MRS Awards 2021 Finalist Agency of the Year

Customer views on desalination

January 2023

South West Water

VERVE Energising Insight

Incremental learning

A more responsive, 'always on' community that will deliver insight greater than the sum of its parts through engagement and incremental learning (rather that a series of ad-hoc projects run in separate workstreams)

Transparency

The insight community ensures projects are consistently run and reported; stakeholders can view the research as it happens, & outputs can be shared with customers and the CCG as required.

Inclusivity

An insight community is inclusive and can help quickly isolate the views of different communities and customer demographics

Broader View

The community model offers greater opportunities to tackle 'big' topics that take into account wider public value.

About the South West Water Customer Panel

Launched in September 2022, the South West Water customer panel is an 'always on,' Qualitative panel of South West Water (SWW) & Bournemouth Water customers that can be tapped into for a variety of PR24-related research needs

Research Background

- South West Water are committed to reducing abstraction in rivers, and with dry seasons a likelihood in the future, it is highly probable that desalination will have to be deployed more frequently

- It is important customers are kept informed about the rationale behind desalination and provide South West Water with informed views on the topic

There are 3 core objectives of this research

Do customers agree that alternative methods of obtaining water should be pursued to reduce reliance on rivers/ reservoirs

In what circumstances (if any) do customers think desalination is appropriate

Understand customer concerns about this process so that these can be effectively addressed in future comms

Research Approach

- We conducted a **1-day pop-up community** on the customer panel platform, open to all **South West Water (SWW) and Bournemouth customer members**
- In total we spoke to **33 customers. Please note that based on this low sample size, figures quoted are indicative only**
- The community left open between **15 – 20 December 2022** to maximise engagement
- Activity flow:
  - **Awareness of any issues with obtaining water:** Customers baseline understanding of issues fraught with obtaining clean water
  - **Rationale for alternate water sources:** Customers reviewed the consequences of abstraction to see if they agreed with the premise that alternative means of water collection should be pursued
  - **Thoughts on desalination:** Customers reviewed the process and were given an opportunity to raise their concerns
  - **Conclusion:** Final vote on if they 1. Support desalination as a means to obtain clean drinking water and 2. Under what circumstances(if any) customers feel desalination should be used

Executive Summary

Executive Summary

Customers have array of concerns about desalination as a method of obtaining water

- **When asked 'do you support desalination as method of obtaining drinking water?' 19/33 initially voted 'No' due to the below concerns**
  - **The biggest concern is cost.** Many want clarity on how this will affect their bills before conclusively deciding if they support desalination
  - **Customers also want reassurance that desalinated water won't taste differently to their current drinking water and have no negative health impacts.** They opted for desalinated water to be mixed with river water to mitigate the possibility of unpleasant taste
  - **Some also want more clarity on how desalination would affect sea life and its role alongside alternative means of water collection** (primarily for reassurance that desalination is not just being used for convenience)

However, most customers support using desalination in some form

- **Although some initially opposed desalination, the majority are likely to support it on an ad-hoc basis i.e., in drought conditions and dry weather as a 'last resort'**
  - **11/33 believe it should be used all the time to protect rivers whenever possible**
  - **16/33 believe it should be used in drought conditions when there is less water in the rivers or in prolonged dry weather to protect levels of water in the reservoir**
  - **Only 6/33 were opposed to desalination in all circumstances**
- Therefore, **27/33 support the use of desalination in some form**
- **Customers conclude that believe that while desalination isn't optimal, it is preferable to harming wildlife in rivers and potentially ruining scenic spaces for the next generation**

Top of mind views on abstraction and desalination

Context: Customers were informed how the water cycle works and how water is extracted from rivers and groundwater

The Water Cycle

When it rains the ground becomes wet and you can see the water collect in puddles.

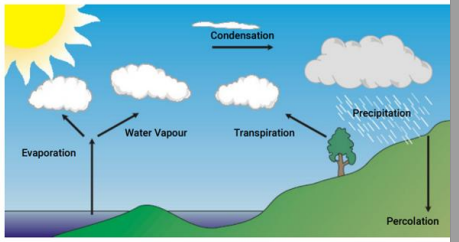
The seas, lakes and oceans are like giant puddles which never dry up, even though huge amounts of water are evaporated from them every minute.

Some of the water in rivers or underground aquifers is pumped out by the water companies and may join other sources of water on the journey to your sink or bath via your tap.

