DRAFT WATER RESOURCES MANAGEMENT PLAN 2024

APPENDIX 7A – OPTIONS

Portsmouth Water Ltd
PO Box 8
West Street
Havant
Hants
PO9 1LG

October 2022

Forward Note

Appendix 7A contains the 'Portsmouth Water Options Appraisal WRMP24: Options Identification and Screening' report of options that was issued in August 2021.

A review of all Portsmouth Water feasible options was subsequently carried out in Spring 2021. As a result of this review and the improved information we had available at this point, there has been an additional option added, another removed from the Options to be included in the Supply Demand Balance and a change made to the delivery of our universal metering option.

Source O Booster

Since the report in this Appendix was issued there has been the addition of another option, Source O Booster. This option is therefore added as an addendum to the report.

Source O booster is a network reinforcement option generated to unlock unutilised deployed output (DO). This will allow an increase in DO pumping from 10Ml/d to 25Ml/d, as investigations have demonstrated previously, the Source O Boosters have reached 24Ml/d.

This option was developed because of our improved understanding of how our supply system operates during extreme drought conditions enabled by the Pywr water resources model built to support our Deployable Output assessment.

Table 7 in Addendum A displays the Feasible Option table for this option, in line with the details contained in the main report for the other Options considered.

Universal metering delivery time frame

Upon review, we have shortened the delivery period for universal metering from 15 years to 10 years. This assumption was updated following the delivery experiences of neighbouring water companies.

Havant Thicket Reservoir

Havant Borough Council's Planning Committee resolved to grant planning permission for both the reservoir and the pipeline between it and Source B2 Springs on 3 June 2021. As a result, the Havant Thicket reservoir was moved from being an Option, to being included in the baseline supply demand balance for this WRMP24.

Summary

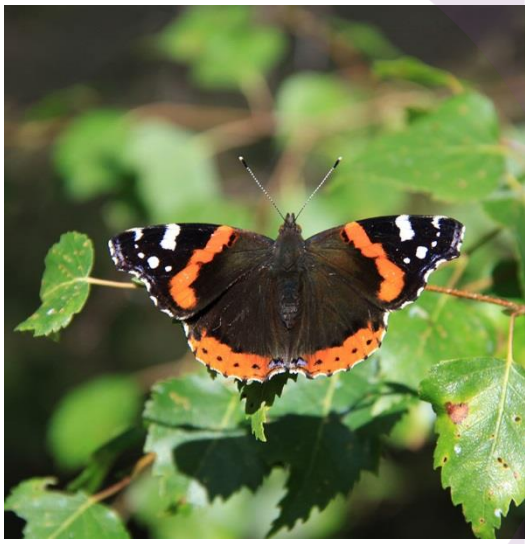
Following these updates, we started our Options screening with an unconstrained list of 137 options and completed the screening with a feasible list of 74 options, which then became a feasible list of 18 options after the 59 demand options were condensed into 4 demand management option baskets and the Havant Thicket reservoir was removed as an option.

Screening	Option screened out	Options carried forward	Additional information
Primary	137	121	Promotability of the option removed 59 Feasibility of the option removed 43 Retrofitting toilets and their issues described from other companies removed 4 Options flagged for future review removed 2
AMP7	6	115	Considered as part of the baseline within regional modelling.
Secondary	41	74	

Portsmouth Water

Portsmouth Water Options Appraisal WRMP24

Options Identification and Screening



Month Year
Wood Group UK Limited – August 2021

Report for

LC
Water Resources Manager
Portsmouth Water Ltd
P.O. BOX NO.8
West Street
Havant, Hampshire
PO9 1LG

Main contributors

AF
BF

Issued by

BF
.....

Approved by

.....

Wood Group UK Limited

Floor 23
25 Canada Square
Canary Wharf
London E14 5LQ
United Kingdom
Tel +44 (0)20 3215 1610

Doc Ref. 43167-WOOD-XX-XX-RP-Z-0001

Copyright and non-disclosure notice

Third party disclaimer

Management systems

This document has been produced by Wood Group UK Limited in full compliance with our management systems, which have been certified to ISO 9001, ISO 14001 and ISO 45001 by Lloyd's Register.

Document revisions

No.	Details	Date

Contents

1. Introduction

This report sets out the approach taken to develop an Unconstrained list of options and refine this list to a set of Constrained Feasible options, ready for use within WRSE's investment model. While this piece of work has a clear focus on supporting Portsmouth Water's contributions to the WRSE programme and the developing regional plan, the options developed from this process may ultimately feed into the company's WRMP24.

1.1 Purpose of this report

This work is being undertaken in a changing context, with the publication of the National Framework for Water Resources, there is a requirement for regional planning groups to develop regional resilience plans and respond to revised guidance for water resource planning (and assessment). The Water Resource South East (WRSE) regional plan sets a high level of ambition with an expectation of greater collaboration across the industry, not least through the development of bulk transfers and the formation of best-value plans. In response, for this round of planning, Portsmouth Water has recognised that they need to ensure the preparation of the WRMP24 is fully integrated with the WRSE regional plan to form part of a resilient, regional, multi-sector plan.

1.2 Overview of the Options Appraisal Process

Figure 1.1 WRSE options appraisal process (Figure 2-3 within Mott MacDonald, 2020a).

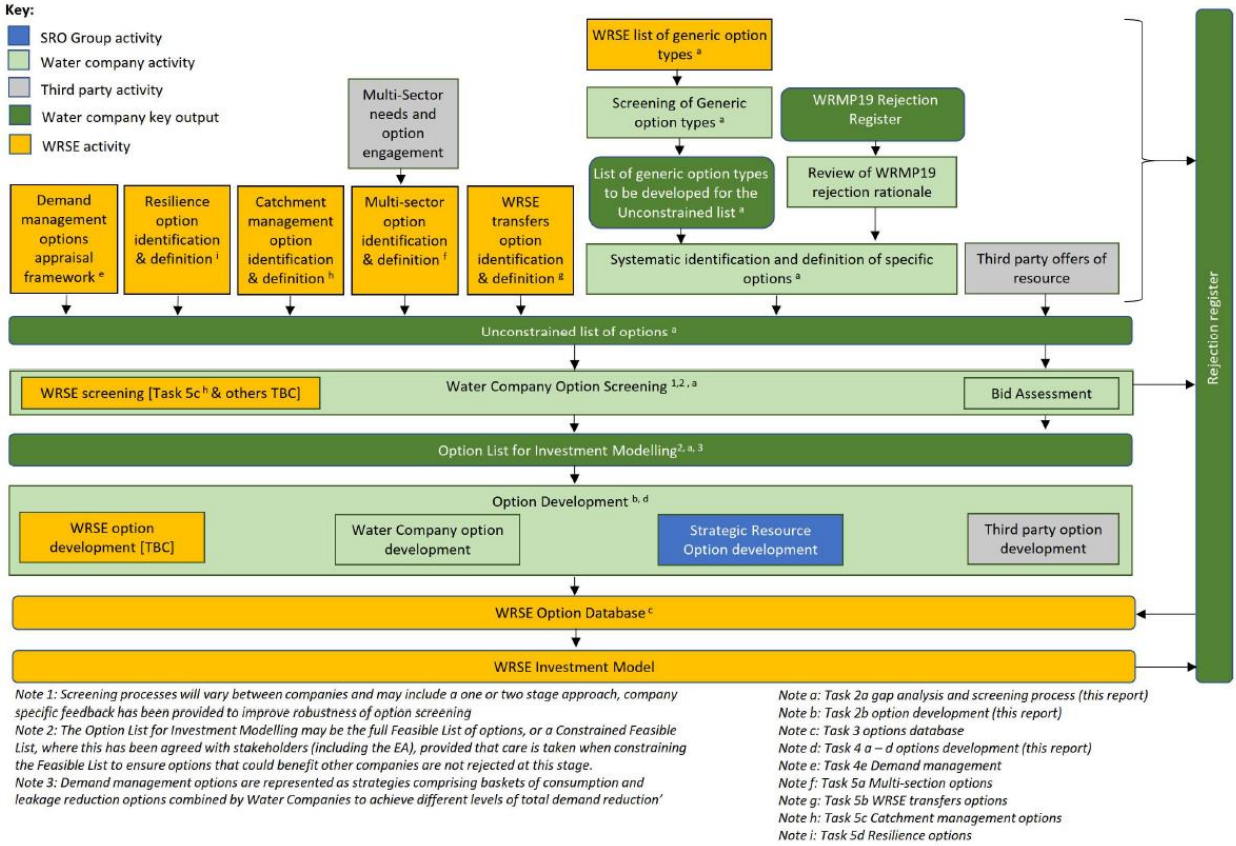


Figure 1.1 summarises the overall options appraisal process for WRSE - from the exploration of generic option types, through to investment modelling. In broad terms it sets out how, starting with the widest range of options, a process whereby this list is refined allows option types and/or specific options to be rejected for robust reasons at different stages. The figure indicates where WRSE-led workstreams and water company activities run in parallel. This report presents the approach and outputs of Portsmouth Water's contributions highlighted in red. This report touches on the approach to "Option Development", but details on this are provided for specific options to be taken forward for investment modelling separately.

WRSE Recommendations for Portsmouth Water's approach

WRSE provided Portsmouth Water with general recommendations (Mott MacDonald, 2020b) following a review of WRMP19 approaches and clear recommendations for changes needed in this round of planning to address deficiencies, transparency and ensure the balance of potential options considered are appropriately broad to provide WRSE and Portsmouth Water with a robust suite of feasible options that can be used to develop a resilient, best-value plan.

The recommendations are summarised below, along with references to where they are discussed further and/or adopted elsewhere in this report.

Terminology used to define the options lists passing through stages of screening should be amended to align with the updated WRPG terminology.

- New terminology has been applied as per the descriptions **below**.

A generic option exploration stage should be documented, taking as a starting point the list of option types included in the 2021 UKWIR WR27 Water Resources Planning Tools project EBSD report. Note that WRSE have expanded on this list for some option types. Portsmouth Water should demonstrate that (ideally from first principles) all potential options of a given type have been identified.

Development of the Unconstrained ListExisting rejected options (those rejected in WRMP19) should be reviewed to ensure that all rejected options have a coherent reason for rejection that can be stored within WRSE's options database. The reason should be self-evident, robust and ideally without a need for reference to other sources unless further detail is required. As part of the review of rejected options from WRMP19, Portsmouth Water should consider whether rejection remains robust if increased water resources needs for Portsmouth Water or neighbouring companies and regional needs are taking into account. This should include a review of options where mutual exclusivity with Southern Water's options was an issue in WRMP19.

