismatch between vastly increased water supply at a time of diminishing rise in demand, together with huge debts incurred at a time of rapid inflation and high interest rates, had lasting effects on the state’s management of water resources*”. The study stated: “**The Scheme is described on a bronze plaque at the reservoir site as one of the biggest water projects ever undertaken in Europe.... Today, the reservoir rests mostly idle. The water is rarely needed for supply....**”

The ominous parallels with the Kielder project should sound alarm bells for anyone who will approve or rubber-stamp the Shannon project – they are on notice about the errors in Irish Water’s analysis and must challenge Irish Water on the evidence contained in the Kennedy Analysis before it is too late.

⁶ “*Spending Money like Water*”, William Charlton, The Spectator, 22 May 1982.

⁷ “*The Kielder Water Scheme: the last of its kind?*” CS MCCULLOCH, University of Oxford, UK (2006)

Part B: Irish Water's reaction to the Kennedy Analysis has been highly defensive

Irish Water's **defensive** reaction to the Kennedy Analysis is not the reaction that one would expect from a body intent on ensuring the best possible use of EUR1.2billion of scarce financial resources. Instead of addressing the issues head-on, Irish Water makes **unrelated and irrelevant statements**. Its responses **deny the most undeniable of errors**, often with very little or no substance. As summarised in the table below, its latest response even **backtracked on issues that Irish Water had conceded during its 16 February 2017 meeting with Emma Kennedy**, failed to make a note of important points that were discussed at that meeting and failed to address issues that the Irish Water team were unable to explain during the meeting and had confirmed would be dealt with in its written response (see **Appendix 9a** and **Appendix 9b**).

Matter discussed during meeting	The position Irish Water took in its written response
Non-domestic demand data: Mick Garrick of Jacobs Tobin confirmed that the data that Irish Water had used was indeed Jacobs Tobin's data and <i>not</i> Indecon's data.	Its response backtracked entirely, stating " <i>Irish Water do not accept this observation</i> ". See Appendix 3b for details of this point.
The false statement that past outages in Dublin have cost the economy EUR78million per day: Alan Gray of Indecon confirmed that Indecon had <i>not even purported to make any analysis of the cost of past water outages</i> – Irish Water is citing the Indecon analysis and this wholly inappropriate figure out of context.	Its response failed to address this point at all and Irish Water continues to propagate this message despite having been informed in Emma Kennedy's presence that it is wrong.
Irish Water's adoption of a 35-year projection window (which is not international best practice and which produces a much higher projected water deficit due to Irish Water's aggressive and uncertain assumptions): during our meeting, Irish Water was unable to explain why it had not used the industry-standard 25-year time frame and confirmed that this issue would be addressed in its written response.	Its response failed to address this point at all .
Irish Water's much-publicised statement that Dublin's demand was projected to increase by over 50% was FALSE: Irish Water was unable to provide any maths to justify this statement during our meeting.	Its response created an embarrassing fudge to try to explain away this basic mathematical error. See Appendix 2 for details of this false statement and its implications.
The results of the First Fix scheme have PROVEN that the volume of water that Irish Water's "need" analysis assumed was being lost through customer side leakage was WRONG: Irish Water still refuses to acknowledge this most undeniable of errors.	Its response failed to address this point at all . See Appendix 3c for details of this point.

Irish Water's latest response still **avoided addressing key issues** that the Kennedy Analysis has raised - see **Appendix 9b** for examples. Even when Irish Water *did* attempt to address issues raised in the Kennedy Analysis **many of the points that Irish Water made in its defence were simply wrong/made no sense/contained basic errors** - see **Appendix 9c** for examples.

Irish Water avoids addressing issues by stating simply that its methodology is "*best practice*" or "*internationally recognised methodology*". We have made clear to Irish Water that, although several aspects of its analysis are *not* considered international best practice, our principal concern is not with the methodology that Irish Water is *attempting* to follow, but rather our concern is that **Irish Water has made major errors in its attempt to follow its selected methodology**. Its analysis contains mathematical errors – this is NOT "best practice"; it is not "best practice" to account for "outage" on both sides of the supply:demand equation; "best practice" does not use data derived from analysis that contained *basic errors*; claiming to use one set of data while actually using a *different* set of data is not "best practice". See **Appendix 3a** for *corrected* analysis, using Irish Water's own selected methodology.

The Kennedy Analysis spelled out Irish Water's **mathematical errors** and demonstrated how many of its **public statements about the need for this project have been false** or highly misleading. Instead of even attempting to justify its position on many of these issues, it has repeatedly stated: "*Irish Water do not accept this observation*". It gives itself a clean bill of health without providing any substance, for example stating simply: "*the technical reports produced ... have been subject to a full quality assurance process*".

Stating "*we do not accept this observation*" does not change the fact that *the observation is accurate*. Simply stating that its own analysis is correct *does not make it so*. Avoiding key issues by raising other matters that are not even in dispute is a *Trump-esque method of diverting attention* away from fully substantiated claims that Irish Water is incapable of providing evidence to refute: there is no need for the EUR1.2billion Shannon project and pursuing it would be a reckless waste of scarce financial resources.