This water will eventually be returned into the drains and sewers after fulfilling a multitude of roles, some important to life, others less vital.

After travelling through the local sewage treatment works, the water will enter a river and eventually return to the sea.

South West Water gets its water from both surface stores (rivers, lakes and reservoirs) and groundwater stores.



A more detailed picture of how South West Water takes water from rivers and groundwater

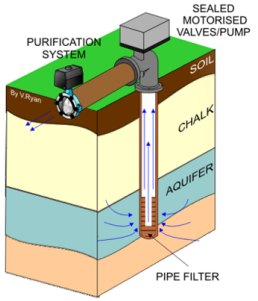
Water is abstracted from rivers and groundwater, treated and then piped to customers' homes and businesses as the public drinking water supply

Groundwater

- Rainfall filters into the ground and tops up groundwater
- Groundwater is stored naturally in layers of rocks that can hold water, these are called **aquifers**
- **Groundwater is abstracted (taken) by water companies by using boreholes**

Rivers

- Rainfall flows directly into rivers, known as 'surface water runoff'
- Groundwater seeps from the aquifers into the rivers, providing important flow in the river
- **A lot of water can be taken from rivers and treated so it can be supplied as clean water.** In some places it is possible to build a dam across the river to form a lake, sometimes called a reservoir. Water is released from the reservoir to keep the river below it at a certain level



Concerns over environmental consequences of abstraction are minimal

Many are aware that abstraction will likely have some impact on local wildlife, but believe there are likely bigger environmental issues for South West Water (SWW) to tackle

- Many admit they had not heard about abstraction being an environmental issue
- They believe SWW has bigger environmental priorities to address
- Specifically, customers are most concerned about the environmental damage caused by sewage being released into the sea
- Customers generally want to hear how SWW plans to better protect natural waterways and the sea from environmental damage

None of what I just read is new to me regarding the water cycle. ***I am not aware of any impact of taking water from rivers and streams to provide clean water for homes and business*** *but could it cause floods?*

Female, 60+

I am unaware of any issues with obtaining water, ***I am only aware of the pumping of excess sewerage into the sea.***

Female 18-29

I feel ***abstraction may be harmful to the environment, but I am not sure why!***

Female, 45-59

There have been incidents where SWW have failed to keep ***sewage from being released into the sea. This should be a priority for SWW to eradicate.***

Female 60+

Context: Customers were then informed about the impact of taking water from rivers and groundwaters

What are the environmental impacts of taking water from rivers and groundwater aquifers?

- Taking water from rivers, or from the aquifers that feed rivers and streams, can have a serious impact on both the natural environment and wildlife.
  - The flow of a river can be significantly reduced, especially in drier and hotter parts of the year.
  - Fish and other creatures and plants that depend on rivers and streams may struggle to thrive and survive in lower flowing water.
  - People who visit rivers for recreation, sport and leisure may be impacted, for example people fishing may have a poor experience.

Experts monitor data on the health of rivers and groundwater → They consider if the abstraction of water impacts plants or wildlife → If negative impacts are identified, they consider what actions are needed

Upon learning about the environmental impacts of abstraction, customers urged SWW to pursue alternative methods of water collection

Customers had a strong negative knee jerk reaction to imagery of dried rivers and the supporting facts that over abstraction can harm wildlife

- Many believe that rainwater collection is the best method of alternatively obtaining clean drinking water
- This was due to a prevailing belief rainwater is in abundance in the UK (N.B., the study was conducted during the winter when rainfall was plentiful.)
- Many also believe that storage should be increased in the reservoirs to better protect wildlife
- Customers want to be informed about alternate methods of water collection and what SWW plans to do to ensure local wild life is protected

> ***I just believe that in our wet climate there shouldn't be a need to find alternatives*** *to collecting the fresh water that regularly falls from the sky.*
>
> **Male, 30-44**

> ***Here in the South West where we have above average rainfall, we should be able to supply enough water*** *for drinking and other uses for South West Water customers.*
>
> **Male, 60+**

> ***We need to invest in enlarging out existing reservoirs*** *sea life can killed during the process baby fish and plankton this will upset the food chain.*
>
> **Female 45-59**

> ***Reservoirs create habitat, industrial plants don't, so increasing storage is beneficial to wildlife.***
>
> **Male, 30-44**

Awareness of desalination is low and generally, customers are openminded to it being used