- This work is presented in **Section 2.1** Development of the Unconstrained List below.
- The approach to option screening is presented in **Section 3** Option Screening.

The new WRSE option referencing system for both rejected and feasible/constrained feasible options should be used.

- Use of the new option referencing system is discussed in **Section 2.1** Development of the Unconstrained List **below**.

Options for water reuse should be reviewed with Southern Water.

- An overview of engagement with Southern Water is given in **Section 3.2** Secondary Screening.

Rejected non-household demand management options should be reviewed in the context of the new Ofwat requirements for wholesalers to engage with retailers to promote non-household water efficiency.

- The outcome of this approach is presented in **Section 3.2** Secondary Screening.

Existing and potential new blue-green infrastructure (including catchment management) options should be reviewed to consider if they could bring wider benefits, in particular if blue-green options could have an environmental or social benefit. Deployable output benefits for such options may include preventing future deployable output reductions due to water quality issues and increasing the acceptability of some Drought Order and Drought Permits.

- This work has been conducted in collaboration with the WRSE task on blue-green infrastructure.

Drought Permit and Drought Order options should be included in the unconstrained list. In addition, consideration should be given to other potential options for responding to regional events, such as tankering.

- This work has been conducted in collaboration with the WRSE task on resilience options.

Terminology

For consistency across companies, WRSE proposed the following terms to describe options at various stages within the options appraisal and development process:

Generic list of option types: A list of all possible option types based on the 2012 UKWIR WR27 Water Resources Planning Tools project EBSD report, and expanded upon by WRSE.

Unconstrained list: All specific options that have been identified for appraisal.

Feasible list: Options which pass a primary screening process and may progress to be screened through a secondary screening process. The feasible list needs to comply with the WRPG requirement that the option must be considered *"suitable to take forward for assessment as part of your preferred programme of options. As such, it should not include options with unalterable constraints that make them unsuitable for promotion. For example, unacceptable environmental impacts that cannot be overcome or options which have a high risk of failure."*

Constrained Feasible List: This is the list of options that have passed the company's secondary screening process and are to be entered into the investment model.

Note that company option references are used in this report for simplicity and to aid tracking options that have passed through previous planning cycles. WRSE option referencing standards (which lead to lengthy option references) are used subsequently within the WRSE options upload template, defined by the appropriate selection of option categorisation.

2. Unconstrained List of Options

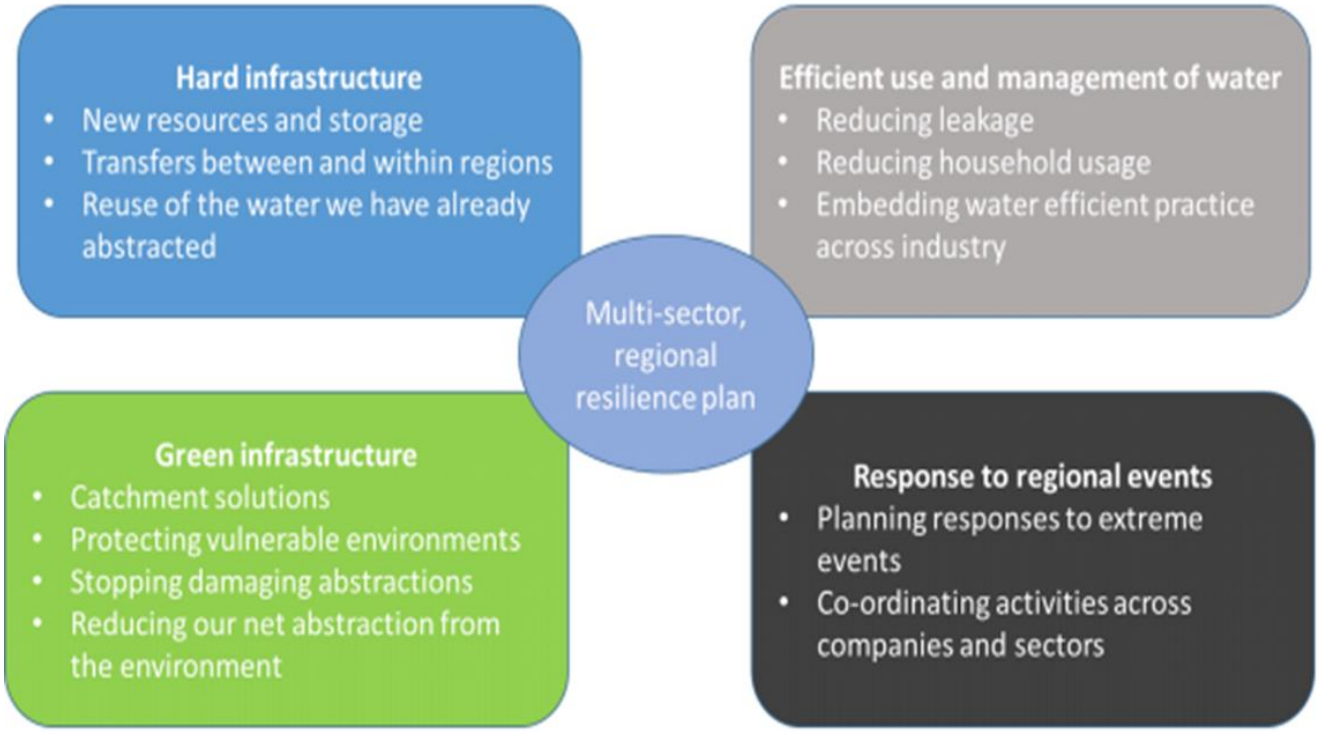
The shift from WRMP19 to WRMP24 and the associated expectations on water companies to work with water retailers, develop regional and inter-regional solutions, achieve greater resilience and environmental improvement, means that the unconstrained list of options needed to be re-visited and built upon in a systematic way. Further, as set out in **Section 3**, the way in which these options are screened needs to ensure that the constrained feasible list of options does not exclude options that ought to be available to the WRSE investment model and the development of a best value plan.

In WRMP19, Portsmouth Water's options appraisal focused on resolving company-level challenges. There were constraints on the ability to drive ambitious demand management (universal metering, or options to reduce non-household consumption for instance) or schemes that would provide benefits at a regional scale.

For the developing regional plan, and subsequently WRMP24, WRSE recommended that companies ensure that the unconstrained list includes all possible options - starting with a systematic exploration of generic option types and a review of WRMP19 unconstrained lists and rejected options.

A summary of option groups as developed by WRSE is shown in on **Figure 2.1**, broadly covering hard infrastructure, efficient use and management of water, green infrastructure (including catchment management), and response to regional events (including Drought Orders and Permits).

Figure 2.1 WRSE option groups



2.1 Development of the Unconstrained List

Portsmouth Water's unconstrained list was developed as follows:

- Review of generic option types
- Validation and review of existing Portsmouth Water WRMP19 options
- Review of WRMP19 rejected options
- Identification of new WRMP24 options
  - Internal Portsmouth Water options workshops focused on option groups
  - Option submission forms
  - Portsmouth Water executive team engagement
  - Engagement with the Environment Agency and Southern Water

In addition, as shown in **Figure 1.1,** parallel WRSE workstreams focused on the identification of catchment and multi-sector options, transfers and resilience options.

Generic Options screening

WRSE provided a list of generic option types, building on those set out in the 2021 UKWIR WR27 Water Resources Planning Tools project EBSD report.

An initial high level review/screening of these generic option types and sub-types was carried out in order to steer the subsequent identification of specific options within the groups that were deemed to be relevant to Portsmouth Water, and its role within the WRSE region. This is shown in the table below.

It is clear that at this early stage in the process, very few option types are excluded.

Following the development of the unconstrained list of options, the list of generic option types screened in were reviewed again to ensure that, where possible, all option types were represented. This is set out **below** at the end of this section.

Generic option	Option type	Option sub-type	Generic option screening
Blue Green Infrastructure			
Catchment management	Catchment management schemes	Catchment management schemes- Agricultural Activity	Yes
		Catchment management schemes- Flood storage/ wetland creation	Yes
		Catchment management schemes- Habitat creation on chalk aquifers	Yes
		Catchment management schemes- Nitrate reduction	Yes
		Catchment management schemes- Payments for ecosystem services	Yes
		Catchment management schemes- Pesticide reduction	Yes
		Catchment management schemes- Reconsider existing fish practices	Yes
		Catchment management schemes- River restoration	Yes
		Catchment management schemes- Supporting river flows	Yes
		Catchment management schemes- Using SUDs to replenishing aquifers	Yes
Other	Water quality schemes that may have the coincidental effect of increasing the deployable output (DO) of a source works		Yes

Efficient use and management of water			
Consumption reduction	Advice and information	Advice and Information- on direct abstraction and irrigation techniques	Yes
		Advice and information- on leakage detection and fixing techniques	Yes
	Awareness campaigns	Awareness campaigns - Targeted water conservation information (advice on appliance water usage)	Yes
	Change to existing measured tariffs	Changes to existing measured tariffs- Drought protection	Yes
		Changes to existing measured tariffs- Other	Yes
		Changes to existing measured tariffs- Volumetric charges	Yes
	Compulsory metering	Compulsory metering- Household	Yes
		Compulsory metering- Non-household	Yes
		Compulsory metering- Selective	Yes
	Enhanced metering	Enhanced metering- Household	Yes
	Enhanced metering, AMI Smart metering	Enhanced metering, AMI Smart metering- For all Customers	Yes
	Home visits to reduce plumbing losses		Yes
	Introduction of special fees		Yes
	Introduction of special tariffs for specific users		Yes

	Meter installation policy	Meter Installation policy- Regional / national level	No - Regional/national level policies
		Meter Installation policy- Water Company Level	Yes
	Metering of sewerage flow	Metering of sewerage flow to manage water consumption and water wastage	No - Portsmouth Water is a water-only company
	Promotion of water saving devices	Promotion of water saving devices- Retrofitting (new or subsidised)	Yes
	Reduction in other consumption		Yes
	Sponsoring water efficiency enabling activities by others		Yes
	Water recycling grey water reuse	Water Recycling grey water reuse- existing household and non-household	Yes
		Water Recycling grey water reuse- new household and non-household	Yes
	Water use audit and inspection	Water use audit and inspection - Household and non-household water efficiency	Yes
Loss reduction	Customer supply pipe leakage reduction		Yes
	Diagnostic studies- for production losses		Yes
	Improved leakage detection and reduction on raw water mains		Yes
	Increase water treatment works (WTW) efficiency		Yes
	Leakage enabling schemes		Yes

	Leakage reduction	Leakage reduction- Active Leakage Control	Yes
		Leakage reduction- Asset renewal	Yes
		Leakage reduction- Customer engagement / education / incentives	Yes
		Leakage reduction- Pressure reduction programmes	Yes
		Leakage reduction- Speed and quality of repairs	Yes
		Leakage reduction- trunk mains and service reservoir leakage reduction	Yes
Other	Rainwater harvesting		Yes
	Sea water for industrial processes and cooling		Yes
Outage reduction	Interventions to reduce outage risk		Yes
Hard infrastructure			
Desalination	Desalination		Yes
Groundwater	Aquifer recharge / Artificial recharge		Yes
	Artificial Storage and Recovery wells or Aquifer Storage Recovery (ASR)		Yes
	Groundwater sources (new source /improve existing sources with or without licence change		Yes
Import	Bulk transfers		Yes

Other	Abstraction licence trading	Yes
	Asset Transfers	Yes
	Conjunctive use operation of sources	Yes
	Joint (“shared asset”) resource	Yes
	Options to trade other (infrastructure) assets	Yes
	Tidal barrage	Yes
Removal of constraints	Distribution capacity expansion	Yes
	Increase water treatment works (WTW) capacity	Yes
	Redevelopment of existing resources with increased yields	Yes
Reservoir	New reservoir	Yes
Reuse	Reclaimed water, water re-use, effluent re-use	Yes
River abstraction	Direct river abstraction	Yes
Transfers	Bulk Transfers	Yes
Response to regional events		
Drought orders	Drought intervention - Drought Order	Yes

Drought permits	Drought intervention - Drought permit		Yes
Other	Change in level of service to enhance water available for use (WAFU)		Yes
	Drought intervention - recommission abandoned sources		Yes
	Imports (icebergs)		Yes
	Rain cloud seeding		No - not considered for the unconstrained list
Transfers	Drought intervention - Temporary transfer		Yes
	Tankering of water	Tankering of water- Road Tankering	No - not considered for the unconstrained list
		Tankering of water- Sea Tankering	Yes

Validation of WRMP19 Options

A validation review was undertaken of existing options within Portsmouth Water's WRMP19. These totalled 184 options: 1 within the Blue Green Infrastructure/Catchment management group; 97 Efficient Use and Management of Water; 69 Hard Infrastructure; 17 Response to Regional Events.

All existing options from WRMP19 (both feasible and rejected), and newly identified options were mapped to the new WRSE option referencing system as per WRSE recommendations. An example is shown in **Figure 2.2**. The full list is found in the master options identification and screening spreadsheet[1].

158 options from the WRMP19 unconstrained list were screened out in WRMP19 and did not reach the feasible list. However, all options were re-screened as part of the process described in **Section 3**.

Figure 2.2 Mapping existing and new options to the WRSE referencing system

Reference code (use)		Option Name (use)	Option Description (use)	Generic option code	sub-type if require	Is there a sub-type?	Generic Option Group	Generic Option Description - primary type	sub-type	Generic Option Description with sub-type	WRSE Option type
C001	(C001) Me	Meter non-HH	A small number of commercial and public sector premises remain unmetered. This option would involve additional activity and effort to go beyond the baseline non-household metering activity. It would require unmetered commercial and public sector properties to be revisited and property water supply line obstacles overcome in order to install the meters. The meter style would be either AMR or Smart Meters.	2.1.1	2.1.1.3	Y	Efficient use and management of water	Compulsory metering	Non-household	Compulsory metering- Non-household	EF-MTR
D013	(D013) Pr	Pressure reduction	The SELL assessment identified that there were some (limited) options for further pressure management at a sub-DMA level. The UKWIR long term leakage targets pressure versus expenditure relationship was used to estimate the cost of further pressure reduction. AISC cost curves were derived and used to determine the AISC cost for a further potential leakage reduction of 2.7 Ml/d.	2.2.2	2.2.2.5	Y	Efficient use and management of water	Leakage reduction	Pressure reduction programmes	Leakage reduction- Pressure reduction programmes	EF-LKR

Initial gap analysis

Following the validation of WRMP19 options, a basic gap analysis was undertaken against the generic option types, taking into account Portsmouth Water's water resources context:

Catchment management options: The WRMP19 unconstrained list had a general lack of options within this category. This was not surprising considering the focus of WRMP19 remained very much on addressing public water supply deficits – in contrast to the WRSE regional plan, which seeks to achieve wider benefits. Additional options to explore beyond the WRMP19 list may include river enhancements, augmentation schemes, habitat creation (and other schemes to offset the need for licence reductions or build resilience in the aquatic environment). The viability of runoff storage for the benefit of agricultural users in the coastal plan may also be considered.

- WRSE's Catchment Management workstream conducted a separate search for catchment and multi-sector options via catchment workshops and subsequent consultation with Portsmouth Water. Options identified via that process were screened and developed separately by WRSE's team.

Efficient Use and Management of Water: While there were a large number of options within this category, the main gaps identified at this stage were those linked to non-household users, both those using mains supply and independent supplies. Advice and efficiency audits for agricultural users and other business for example, outage reduction, rainwater harvesting options (which may be more viable for some of the larger non-household sites within Portsmouth Water's supply area such as the military dockyards, or large growers). Leakage detection and advice/support for non-household users could also be explored (for example at holiday parks).

[1] WRMP2024_UCOptions & screening_v10.1.xlsx

Hard infrastructure: Being more "traditional" in nature, the existing unconstrained list contained a good variety of options within this category. The main potential gaps were found in a more detailed review of potential shared resources and transfers.

- WRSE's Transfers workstream carried out a thorough review of potential inter zonal and inter-company transfers for subsequent testing within the investment model. Options identified via that process were screened and developed separately by WRSE's team.

Response to regional events: Within this option category, most sub-types were already covered within the existing unconstrained list. Resilience of other non-household and business users is an area for Portsmouth Water and the regional plan to consider further however.

- In addition to further review by Portsmouth Water, WRSE's Resilience Options workstream worked with the WRSE member companies to identify and screen additional options for resilience-building purposes (resilience of individual sources, network connectivity, and solutions to build resilience to non-drought hazards).

Identification of New Options

To address deficiencies in the existing unconstrained list of options, internal Portsmouth Water workshops were held. Participants from across various teams and specialties within Portsmouth Water and technical specialists from Wood were invited to actively engage in discussion regarding options which should potentially feature in the WRMP24 unconstrained list.

Focus sessions took each of the generic option categories in turn, giving participants (across Portsmouth Water's teams) an overview of the types of options being sought, background regarding the types of options considered in previous planning cycles, and also providing feedback from the initial gap analysis described above, to prompt the discussion.

The discussions were engaging, giving those that don't typically have involvement in water resources planning an opportunity to generate ideas, particularly around customer-facing options, due to the fact that most attendees are of course Portsmouth Water customers.

During the workshop sessions notes were taken of suggestions and ideas, which were then compiled to generate a preliminary list of 59 *potential* unconstrained options[2]. Each *potential* option was recorded with a unique reference (beginning WS_01) and name, basic description, and any associated commentary from the workshop (case studies, benefits, risks etc). These *potential* options underwent a pre-screening check (described briefly in **Section 3** (checking for duplication or relevance for example). Those that were to be taken forward to the unconstrained list of options were mapped to the WRSE option referencing system.

29 options were added to the unconstrained list following pre-screening: 8 Blue Green Infrastructure/Catchment Management, 14 Efficient Use and Management of Water, 5 Hard Infrastructure, and 2 Response to Regional Events.

Following the workshop, 'option submission forms' (see **Appendix C**) were internally dispatched to Portsmouth Water staff which provided opportunity to submit additional option ideas to feature in the unconstrained list.

18 *potential* options were received via this route[3]. These were assigned unique references (beginning OF_01) and underwent the same pre-screening that workshop submissions went through before 15 were selected to be included in the unconstrained options list. 9 Efficient Use and Management of Water, and 6 Hard Infrastructure options.

[2] See worksheet "CollatedWorkshopNotes_WRMP24" within WRMP2024_UCOptions & screening_v10.1.xlsx
[3] See worksheet "OptionFormsRecieved_WRMP24" within WRMP2024_UCOptions & screening_v10.1.xlsx

Figure 2.3 Example slides used to prompt discussion in Portsmouth Water option identification workshops

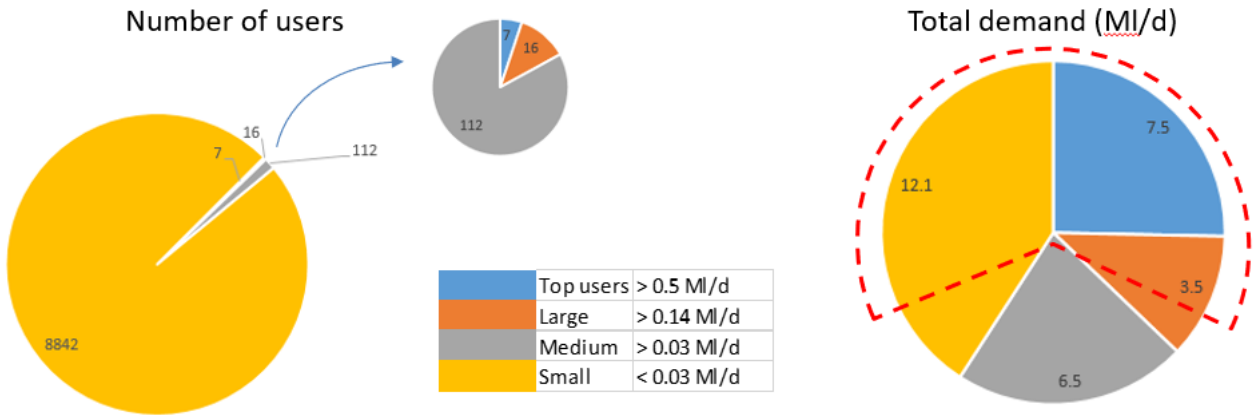
Additional option identification

Following the internal workshops, a need for further work was identified to support the development of options relating to non-household demand. Non-household user and demand data (from MOSEL) was used to develop an improved understanding of the characteristics of the user base. The data was broken down by sector, supply points and average demand ranking. This exercise revealed that, due to the large amount of variation in water use and drivers of demand amongst non-household customers, different types of options would be required. **Figure 2.4** (taken from a slide presentation given to Portsmouth Water's Executive Team) presents a high level illustration of the need, when considering demand reduction options, to differentiate between the relatively small number of very large users, and the very large number of small users.