8/33 have report some level of awareness of desalination and generally, view it as a positive alternative to abstraction

- These customers support the idea of using desalinated water in the UK mainly because they know it is a tried and tested method in other countries
- However, the initial reaction to this idea is that it wouldn't be as environmentally beneficial for the wildlife (the prime motivator) as expanding reservoirs
- Generally, many want to learn more about this process before weighing in with an opinion

I have witnessed desalination plants in action *while travelling and* ***wondered why we didn't use such methods, especially in areas where excess sea levels are creating issues.***

Female 60+

I know building these would cause problems with the environment *while the groundworks are completed and also* ***the people living in and around the area would protest/complain about it, as people just don't like change, even if it's for the better.***

Female, 45-59

One concern or question I have is if very salty water returned suddenly in large quantities bad for sea life.

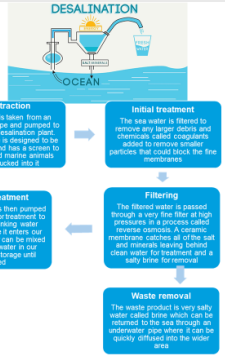
Female, 30-44

Informed views on desalination

Context: Customers were finally provided with a brief explanation of what desalination is and why it is used

Desalination involves taking water out of the sea passing it through a process which separates out drinkable water

- At the end of the process, we have drinking water which is very pure and super salty left-over water, sometimes referred to as brine, which can be put back into the sea.
- Desalination is used around the world for producing drinking water, it is frequently used on ships and on small islands.
- Compared to building new reservoirs which can take years of planning and development plus over a year to fill before they can come into use, desalination is relatively quick to bring online.
- South West Water currently run desalination plans on St Mary's on the Isles of Scilly which provides around 50% of the water for the island and there are also larger scale plants in operation in the UK such as those built to help supply London during periods of drought.



However, Desalination is energy intensive (and therefore, expensive), which is why it is not typically used

- Standard water treatment processes, using raw water from rivers or groundwater sources use approximately 0.22 kWh to produce 1 cubic metre of water, desalination uses around 3 kWh per cubic metre. → **Per cubic meter this is enough energy to boil a kettle 18 times or run a TV for 39 hours**
- Even with the installation of solar panels or wind turbines on the site of the desalination works, extra electricity is usually needed to power the works. → Renewables would likely contribute around 20% of the energy require
- There are also challenges in ensuring that the water meets UK water quality standards – that the filters are good enough to stop any salts or other chemicals in the sea water getting into the supply. Desalination isn't currently approved for putting directly into the potable drinking water supply. → However the Drinking Water Inspectorate (DWI), who are responsible for regulating water quality are expected to approve it for use imminently

Therefore, Desalination is being considered as a temporary solution to help with the current drought conditions that are predicted to continue into next year; there are two possible ways to do this

Option 1. Desalinated water can be pumped into a reservoir to mix it with river water and then put it through one of South West Waters existing water treatment works and out into supply

- Putting it into a reservoir for secondary treatment will add more cost to the process (for pumping to the reservoir and the additional treatment) but would provide even more confidence in the quality of the water.
- This also has the added benefit of maintaining water levels in the reservoir for recreation and stored water levels for times of drought.

Option 2. Alternatively, once approved by the DWI, we could pump desalinated water directly into the supply network

- Pumping directly into the supply can help to keep the energy use and costs down as less energy is needed

Customers are concerned how desalination will impact their bills, how it will taste and if its safe to drink

'How will this affect my bills?'

- Many are concerned their bills will significantly increase if desalination is used more frequently

Providing transparency on much bills may rise will provide reassurance

Why look for expensive solutions to a problem rather than managing the current infrastructure?

Male, 60+

'Will desalinated water have a weird taste?'

- Some believe desalinated water will be unpleasant to drink, and many are happy with the quality of their current drinking water

Customers want reassurance desalinated water won't taste differently to their current supply

It would be best to mix with river water so as to minimise any significant differences on taste.

Male, 60+

'Will this impact my health in any way'

- Some are concerned the ocean is less clean than rivers/reservoirs and ask if desalinated water is safe enough to drink

Customers want to know if drinking desalinated water could harm their health in anyway

My biggest concern about drinking water from the sea is knowing sewerage is dumped into the sea in my local area.

Female 18-29

Some also question the sustainability credentials of desalination, and want to know more how it impacts sea life

While environmental concerns are of secondary importance to customers, they want to better understand how the process impacts sea wildlife

- Customers generally assumed that the environmental impacts of desalination would be less damaging than over abstraction
- However, they want reassurance that in the long term, more sustainable methods will be deployed

> *I don't like the fact that brine is released back into the sea. Obviously it would need to be scaled up massively in order for it to change the balance of the sea but in certain areas if we were releasing a lot of very salty water, **could that have a localised environmental factor?.***
>
> **Male, 60+**

> ***I would require reassurance that any changes are only incorporated into a fully sustainable future plan***
>
> **Female, 45-59**

N.B. Customers did not mention any concerns surrounding the carbon emissions produced by a desalination plant, or the visual impacts of building a desalination plant

These concerns initially lead more than half to object to desalination as a method to obtain drinking water

19 do not support using desalination for drinking water

- Concerns about a change in taste and potential health implications are the guiding rationale

I like having high quality pure water at my disposal through the water ***taps. Anytime I taste the difference in it, I become wary of using the water to drink straight form the tap.***

Female, 45-59

14 support using desalination for drinking water

- These customers implicitly trust SWW will ensure quality drinking water is maintained

It is better than drying up rivers and larger sea water supply

Female., 30-44

Regardless of their vote, many customers feel they need more information to make a fully informed opinion

Specifically…

1. What will this cost?
2. Will it taste differently?
3. Are there are any potential health implications?
4. Is it sustainable in the long term?

I really do not have enough information to know how desperate you are for water, the additional cost on water bills and the degree of flexibility this would add to make any meaningful comment

Male, 60+

Context: Customers were finally asked to comment on whether desalination should be used in different situations

To conclude the study, customers were asked when South West Water should (or shouldn't) use desalination. They were asked to select one of the 4 options below:

- *Never. We should keep taking water from the rivers.*
- *Use it only during drought conditions when less water is available in the rivers*
- *During times of prolonged dry weather to preserve the levels in our reservoirs*
- *Use it all the time to reduce the amount of water we take from rivers*

VERVE

When customers consider circumstances such as drought conditions/ dry weather, many support desalination

16 believe desalination should be used in drought conditions or prolonged dry weather

- Many believe that desalination is best used as a 'fail safe' in times of drought to protect local wildlife dependent on rivers and reservoirs
- They see desalination is a viable short-term solution, but that SWW should be pursuing more sustainable means of obtaining water in the long term

I do not see desalination as a solution to the problem – more of an emergency quick fix back up plan

Female, 45-59

11 believe desalination should be used all the time to reduce water taken from rivers

- They believe that despite its higher cost, desalination causes less environmental damage to rivers than abstraction
- Therefore, they feel it should be used whenever possible

If SWW go to the expense of using desalination plants they should put it to full use and save the rivers.

Female., 60+

6 believe desalination should never be used and SWW should keep taking water from rivers

- The concerns of how this will…

1. Impact bills
2. Taste
3. Potentially damage health
4. Adversely impact sea wildlife

leads them to conclude this method should be abandoned in favour of alternate means to obtaining water

Maximise rain fall collection. Desalination is a ridiculous suggestion.

Male, 18-29

Customers would prefer desalinated water to be mixed with river water, believing this will taste better

Customers are strongly in favour of desalinated water to be mixed with river water because:

- They believe it will not change the taste in their water
- It will be safer to drink. They believe that UK enjoys higher quality water than other countries who use methods like desalination, and want to keep enjoying that privilege

> ***Directly desalinated water*** *contains minimal minerals so* ***tastes like shit.***
>
> **Male, 60+, SWW**

> ***Whilst it may be considered safe, I would still feel more comfortable especially if there were any issues with the filters during the desalination process.***
>
> **Female, 45-59, SWW**

> ***I think I would prefer it to go into a reservoir*** *and be filtered again. I have not tried desalinated water but suspect if it is to be used* ***it would be best to mix with river water so as to minimise any significant differences on taste.***
>
> **Male, 60+, SWW**

To conclude: Desalination raises some concerns but overall, customers believe it is a viable means of obtaining water

27/33 support desalination in some form

- 16 believe it should only be used in dry weather or prolonged droughts
- 11 believe it should be used whenever possible
- **These customers conclude that while not perfect, desalination is prefable to further damaging wildlife dependent on local waterways**

6/33 oppose desalination in any form

- The concerns of cost, difference in taste, health implications and sustainability credentials lead them to conclude there must be better ways to obtain water
- **They want SWW to reassure them that the above concerns are negligible, and that desalination is part of a long term, completely sustainable agenda**

Appendix: Stimulus viewed by customers

The Water Cycle

When it rains the ground becomes wet and you can see the water collect in puddles.