In addition, the team began to distinguish between non-household users whose demand may be dominated by "domestic-style" uses of water (e.g. kitchens, toilets, taps etc) and those that also had process or other large uses of water, in addition to those most likely to have large customer-side networks where leakage may occur unnoticed.

This exercise resulted in the identification of an additional 9 options to be added to the unconstrained list, targeting leakage reduction in large non-household customers, small business efficiency audits, and others aimed at specific sectors (e.g. the leisure or agricultural sectors).

Figure 2.4 Exploring non-household demand to inform option identification



- Top 7 users = 7.5 Ml/d (approx. 30% of total)
- Customer side average leakage may be the region of 20-30%

NameCleaned	Retailer	SPIDcount	MIC_Desc	Volume Mld	Equivelent Persons
Ancala Water Services	BUSSTREAM-R	16	Water Supply Industry	2.79	18,598
Natures Way Food	CASTLE-R	5	Agriculture and Horticulture	1.09	7,281
Bourne Leisure	TWRC-R	6	Other Tourist or Short-Stay Accommo	1.06	7,047
Southern Water Services	CASTLE-R	118	Refuse Disposal Sanitation and Simila	0.76	5,069
Portsmouth Hospitals Nhs Trust	CASTLE-R	3	Hospitals Nursing Homes Etc.	0.76	5,047
Portsmouth City Council	ADSM-R	113	National and Local Government Servic	0.55	3,636
Hampshire County Council	BUSSTREAM-R	177	School Education (Nursery Primary ar	0.51	3,368

Engagement with Southern Water

Effluent reuse and desalination options were reviewed via engagement with Southern Water. Most possible options had been taken on by Southern Water to be included within their own unconstrained list.

However, an additional suite of options was identified with links to Havant Thicket winter storage reservoir. Southern Water (SWS) have since built elements of this into their Strategic Resource Option (SRO) submissions to Ofwat.

Under the current design for Havant Thicket, the reservoir will be filled and topped up from the Source B Springs in the winter (Chalk spring water pumped up to the reservoir) and provide 20-30Ml/d. Reservoir water will, in the summer/during drought be drawn down to an existing treatment works at Works A via a new 25Ml/d capacity DAF plant.

Southern Water are facing massive pressures in Hampshire and are at risk of losing existing sources in the Test and Itchen catchments. As a result, they are now developing a strategic option to develop a raw water transfer pipeline between Havant Thicket reservoir and their existing works at SRN Source A. Capacity variants on this up to approximately 100Ml/d are being considered. This is possible because SWS are considering using recycled water from their SRN Works A WWTW to top up the reservoir. Southern Water are looking into this as a drought resource and to alleviate an MDO issue. However, with such capacity potentially available, SWS and Portsmouth Water are now exploring an opportunity to create a more frequently used spur off SWS's Havant Thicket-SRN Source A raw water transfer to feed water to new treatment capacity at Reservoir C. This would offset loss of sources in the Meon catchment that Portsmouth Water are facing due to regulatory pressure to reduce impacts on Chalk streams in the western portion of their supply area.

In addition, with a dependency on the above already being in place, increased treatment capacity at Works A and network capacity to Reservoir B could compensate for possible loss of sources in the Ems catchment

under certain environmental destination scenarios. Reservoir B service reservoir is deemed to be a suitable destination for replacement treated water.

Figure 2.5 provides a high level schematic of these options, which were added to the unconstrained list.

Figure 2.5 Basic schematic of additional options relating to Havant Thicket reservoir

2.2 Summary of the Unconstrained List of Options

In total the unconstrained list is composed of 258 options (this includes 184 existing WRMP19 options and 74 new options identified for WRMP24)[4].

Table 2.1 Origin of options within the unconstrained list

WRMP19 existing options (including rejection options)	No. of new options identified through submission forms (excluding those pre-screened for clear duplication)	No. of new options identified through company workshops (excluding those pre-screened for clear duplication)	No. of new options identified via other routes (excluding those pre-screened for clear duplication)	Total new options	Total no. of unconstrained options
184	15	29	30	74	**258**

Note that where appropriate, the unconstrained list includes size variants for some options. In some cases these might be mutually exclusive, or the option may be developed in phases.

Check against generic option types

Following on from the screening of generic option types shown in **Section 0,** a final review of the unconstrained list was carried out to count the number of options assigned to each type or sub-type.

Gaps were found in a small number of sub-types. These were explored in more detail. While all options in the unconstrained list were mapped to the new WRSE referencing system through the use of the expanded generic option typology, there are many cases where selecting an appropriate option type can be challenging, with more than one being of possible relevance. In most cases, this explains the absence of options within some sub-types. A brief overview is shown in **Table 2.2**, giving added confidence that, alongside the separate WRSE option identification workstreams, Portsmouth Water's unconstrained list of options is comprehensive.

Table 2.2 Review of generic option types for which no unconstrained options were assigned

Option type	Sub-category	Commentary on gap
Catchment management	Catchment management schemes-Habitat creation on chalk aquifers	River restoration referenced in other options without specific mention of Chalk aquifers. WRSE catchment management option programme may build on this, pending outputs.

[4] For full unconstrained list (and screening), see worksheet "WRMP24 Uncon & Screening" within WRMP2024_UCOptions & screening_v10.1.xlsx

Option type	Sub-category	Commentary on gap
	Catchment management schemes- Payments for ecosystem services	Existing WQ land management schemes referenced without reference to payment for ecosystem services. WRSE catchment management option programme pending outputs.
	Catchment management schemes- Pesticide reduction	Existing WQ land management schemes referenced without reference specifically to pesticide reduction.
	Catchment management schemes- Using SUDs to replenishing aquifers	No options identified specifically. WRSE catchment management option programme outputs pending.
Consumption reduction	Changes to existing measured tariffs- Other	Captured in other tariff types
	Home visits to reduce plumbing losses	Captured within "Water use audit and inspection"
	Introduction of special fees	Covered via consideration of tariffs and incentives elsewhere
	Meter Installation policy- Regional / national level	None identified. Only company-level policies. Not deemed relevant.
	Metering of sewerage flow to manage water consumption and water wastage	PW a water-only company. None identified, only metering of supply.
Loss reduction	Diagnostic studies- for production losses	Production losses were discussed during company workshops, but no further actions identified beyond recent work in this area.
	Leakage enabling schemes	Covered by leakage action via other routes or via direct customer engagement (HH and non-HH).
	Leakage reduction- Active Leakage Control	ALC is covered by separate work package led by Portsmouth Water and captured within the draft leakage reduction strategy submitted to WRSE.
	Leakage reduction- Asset renewal	ALC is covered by separate work package led by Portsmouth Water and captured within the draft leakage reduction strategy submitted to WRSE.
	Leakage reduction- Customer engagement / education / incentives	Covered under leakage within consumption reduction category 2.1.2, Advice and Information
Hard Infra. Other	Joint ("shared asset") resource	The major joint asset considered is Havant Thicket, and this is assigned to the reservoirs category. No others identified.
	Options to trade other (infrastructure) assets	Third party trades were considered but assigned to other categories (e.g. GW). No specific trades identified.
Removal of constraints	Increase water treatment works (WTW) capacity	No new schemes identified to address constraints directly. Major increases associated with Havant Thicket. Note that increased water treatment may form an element of other options categorised under different headings
	Redevelopment of existing resources with increased yields	These were considered but categorised under different headings (e.g. GW)
Transfers	Drought intervention- Temporary transfer	No options identified. WRSE transfer programme may identify options of this nature, or via the regional optimiser.

3. Option Screening

The screening methodology used here is adopted from the WRSE recommended process. The full unconstrained list of options as described above have passed through the screening process in the same way.

Pre-screening and checks/assignment of links etc

Newly identified *potential* options underwent an initial pre-screen to determine whether they were relevant to the planning challenge, or obviously represented a duplication of an existing option before being added to the unconstrained list. *Potential* options may also have been excluded for lack of specific details, in some cases remaining generic in nature.

Full screening results for both primary and secondary screening can be seen in worksheet "WRMP24 Uncon & Screening" within WRMP2024_UCOptions & screening_v10.1.xlsx.

3.1 Primary Screening

Primary screening reviewed options for showstoppers and provided 5 tests (**Table 3.1**). Criteria were considered on a pass/fail basis at the primary screening stage. Failure against one criteria, with appropriate justification captured, was sufficient to screen an option out. Early engagement with the Environment Agency supported the assessment of a number of supply options against the question "Is the option promotable - will it likely be objected to by regulator/ customer?".

Of the 258 unconstrained options, 137 were screened out at the Primary stage. The two tests that caused the greatest number of options to be screened out were criteria D – Promotability, and criteria A – Technical feasibility, causing failures for 59 and 43 options respectively.

4 options were screened out that were previously considered preferred options in WRMP19 for Portsmouth Water. This included option C034 retrofitting existing toilets with dual flush mechanisms. Recent experience amongst other water companies suggests that dual flush toilets are more likely to develop a leak than regular flush mechanisms. Bearing in mind the potentially significant effects of "leaky loos" on a household's water consumption, it was deemed appropriate to remove this option from the feasible list.

2 options (C048, C049) were screened out at this stage, but flagged for potential review in the near future as case-specific opportunities or trials arise. These relate to rainwater harvesting and greywater recycling in new homes.

Options rejected at this stage and subsequent stages were added to the Rejection Register[5], recording their stage of rejection, the criteria that caused the rejection, and a concise summary of the reason for rejection.

[5] 43167-WOOD-XX-XX-CA-Z-0001_S3_P04_Rejected Options_update 06.08.2021.xlsx

Table 3.1 Primary screening criteria

Ref.	Criteria	Description	Assessment
A	Is the option technically feasible?	Does the option use proven solutions deployed in a way that will provide a reliable water supply?	N = fail
B	Does the option address the planning problem?	Does the option contribute to addressing the Public Water Supply (PWS) water resources planning problem at the WRZ and regional level (e.g. consider whether need is annual average, critical period, 1:200, 1:500). Include consideration of benefits in terms of mitigating potential resource reductions (e.g. due to water quality or sustainability). Consider Non-PWS needs identified and whether the option could contribute to addressing these.	N = fail
C	Does the option avoid breaching any legal constraints?	For example, are there planning and environmental restrictions associated with designated sites including SSSIs, SACs, any health and safety regulations and legal restrictions.	N = fail
D	Is the option promotable - will it likely be objected to by regulator/ customer?	Is there strong evidence that the option is not promotable, for example due to strong objections by the Environment Agency or customers.	Y = fail
E	Indicative cost and option capacity. Is the option clearly excessively costly?	A good basis for cutting down a very large options set to a size that is manageable from the point of view of analytical tractability is to carry out a qualitative assessment of ball-park financial costs... Options should only be rejected against this criteria at primary screening where the there are substantially more options to address regional needs at substantially lower costs.	Y = fail

121 options were screened in after Primary Screening to form the Feasible List. 17 of these were existing preferred options from WRMP19. 6 of these are set for delivery prior to AMP7 and so are to be considered as part of the baseline within regional modelling. As such, these options were subsequently screened out for further consideration as options post 2024/25. There options are:

Table 3.2 Options set for delivery during AMP7 – now considered baseline

Option ref.	Option short name
D004a	Permanent noise loggers (Phase 1)
D004b	Permanent noise loggers (Phase 2)
R021a	Source O DO recovery
R022a	Source J - Maximising ADO and PDO
R023a	Source H DO recovery
R024a	Source C Group - Maximising DO

45 options that did not reach the feasible list in WRMP19 passed primary screening using the new criteria. These include options linked to universal metering and smart metering, non-household users, and options with wider potential regional benefit.

3.2 Secondary Screening

Secondary screening was divided into two phases, 2a (conducting a preliminary environmental screening of options with physical assets or activities against SEA, HRA and WFD measures) and 2b (a qualitative review against a number of further tests), again following the WRSE recommended approach. After some consideration it was decided that phase 2b would be carried out prior to 2a to avoid unnecessary work in defining geographic locations for assets or other activities for options that might be more efficiently, and robustly screened out against one of the qualitative tests. The simple, proximity-based nature of the preliminary environmental assessment against SEA, HRA and WFD objectives risks missing critical pathways of impact or likely mitigation.

The phase 2b secondary screening criteria (set out below in **Table 3.3**) were assessed using a RAG (Red, Amber, Green) system. In contrast to the primary screening tests, a more measured approach is taken, whereby the results against all criteria are taken collectively to arrive at a final screening verdict. To support the process, a simple matrix was used to derive an overall secondary screening RAG outcome. However, this derived colour did not define the final screening verdict rigidly, but informed it alongside a considered view of the range of screening tests.

Table 3.3 Secondary screening criteria (stage 2b)

Ref.	Criteria	Description	Assessment
i	Incremental cost	Where options are mutually exclusive cost may be an important factor for identifying the better value options. In some cases, proxies for cost may also be useful e.g. comparison of pipeline length and pumping head for transfers of similar capacities. Where there are substantially more feasible options than required then incremental costs can be a useful tool for helping constrain the list to a manageable size. Where cost comparisons are undertaken between options of different sizes higher thresholds should be set for smaller option sizes. Where comparisons are undertaken between options with different proportions of fixed and variable costs then sensitivity of decisions to utilisation should be conducted (e.g. by comparing incremental costs at both maximum and minimum utilisation).	RAG
ii	Promotability	Are there issues that create significant concerns around promotability including: - acceptability to customers and support of customer challenge group - planning issues that are likely to prevent the scheme from progressing - significant regulatory issues that are likely to prevent the scheme from progressing	RAG
iii	Deliverability	Are there significant deliverability considerations including in relation to: - constructability, for instance due to unknown technologies, land availability, or contamination risk - additional benefits from phased implementation - operability, for instance due to intermittent utilisation and long ramp-up times - dependency on third party assets or operations for successful operation	RAG
iv	Adaptability	Are there significant adaptability considerations including in relation to: - potential to adapt the option once constructed in response to future unexpected circumstances - potential ability to supply other companies or WRZs in future if needed	RAG
V	Resilience	Are there significant resilience consideration including in relation to: - vulnerability of the source to climate change and severe drought - predictability of the availability of the resource - contribution to the system's ability to respond to outage events - vulnerability to other failure modes such as flooding, pollution, damage, power loss - vulnerability to future regulatory and legislation changes (e.g. uncertainty around abstraction reform and changes to water quality)	RAG

Ref.	Criteria	Description	Assessment
vi	Uncertainty around key assumptions	Is there significant uncertainty around key assumptions? If these are potentially manageable then further steps to manage these uncertainties need to be identified and the option may need to be staged to facilitate real options analysis	Y/N

It is worth noting that, in contrast to the approach taken in WRMP19, options have not been screened out on the basis of a key dependency not being guaranteed in delivery. For example, compulsory metering has been screened in despite Portsmouth Water not yet having the appropriate Water Stressed Status[6]. This matter is being consulted on by the Environment Agency at the time of writing, and an outcome that allows for further consideration of compulsory metering is a possibility. As part of the secondary screening process, other option dependencies and mutual exclusivities were explored.

Key dependencies exist around the construction of Havant Thicket Winter Storage Reservoir, which must take place prior to a number of Southern Water and Portsmouth Water options being implemented. Another set of dependencies exists around water efficiency and metering options whereby widespread smart metering must be in place to support other data-driven behavioural initiatives.

The two main mutually exclusive groups for Portsmouth Water to consider are:

- EX_15a-d: Four capacity variants of a spur from the Southern Water-proposed Havant Thicket to SRN Source A transfer.
- EX_17a-c: Three capacity variants of a new internal transfer of water from Havant Thicket, via Works A WTW, to Reservoir B service reservoir. This particular option may be developed with two components – one phased group for increased treatment capacity at Works A, and the mutually exclusive group of 3 pipeline capacities.

Following secondary screening, 41 options were screened out. One of these (C005 Smart Metering Trial NFR) was a preferred option in WRMP19. Undertaking smart metering trials is of benefit. However, as an option for AMP8 and beyond, the practicalities and relative costs (per household) of ongoing trials present challenges in comparison to widespread, programmed rollout of smart metering through which overheads and system upgrade costs will be more appropriately distributed across the customer base.

Secondary screening Phase 2a (environmental screening) was limited to those options with physical assets or characteristics that would typically be assessed against SEA, HRA and WFD measures for environmental impacts (as opposed to social or economic impacts). 9 options that passed the Phase 2b criteria were identified for environmental screening and passed through a high level RAG assessment against the three tests below in **Table 3.4**.

Table 3.4 Environmental screening

Environmental screening
Footprint or associated impact are within 100m of: Special Area of conservation, Sites of specific scientific Interest, Special protected areas, Ramsar Sites, Scheduled Monuments, National Nature Reserve, Registered Parks and garden, Current Landfills, Historic Landfill, Grade 1 Agricultural Land Classification, Flood Zone 3, Ancient Woodland, Marine conservation zones
Assessment of any direct impacts on European designated sites and the identification of any options within 500m of European designated sites.
Initial assessment of whether the option is likely to impact upon WFD no-deterioration objectives.

[6] Update August 2021 – note that the Environment Agency consulted on this, and Portsmouth Water is now an area of Serious Water Stress. However, the customer base will still need to be consulted regarding future metering policies.

Following this environmental screening, no additional options were screened out.

As with Primary screening, a number of options (22) that were screened out have been flagged for potential further consideration at a later date as trials or specific opportunities arise. These included a number of water efficiency options that do not yet have sufficient evidence behind them to quantify the level of saving, or the arrangements in place for structured roll out beyond exemplar projects. For example, community rainwater harvesting schemes, catchment management interventions and supporting non-household users in the development of alternative sources. These options are listed, along with their reasons for rejection at this stage in **Appendix A**.

74 options remain screened in to form the Constrained Feasible list. 31 of these are new options.

The Constrained Feasible List of options is provided in **Appendix B**.

4. How constrained feasible options were then taken forward

Resource side options

The feasible constrained list includes 12 hard infrastructure options and 1 drought permit option to be taken forward to the WRSE options upload template for inclusion within the regional investment modelling workstream:

- EX_17a-c: Three capacity variants of a new internal transfer of water from Havant Thicket, via Works A WTW, to Reservoir B service reservoir.
- EX_21a-b: An initial and subsequent expansion of treatment capacity at Works A WTW to accommodate increased draw from Havant Thicket Reservoir and pass forward to Reservoir B.
- EX_15a-d: Four capacity variants of a spur from the Southern Water-proposed Havant Thicket to SRN Source A transfer to feed proposed new treatment capacity at Reservoir C.
- EX_22a-b: An initial and subsequent expansion of new WTW capacity at Reservoir C in the event that EX_15 is developed.
- R013: Havant Thicket Winter Storage Reservoir
- R068: Drought permit, Source S

These options, to be made available to the investment model are developed further according to the WRSE Cost Consistency Methodology (Mott MacDonald, 2020c), and uploaded to the WRSE SharePoint using the required upload template. Option technical notes and proformas detailing the specific elements and costing approach for these options were produced to support traceability in assumptions and the final upload.

Demand side options

While individual demand management options had been identified and screened alongside resource side options, demand reduction interventions (including leakage reduction measures) were to be included within the modelling as combined strategies, or baskets of measures that provide total demand reduction timeseries (2025/2026-2099/2100), rather than the costs and savings (demand reductions) associated with each measure acting in isolation[7].

Resource-side options were to be included within the investment model as discrete options from which the model could choose, subject to pre-defined option groupings and dependencies. Presenting the investment model with defined **suites** of demand interventions, however, ensures that interactions between options that might otherwise lead to unrealistic solutions or a high degree of double counting of savings had been worked through.

Amongst the 74 constrained feasible options, 59 fall into the category of efficient use and management of water. Many of these (34) form the basis of the four demand reduction strategies presented to WRSE to support the regional investment modelling workstream. This is shown in **Appendix B**. 14 others in this group do not yet feature on the demand reduction strategies due in some cases to a current lack of evidence to support quantification of savings, or they may represent more ambitious or case-specific interventions that Portsmouth Water may wish to consider as future "bolt-ons" to their overall demand reduction work. These include rainwater harvesting options.

[7] See technical note: 43167-WOOD-XX-XX-RP-Z-0002_S3_P02_Demand reduction baskets.docx

References

Mott MacDonald (2020a) Options Appraisal: Guidance on option identification, screening and development. October 2020. Doc ref. 412624 OA-222 A.

Mott MacDonald (2020b) WRSE Options Appraisal: Task 2 – Technical Note on Option Screening – Portsmouth Water Appendix. June 2020

Mott MacDonald (2020c) Cost Consistency Methodology. Technical Note and Methodology. August 2020.