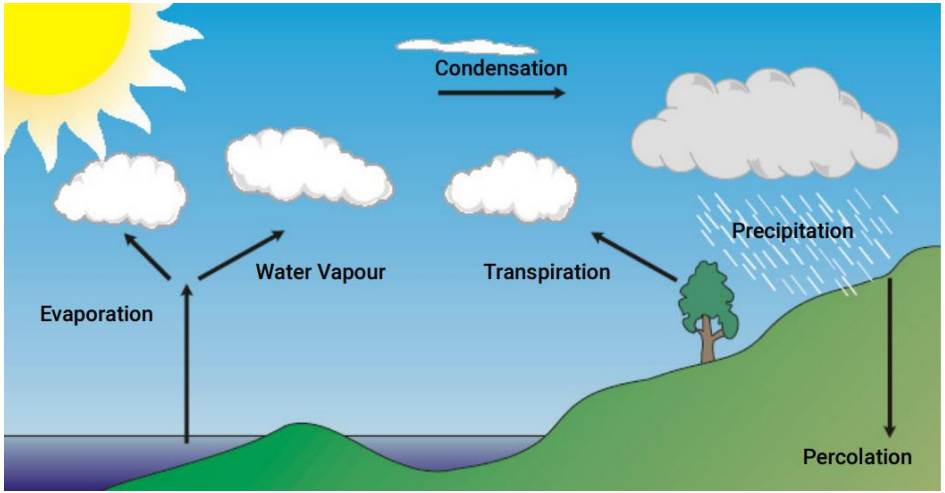
The seas, lakes and oceans are like giant puddles which never dry up, even though huge amounts of water are evaporated from them every minute.

Some of the water in rivers or underground aquifers is pumped out by the water companies and may join other sources of water on the journey to your sink or bath via your tap.

This water will eventually be returned into the drains and sewers after fulfilling a multitude of roles, some important to life, others less vital.

After travelling through the local sewage treatment works, the water will enter a river and eventually return to the sea.

South West Water gets its water from both surface stores (rivers, lakes and reservoirs) and groundwater stores.



A more detailed picture of how South West Water takes water from rivers and groundwater

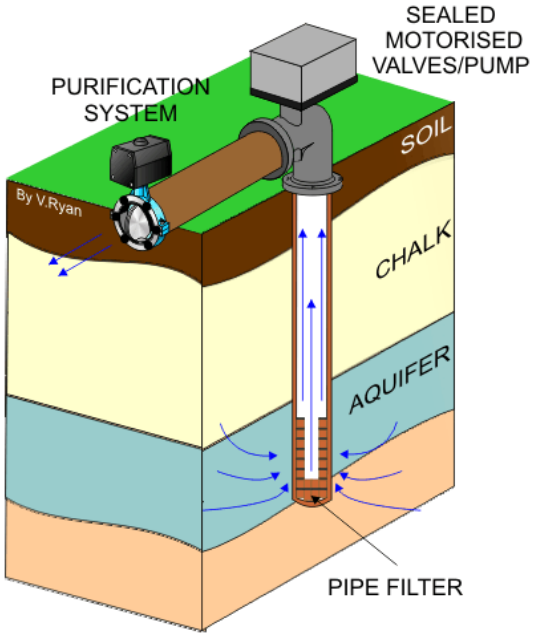
Water is abstracted from rivers and groundwater, treated and then piped to customers' homes and businesses as the public drinking water supply

Groundwater

- Rainfall filters into the ground and tops up groundwater
- Groundwater is stored naturally in layers of rocks that can hold water, these are called **aquifers**
- **Groundwater is abstracted (taken) by water companies by using boreholes**

Rivers

- Rainfall flows directly into rivers, known as ‘surface water runoff’
- Groundwater seeps from the aquifers into the rivers, providing important flow in the river
- **A lot of water can be taken from rivers and treated so it can be supplied as clean water.** In some places it is possible to build a dam across the river to form a lake, sometimes called a reservoir. Water is released from the reservoir to keep the river below it at a certain level



What are the environmental impacts of taking water from rivers and groundwater aquifers?