Appendix A Options screened out but flagged for future review

Reference code (use)	Option Name (use)	Option Description (use)	Reasons for rejection
C020	Trickle irrigation	This option would provide information to spray irrigators in Portsmouth Water's supply area to inform them of the water conservation benefits of trickle irrigation. This would be done via a regional farmers' network. The rationale behind this option is to encourage spray irrigators to use trickle irrigation, which is a lower consumption form of irrigation. This would result in less demand for water from third parties. More water would then be available for other purposes such as public water supply. This option is distinct from Option No: C001, C002, and C003 which formerly seek traded licences (procure or rent).	The level of savings resulting from this option are highly uncertain without further work. Further engagement with the agricultural sector within Portsmouth Water's supply area is planned to explore opportunities in more detail. At this point, there is insufficient evidence to confidently include this option into the demand reduction strategies presented to WRSE, but the company has an ambition to work closely with the agricultural sector beyond the programmes already carried out in relation to water quality.
C024	Agri - leakage advice	Portsmouth Water would provide (or initiate provision) of information on leakage detection/management to agricultural customers. The rationale behind this option is to encourage agricultural customers to make leakage reduction measures within their farms/sites/properties and thus use less water. This would 'free up' resources to be used by other customers.	There is an expectation that wholesalers and retail water companies should work together to address non-HH demand. There is scope for significant savings amongst non-HH customers with large underground networks. Note that provision of a leak detection service alone does not necessarily lead to the user investing in repairs.
C048	Greywater reuse- new HH	Install greywater systems in new build households for internal water uses (e.g. toilet flushing). The rationale behind this option is that greywater would be used for non-potable purposes instead of potable water from the public supply system, reducing demand.	Consolidated with other non-HH options re. alternative sources
C049	Rainharvest- new HH	Install rainwater harvesting systems in new build households. Portsmouth Water would bear the costs of the installation of rainwater systems. The rationale behind this option is that rainwater would be used for non-potable purposes instead of potable water from the public supply system, reducing demand.	Very case specific. To be explored as case studies arise.

C073	Rainshare	Portsmouth Water works with communities with a significant annual average or critical period demand (e.g. allotments) to identify opportunities to utilise Rainshare, i.e. to direct harvested rainwater into a centralised shared resource. Under this same option Portsmouth Water would work with the Council to identify Rainshare twinning schemes, e.g. where buildings with low demand but which can generate high rainfall yields are located next to buildings or other demands with high non-potable demand (e.g. for irrigating or dual-supply toilet flushing). The rationale behind this option is that the harvested rainwater will replace water that had been, or would have been taken from public mains supply.	General customer acceptance that is makes sense to implement these types of schemes at community rather than property level. However, all schemes would need to be appraised on a bespoke basis considering the relationship between potential 'demand centre' and opportunities available from which to harvest water (e.g. from collections of terraced properties, from large commercial properties etc.). Evidence base includes recognition of difficulties securing support from all relevant Council departments. E.g. example from Exeter revealed significant challenges securing agreement from highways and planning teams, despite strong support from the sustainability teams and the water utility. This would be an interesting research/trial programme to explore in partnership with others, but not viable as a company-wider option for WRMP.
C077	Urban Greenery	This option would target landscaping and vegetating in public parks, garden centres etc. Portsmouth Water would work with other authorities to vegetate urban green areas with drought tolerant plants and notifications to update people's experiences and expectations of greenery in the south of England.	It is unclear what water savings (volume) this option would inspire and the level of certainty may be low. However, this option could be considered on an education basis or exemplar projects to target public perception of the water environment.
R031	Reclaim Ind WW	Reuse treated wastewater effluent from industrial customers in the Portsmouth harbour area for supply to industrial customers. This reclaimed water could be used for industrial/commercial use rather than potable water (drinking water). This is no longer an option for Portsmouth Water. It is an option for any industrial customer under the new competition rules.	No specific schemes have been identified. Such a scheme, if in some way supported financially by PW, would need collaboration multiple stakeholders and the relevant water retailer. While this is screened out at this stage, future ambition in multi-sector water use and working more closely with non-HH customers remains. Schemes such as this may be explored as exemplar projects.
R053	Conjunctive use	Use existing resources conjunctively and operate differently to baseline to release additional DO. For example, operating certain sources during the winter period could result in greater resources remaining in the Chalk aquifer during dry or summer periods.	At this stage, this is not a specific option. Outputs from recently development conjunctive use model for PW and outputs from WRSE modelling will assist in developing this.

WS_01	Rainharvest Potable	Install rainwater harvesting systems in new builds or retrofit systems existing buildings. Portsmouth Water would bear the costs of the installation of rainwater system investments rather than new supply. The rationale behind this option is that rainwater would be used for potable purposes therefore reducing demand off mains and rest abstraction sources.	Recent research suggests that rainwater harvesting may be more cost-beneficial than previously thought. Implementation within new builds is likely to be more viable than retro-fitting to existing housing stock. Other water companies have experience providing customers with access to a fund for water efficiency schemes such as this. Roll out of this as a blanket option at the company level would be challenging due to the unique circumstances of each build. However, delivery via encouragement through engagement with planning authorities or on a case by case basis via access to a fund to provide subsidies for exemplar projects may be worth exploring. The key challenge associated with this option is that it refers to subsequent potable use.
WS_02	Rainharvest agriculture	Encourage all agricultural and horticulture users in the WRZ to capture rainwater for non-potable uses and disconnect from Portsmouth Water network. The rationale behind this option is that rainwater would be used for non-potable purposes therefore reducing demand from mains supply and rest abstraction sources.	Recent research suggests that rainwater harvesting may be more cost-beneficial than previously thought. Implementation within larger sites/business is likely to be more viable than small sites or household customers. Other water companies have experience providing customers with access to a fund for water efficiency schemes such as this. Roll out of this as a blanket option at the company level would be challenging due to the unique circumstances of each farm. Partnership work with agricultural sub-sector umbrella or membership groups to engage more wider on water efficiency may be preferred as a broader scheme with lower site-specific cost implications. However, PW plans to continue to work with the agricultural sector. So, while this generic option is screened out at this stage, it does not preclude that ongoing work and the identification of specific partnership projects in the future.
WS_08	Run-off storage	Invest in storage infrastructure to capture run-off from impermeable Chalk for non-potable agricultural uses. The rationale behind this option is that the run-off would be used for non-potable agricultural purposes therefore reducing demand from mains supply.	The WRSE catchment management options programme is exploring potential schemes of this nature with a wider group of stakeholders. No specific schemes have been identified outside of the WRSE programme as yet. For this reason, this option is screened out at this stage. However, PW continues to engage with the agricultural sector within the supply area and has an ambition to explore schemes with mutual benefits in the future.

WS_16	Alt source non PWS	Investigate and promote alternative water supply sources other than mains supply for non-PWS users this reducing pressure on mains supply/ securing it for potable PWS.	No specific schemes have been identified. Such a scheme, if in some way supported financially by PW, would need collaboration with multiple stakeholders and the relevant water retailer. While this is screened out at this stage, future ambition in multi-sector work and finding ways to alleviate pressure during peak PWS demand, or greater resilience for other water-using sectors remains. It should be noted that where alternative sources involve new abstractions from the environment, similar pressures and limitations facing PW with regards to environmental water availability will exist.
WS_19	Private Supply - reuse	Investigate and promote private water supplies use reclaimed water/ re-use effluent. The rationale behind this option is that the private supplies would be reusing water and thus saving water in the catchment.	No specific schemes have been identified. Such a scheme, if in some way supported financially by PW, would need collaboration multiple stakeholders and the relevant water retailer. While this is screened out at this stage, future ambition in multi-sector water use and working more closely with non-HH customers remains. Schemes such as this may be explored as exemplar projects.
WS_23	River restoration	Target areas which may benefit from river restoration to improve flows and thus mitigate the need to reduce abstractions (groundwater/ surface water) via the WINEP or future regulatory ambition to meet EFIs or WFD targets.	PW has an ongoing WINEP programme. The WRSE catchment management options programme is exploring potential schemes of this nature with a wider group of stakeholders. No specific schemes have been identified outside of the WRSE programme as yet, beyond those already under way. For this reason, this option is screened out at this stage. However, PW continues to engage with catchment groups and the regulators within the supply area and has an ambition to explore schemes with mutual benefits in the future, especially where this acts to reduce the need for changes to abstraction licences while protecting the water environment.
WS_24	Catchment WQ	Investigate catchment management strategies to deal with deteriorating water quality trends. This could target issues at specific abstraction sources where catchment measures in place would avoid the loss of that source if the elevated levels are or predicted to breach water quality standards.	PW continues to work with sectors on land management for water quality/drinking water quality purposes. The WRSE catchment management options programme is exploring potential schemes of this nature with a wider group of stakeholders. No specific schemes have been identified outside of the WRSE programme as yet, beyond those already under way. For this reason, this option is screened out at this stage. However, PW continues to engage with the agricultural sector within the supply area and has an ambition to explore schemes with mutual benefits in the future.

WS_25	Flood transfer	Invest in infrastructure to transfer water from areas of flooding/ high flows to areas in deficit for non-potable uses (industrial/ commercial/ agriculture).	The WRSE catchment management options programme is exploring potential schemes of this nature with a wider group of stakeholders. No specific schemes have been identified outside of the WRSE programme as yet. For this reason, this option is screened out at this stage. However, PW continues to engage with catchment groups and the regulators within the supply area and has an ambition to explore schemes with mutual benefits in the future.
WS_46	WQ outage resilience	Resolve water quality issues at sources which cause frequent outage. For example frequent turbidity issues at sources can result in having to reduce or ceasing pumping but going forward with increased future demand this will become increasingly problematic and needs a long-term solution.	PW continues to work with sectors on land management for water quality/drinking water quality purposes. The WRSE catchment management options programme is exploring potential schemes of this nature with a wider group of stakeholders. No specific schemes have been identified outside of the WRSE programme as yet, beyond those already under way. For this reason, this option is screened out at this stage. However, PW continues to engage with the agricultural sector within the supply area and has an ambition to explore schemes with mutual benefits in the future.
WS_49	Drought resilient network	Investigate using model to identify which sources are more resilient to drought and rethink strategy how network could be more efficiently used.	This option mirrors others presented regarding conjunctive use. Recently developed conjunctive use model for PW and ongoing WRSE optimisation modelling is intended to shed more light on this to identify more specific schemes. In the absence of a specific scheme, the option is screened out here.
WS_51	Dew Ponds - non potable	Promote use of Dew Ponds for non-potable supply thus reducing pressure on mains supply	PW continues to work with sectors on land management for water quality/drinking water quality purposes. The WRSE catchment management options programme is exploring potential schemes with a wider group of stakeholders. No specific schemes have been identified outside of the WRSE programme as yet, beyond those already under way. For this reason, this option is screened out at this stage. However, PW continues to engage with the agricultural sector within the supply area and has an ambition to explore schemes with mutual benefits in the future. Opportunities may exist for individual demonstration projects and further assessment of resilience during drier conditions.

OF_09	Private supplies	Assist large abstractors develop their own raw water scheme	No specific schemes have been identified. Such a scheme, if in some way supported financially by PW, would need collaboration with multiple stakeholders and the relevant water retailer. While this is screened out at this stage, future ambition in multi-sector work and finding ways to alleviate pressure during peak PWS demand, or greater resilience for other water-using sectors remains. It should be noted that where alternative sources involve new abstractions from the environment, similar pressures and limitations facing PW with regards to environmental water availability will exist.
EX_02	Golf Courses water efficiency	Work with golf courses to reduced mains consumption - advice on water efficiency so reducing pressures on peak demand	A separate collaboration between a number of water companies and the golf/irrigated leisure sector is underway. This project will explore opportunities for future schemes to tackle demand and improve business resilience. No specific schemes have been identified for Portsmouth Water's supply area to date, but there is a desire to work with these sectors and develop schemes where appropriate.
EX_03	Golf Course rainharvest	Work with golf courses to reduced mains consumption -support to implement rainwater harvesting so reducing pressures on peak demand	A separate collaboration between a number of water companies and the golf/irrigated leisure sector is underway. This project will explore opportunities for future schemes to tackle demand and improve business resilience. No specific schemes have been identified for Portsmouth Water's supply area to date, but there is a desire to work with these sectors and develop schemes where appropriate.
EX_07	Agri winter storage support	Support agricultural users of mains supply to develop storage facilities. These may be filled via user's own independent abstraction if there are local constraints, rainwater harvesting, or potentially topped up by Portsmouth Water during winter for subsequent use in summer to reduce peak demands on mains supply.	Roll out of this as a blanket option at the company level would be challenging due to the unique circumstances of each farm. Partnership work with agricultural sub-sector umbrella or membership groups to engage more widely on water efficiency may be preferred as a broader scheme with lower site-specific cost implications. However, PW plans to continue to work with the agricultural sector. So, while this generic option is screened out at this stage, it does not preclude that ongoing work and the identification of specific partnership projects in the future. Such solutions may combine winter storage, alternative supplies and rainwater harvesting.

EX_08	NonHH winter storage support	Support large non-HH users of mains supply to develop storage facilities. These may be filled via user's own independent abstraction if there are local constraints, rainwater harvesting, or potentially topped up by Portsmouth Water during winter for subsequent use in summer to reduce peak demands on mains supply.	Roll out of this as a blanket option at the company level would be challenging due to the unique circumstances of each business/site. Partnership work with non-HH customer groups and the relevant waster retailer more widely on water efficiency, business water use assessments etc may be preferred as a broader scheme with lower site-specific cost implications. While this generic option is screened out at this stage, it does not preclude ongoing work and the identification of specific partnership projects in the future. Such solutions may combine winter storage, alternative supplies and rainwater harvesting.

Appendix B Constrained Feasible List

Reference	Option Name	Option Description	Generic Option Group	Flag - now part of demand reduction strategy baskets (HH and non-HH consumption) - y/n	Flag - now likely to be part of leakage reduction strategy - y/n	Comments relating to screening tests
C004	Compulsory metering HH	Compulsorily meter (AMR or Smart) all remaining unmetered households within a water stressed area (as assessed currently). Install meters where there is currently no meter and convert all households to metered billing.	Efficient use and management of water	Y		
C006a	Metering on Change of Occupancy – Existing meter pits	Metering on Change of Occupancy – Existing meter pits	Efficient use and management of water	Y		Metering upon change of occupancy is a valid scheme and has been applied elsewhere.
C006b	Metering on Change of Occupancy – all properties	Metering on Change of Occupancy – all properties	Efficient use and management of water	Y		Metering upon change of occupancy is a valid scheme and has been applied elsewhere. Implementing for all properties (i.e. those with and without existing meter pits) brings higher costs.

C016	Ind efficiency advice	This option would issue targeted water efficiency advice to non-household customers. This option excludes targeting the university (New option C058). This would include information leaflets [via email] informing non-household customers about how they could reduce their demand and the potential financial benefits (relating to metered water charges and energy bills). A water audit would be undertaken by a qualified specialist to provide technical advice about water use. It would focus on the process use component and domestic-type use in a non-domestic setting. For the domestic element occupant surveys would ensure appropriate fittings are installed. A team of relevant experts would be deployed to target the different non-household sectors across Portsmouth. The rationale behind this option is that customers would be encouraged to reduce their demand, which would 'free up' resources to be used by other customers.	Efficient use and management of water	Y	Agreement with the water retailers would be required, but this is expected from the regulators in preparation of WRMP24/

C023	Ind - leakage advice	Portsmouth Water would provide information on commercial site leakage detection and fixing techniques to industrial/commercial customers receiving mains supply. This option does not include Portsmouth Water undertaking subsequent find and fix measures. That activity is listed separately under Option C070. The rationale behind this option is encourage industrial customers to make leakage reduction measures and thus use less water. Their main incentive would be reduced a reduced water bill. This would 'free up' resources to be used by other customers. This option could supplement option C016 to support commercial customers to reduce their process and domestic-type use demands.	Efficient use and management of water	Y	There is an expectation that wholesalers and retail water companies should work together to address non-HH demand. There is scope for significant savings amongst non-HH customers with large underground networks. Note that provision of a leak detection service alone does not necessarily lead to the user investing in repairs.
C037	Water timing devices	Distribute shower timing devices to household and properties. Shower timers are set at [5 minutes]. A range of 'timers' including colour changing lights are available to notify people of shower duration. The rationale behind this option is that shower timers (and supporting information) would encourage customers to take shorter showers, reducing demand for water used for showering. This would 'free up' resources to be used by other customers.	Efficient use and management of water	Y	PW already promote 4 minute shower timers but could this scheme be enhanced to incorporate new technology in behavioural influences on shower duration or target tooth brushing, washing vegetables etc. Such devices are offered to customers either through direct order from the company, or following more targeted advice via a home assessment.

C039	Self closing taps	Install self-closing taps (e.g. push taps or infra-red taps) in household and non-household properties. The rationale behind this option is that it would reduce demand by encouraging customers to use taps for a shorter period and/or reduce wastage from taps left on accidentally. This would 'free up' resources to be used by other customers.	Efficient use and management of water	Y	Self-closing taps are considered from here within non-HH customers only. Cheaper solutions to reducing tap water demand during use are available (e.g. tap inserts), but savings from these devices that automatically close the tap are potentially high within some non-HH sectors (especially schools where taps are often left open). Delivery of this solution would take place via a non-HH water use assessment, be that online, virtual or in person.
C041	Spray fitting taps	Install retrofit spray fitting inserts to existing taps in household and non-household properties. The rationale behind this option is that the spray fitting reduces the volume of water that passes through the tap each time it is used (compared to a tap that does not have a spray fitting). This would reduce demand and 'free up' resources to be used by other customers.	Efficient use and management of water	y	Delivery of this option in practice is via a "standard suite" of water efficiency devices available for order via PW's website, or following a home water use assessment.

C043	Water saving devices - Trigger nozzles for hoses	Distribute trigger nozzles for use on hosepipes to household properties. The rationale behind this option is that the trigger nozzle would allow customers to control the amount of water used through hosepipes (when compared to a hosepipe with no control fitted). This would reduce demand and 'free up' resources to be used by other customers. Distribution would be supported with regular annual messaging about long-term sustainability in the garden (including distribution of devices). This will strengthen drought messaging and customers' ability to respond during drought.	Efficient use and management of water	Y	Offering trigger nozzles for hoses may be a stand alone option, or as part of a "standard suite" of household customer devices from which appropriate selections can be made depending on the HH's use of water.
C044	HH efficiency self-install	Distribute water efficiency information and devices to household customers for installation by the customer. The rationale behind this option is that water efficiency devices would be installed by the customer and they would be encouraged to change their water-using behaviour through the water efficiency information, reducing demand. This would include advice relating to 'technologies of demand' (i.e. behaviours that lead to unnecessary clothes washing, behaviours that lead to excessive shower durations e.g. watching TV, advice on the garden design, etc.).	Efficient use and management of water	y	

C045	HH efficiency home visit	A home visit by a Portsmouth Water Home Visit Team to improve customer satisfaction. During the visit leaks, dripping taps, damaged toilet siphons etc. are repaired/fixed, and water efficiency devices are installed together with information on how to save money, protect the home against water related damage, and water consumption positive behaviours. This would include written and verbal advice relating to 'technologies of demand' (i.e. behaviours that lead to unnecessary clothes washing, behaviours that lead to excessive shower durations e.g. watching TV, advice on the garden design, etc.). Each home would receive a follow up personalised family report. The rationale behind this option is that water efficiency devices would be installed by a qualified plumber and householders would be encouraged to change their water-using behaviour through the water efficiency information, reducing demand.	Efficient use and management of water	y

C046	HH efficiency home visit partnership)	A home visit by plumbers to install water efficiency devices in households and provide information to encourage and support behavioural changes. This would include written and verbal advice relating to 'technologies of demand' (i.e. behaviours that lead to unnecessary clothes washing, behaviours that lead to excessive shower durations e.g. watching TV, advice on the garden design, etc.). Each home would receive a follow up personalised family report. The home visit would be delivered through a partnering approach involving other organisations such as Energy Saving Trust, Housing Associations, or Local Authorities. The rationale behind this option is that water efficiency devices would be installed by a qualified plumber and householders would be encouraged to change their water-using behaviour through the water efficiency information, reducing demand.	Efficient use and management of water	Partnering with other organisations brings opportunities for multiple benefits for customers and reduced costs for Portsmouth Water. Deliverability depends on developing the partnership with a third party.

C050	Rainharvest new nonHH	Install rainwater harvesting systems in new build non-households. Portsmouth Water would bear the costs of the installation of rainwater systems. The rationale behind this option is that rainwater would be used for non-potable purposes instead of potable water from the public supply system, reducing demand.	Efficient use and management of water	Recent research suggests that unit costs of rainwater and harvesting systems is lower than previously thought, and in many cases may be a cost-beneficial investment. While building these systems into the design of new non-HH businesses is likely to be less costly than retro-fitting rainwater harvesting technology within existing non-HH customers (e.g. option C052), they do represent potentially high costs per site. While there is ambition for PW to engage with non-HH customers more, working with the water retailers, a specific delivery mechanism for this type of scheme, through promotion, subsidy or partnership is yet to be developed. Other companies have experience offering access to a fund for subsidies towards similar schemes.