- Taking water from rivers, or from the aquifers that feed rivers and streams, can have a serious impact on both the natural environment and wildlife.
    - The flow of a river can be significantly reduced, especially in drier and hotter parts of the year.
    - Fish and other creatures and plants that depend on rivers and streams may struggle to thrive and survive in lower flowing water.
    - People who visit rivers for recreation, sport and leisure may be impacted, for example people fishing may have a poor experience.

Experts monitor data on the health of rivers and groundwater

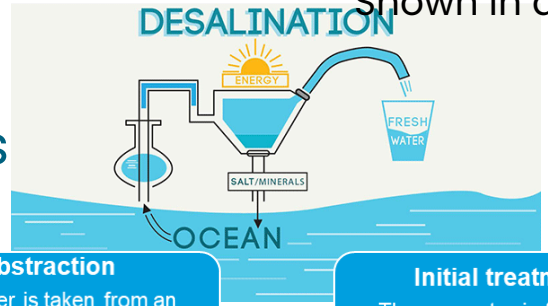
They consider if the abstraction of water impacts plants or wildlife

If negative impacts are identified, they consider what actions are needed

Shown in activity 1.4

Desalination involves taking water out of the sea passing it through a process which separates out drinkable water

- At the end of the process, we have drinking water which is very pure and super salty left-over water, sometimes referred to as brine, which can be put back into the sea.
- Desalination is used around the world for producing drinking water, it is frequently used on ships and on small islands.
- Compared to building new reservoirs which can take years of planning and development plus over a year to fill before they can come into use, desalination is relatively quick to bring online.
- South West Water currently run desalination plans on St Mary's on the Isles of Scilly which provides around 50% of the water for the island and there are also larger scale plants in operation in the UK such as those built to help supply London during periods of drought.



Abstraction
Sea water is taken from an underwater pipe and pumped to the nearby desalination plant. The inlet pipe is designed to be a slow-flow and has a screen to stop fish and marine animals being sucked into it

Initial treatment
The sea water is filtered to remove any larger debris and chemicals called coagulants added to remove smaller particles that could block the fine membranes

Filtering
The filtered water is passed through a very fine filter at high pressures in a process called reverse osmosis. A ceramic membrane catches all of the salt and minerals leaving behind clean water for treatment and a salty brine for removal

Waste removal
The waste product is very salty water called brine which can be returned to the sea through an underwater pipe where it can be quickly diffused into the wider area

Further treatment
The clean water is then pumped to a local works for treatment to bring it up to drinking water standards before it enters our supply network or can be mixed with other raw water in our reservoirs for storage until needed

However, Desalination is energy intensive (and therefore, expensive), which is why it is not typically used

- Standard water treatment processes, using raw water from rivers or groundwater sources use approximately 0.22 kWh to produce 1 cubic metre of water, desalination uses around 3 kWh per cubic metre.
- Even with the installation of solar panels or wind turbines on the site of the desalination works, extra electricity is usually needed to power the works.
- There are also challenges in ensuring that the water meets UK water quality standards – that the filters are good enough to stop any salts or other chemicals in the sea water getting into the supply. Desalination isn't currently approved for putting directly into the potable drinking water supply.

→ **Per cubic meter this is enough energy to boil a kettle 18 times or run a TV for 39 hours**

→ Renewables would likely contribute around 20% of the energy require

→ However the Drinking Water Inspectorate (DWI), who are responsible for regulating water quality are expected to approve it for use imminently

Therefore, Desalination is being considered as a temporary solution to help with the current drought conditions that are predicted to continue into next year; there are two possible ways to do this

Option 1. Desalinated water can be pumped into a reservoir to mix it with river water and then put it through one of South West Waters existing water treatment works and out into supply

- Putting it into a reservoir for secondary treatment will add more cost to the process (for pumping to the reservoir and the additional treatment) but would provide even more confidence in the quality of the water.
- This also has the added benefit of maintaining water levels in the reservoir for recreation and stored water levels for times of drought.

Option 2. Alternatively, once approved by the DWI, we could pump desalinated water directly into the supply network

- Pumping directly into the supply can help to keep the energy use and costs down as less energy is needed

Ronan

r.hegarty@addverve.com

Laura

l.ryan@addverve.com

And the rest of the team at **VERVE**