C052	Rainharvest non-HH	Retrofit rainwater harvesting systems in existing non-households. Portsmouth Water would bear the costs of the installation of rainwater systems. The rationale behind this option is that rainwater would be used for non-potable purposes instead of potable water from the public supply system, reducing demand.	Efficient use and management of water	Recent research suggests that unit costs of rainwater and harvesting systems is lower than previously thought, and in many cases may be a cost-beneficial investment. Retro-fitting rainwater harvesting technology within existing non-HH customers is likely to be more costly than building these systems into the design of new non-HH businesses (e.g. option C050). While there is ambition for PW to engage with non-HH customers more, working with the water retailers, a specific delivery mechanism for this type of scheme, through promotion, subsidy or partnership is yet to be developed.
C054	WaterButt HH - subsidise	Retrofit water butts in existing households. Portsmouth Water would subsidise the costs of the installation of water butts. The rationale behind this option is that rainwater would be used for garden water use instead of potable water from the public supply system, reducing demand.	Efficient use and management of water	

C057	Fix leakage HH	Target metered households whose smart meter data suggests there are ongoing leaks in the property. The rationale is that households with a meter would be incentivised to let the water company experts fix leaks that the householder is paying for and which could be undermining the fabric of the property. It may also incentivise other smaller residence households into having a smart meter installed. This option is distinct from but would benefit from Option C062 'Seasonal Water Messaging' which will advise on the property maintenance benefits of troubleshooting plumbing leaks in the home.	Efficient use and management of water	y	There are significant water savings to be made by reducing customer-side leakage. Implementation of this option would be made more effective once PW reaches a higher level of meter penetration and metered billing, and even more so if a smart metering programme was rolled out across the supply area, allowing much greater targeting of efforts to take place. Internal wastage and leaks may be identified and fixed through delivery of home assessments, while external customer-side leaks within supply pipes may be tackled by the customer following company promotion/engagement, or other mechanisms that encourage uptake of insurance policies covering repairs to supply pipes.

C058	Uni accommodation	Portsmouth Water has a student population of 25,000. This option specifically targets the university owned/managed accommodation: installing water meters (and sub-metering) to monitor and track consumption. Portsmouth Water would work with the university facilities and academic departments to target inefficient use and leakage with advice and devices. This option links to Option C074 Portsmouth Water Online Accounts - Gamification (a Metering category). This option would give Portsmouth Water an opportunity to engage with Portsmouth University One Water charity - which actively encourages students to buy bottled water.	Efficient use and management of water		Tackling non-HH demand, particularly within education establishments provides significant water saving opportunities. Arrangements or partnerships with water retailers would be required. The specific nature of this option would require development - metering, sub-metering, communication, retro-fits etc.
C059	Urinal flush mech	Identify and replace inefficient urinal flushing systems in high density non-household properties, e.g. shopping centres, sports facilities etc. This would involve an audit of site specific consumption patterns and bespoke solutions, e.g. Passive Infra-Red controllers in low density situations, or timers in high-density situations. The rationale is that replacing flushing systems with systems appropriate to the level and frequency of use demand for water will be reduced.	Efficient use and management of water	y	As an option in its own right, this needs a delivery mechanism such as targeted non-HH water use assessments/audits to ensure that replacements take place in appropriate situations, with buy in from the customer and the relevant water retailer. Demand reduction potential is high in the right circumstances (e.g. schools).

C060	SMART metering nonHH	Upgrade standard water meters (in non-household properties) to Smart water meters. This option excludes the component to upgrade the billing and accounts system to provide commercial customers access to a more sophisticated online account (and mobile app) tracking and monitoring their own consumption and costs. The estimated water savings associated with this option are solely based on the impact of converting from unmeasured to measured billing. Additional water savings to be generated using online account tools and incentives are covered under other options (C061). This is an opportunity to revitalise water efficiency measures by 'upgrading' metering technology. Water savings estimated on basis of more visible water data combined with refreshed water saving messaging.	Efficient use and management of water	Promoting smart metering within non-HH customers can drive forward other schemes and greater demand reduction potential through engagement and leakage detection. Delivery of this would require cooperation with the relevant water retailers, and the development of necessary data management systems.

C062	Seasonal messaging	Develop and issue seasonally relevant messaging to customers to encourage a more sustained mind-set that water is a precious resource and is linked to the consumption of other resources. It is continuous rather than the drought messaging which is triggered by drought triggers. Daily tweets, monthly emails, and messages on a Smart meter billing app would be used to regularly reach out to customers. Examples: Spring messaging advice on preparing water efficient gardens and minimising unnecessary water use during the spring clean. Summer messaging news on where to go to enjoy the water environment and how to minimise water use during warmer weather. Autumn/winter messaging focusing on how to stay safe near rivers and lakes, combined with messaging on how to prepare the home against freezing pipes, how to fix minor plumbing leaks, how to report external leaks. This option does not include individual customer billing related advice. The rationale is that by combining seasonal related messaging on the recreational value of the water environment with conservation and home maintenance advice customers will be more engaged and more inclined to use water more wisely.	Efficient use and management of water	y	This specific theme is effectively subsumed within a wider goal to increase water efficiency communications and engagement with customers.

C064	Water efficiency out HH	This option recognises that many people's per capita consumption is demanded at locations outside of their own homes, e.g. in gyms, restaurants (dishwashing), launderettes, etc. This option involves providing messaging urging people to use water wisely everywhere they go, and also actively targeting core centres of 'demand re-location', e.g. large gyms, sports centres, restaurants etc. The rationale is that customers need to use water wisely wherever they go, and advice and messaging that reminds and enables customers to use water wisely in other places will suppress all their daily demands, not just those in the home.	Efficient use and management of water	Y	Tailoring water efficiency communications and engagement according to the different ways in which people use water in their daily lives is likely to be more effective.
C065	Shorter showers	This option specifically targets teenagers' higher frequency and longer duration shower behaviours. The average adult shower duration is between 7 to 10 minutes. Case study research suggests teenagers' shower for average 20-30 minutes. This option involves going into secondary schools across the Portsmouth Water supply area to engage teenagers, identify water usage habits, and provide stimulus and materials to reduce those shower times. This also involves water auditing and retrofitting schools with water efficiency devices. It involves replacing school water meters with smart meters (and sub-metering) to enable schools to engage in Gamification programmes and prizes (annual and inter-school competitions).	Efficient use and management of water	Y	Delivery of this targeted advice can be achieved through a programme of school education visits. Quantification of the uptake and savings is challenging, but this does not preclude this forming part of a wider communications plan.

C066	Uni accom private	This option relates to and would build on the success of Option C058 'Target water consumption in university accommodation' and C074 'Gamification'. It would target the student private rental sector in Portsmouth. Landlords would be invited to receive free household water audits including repairs of plumbing leaks, and free water saving devices. They would also be given a subsidy to replace any water inefficient appliances. This would be in return for letting Portsmouth Water install meters and sub-meters to monitor usage and wastage in high density student households. In metered properties students would be able to continue to claim prizes relating to their Gamified water online accounts.	Efficient use and management of water	Y	This effectively represents a targeting of a wider home water assessment and retro-fit programme. Identification of private lets for student accommodation is key, but this could be achieved through either partnership working with colleges/universities to encourage proactive uptake, or by focusing efforts on certain DMAs known to have a higher proportion of student lets.

C070	nonHH leaks	This option would target industrial and commercial properties. Where leakage data (e.g. nightlines) suggests there are significant leaks on site, Portsmouth Water would find and fix. The rationale is that it could be effective to reduce leaks on a smaller number of larger sites/properties. Site owners are incentivised by reduced bills and 'free' leak repairs. This is a more involved option than C023 which is limited to providing advice on how to undertake leak detection and fixes.	Efficient use and management of water	Y	This option is similar to C023 but goes further to fix the leaks. This would probably increase and / or accelerate the leakage reduction but would be more expensive than C023. Levels of leakage are highly variable and site-specific. Quantifying the potential for demand reduction as a result of this option is extremely challenging. Delivery will require collaboration with the relevant water retailer.

C074	SMART metering app	This option targets existing smart metered households and non-households. It involves Portsmouth Water developing an App (or accessing an off-the shelf app) to enable customers to access their water account online. Customers with smart meters are able to take advantage of rewards for reducing or maintaining low consumption levels. The aim of this option is to increase the number of 'optants' specifically to adopt smart meters, incentivised by gamification measures. Customers are incentivised to have a smart meter installed by being entered into 'raffle draws' or cashback schemes if they meet water reduction targets. This option on its own is NOT linked to the roll-out of tariffs.	Efficient use and management of water	This option clearly depends on the widespread rollout of smart metering and associated systems. That being said, providing customers with information about their use and mechanisms to influence behaviour, retaining their interest in water saving would be a positive measure alongside smart metering in the future.

C075	SMARTmeter NewHH	Replacing basic meters and installing smart meters in remaining unmetered households. Delivery of this option would increase the likely yield of Option C074 Gamification. Similarly, options C074 and C061 may incentivise customers to agree to a smart meter.	Efficient use and management of water	Y	Encompassing a switch for those already on with dumb meters to smart meters, plus smart metering of existing non-metered customers. These two angles are subject to different challenges. Existing metered customers could be switched to smart metering, while new installations at currently unmetered homes would be delivered either through enhanced optant uptake, or following the introduction of a universal metering policy.

C076	Proactive metering	Portsmouth Water would use the data from smart meters to monitor individual household consumption rates and trends. Increases in consumption trigger an alert whereby Portsmouth Water contacts the customer to let them know that their usage is going up (and therefore their bill) and offers the customer advice on how to get their demand back to the lower level. Customers tracking their own consumption are able to contact Portsmouth Water to request a review of their data and either tips or a visit to identify ways to get demand back under control.	Efficient use and management of water	Option dependent on widespread SMART metering within households and associated data management and analysis systems. Quantifying potential demand reductions specifically resulting from this enhanced data review and customer engagement option is challenging, but this does not preclude further exploration of such a service in the future.
C078	Voluntary restraint & leakage action	Enhanced public awareness campaigns on dry year versus drought situation as triggered by emergent conditions. This includes advice on benefits of mild restraint to households and non-households (less extreme than drought restraint appeals) - Target residents, tourists, and non-household customers. Increase leak detection activity (above DYAA levels) and increase priority of repairing leaks (accelerate response time and reduce leak volume threshold to respond to, i.e. fix more, smaller leaks). Combined impact expected to reduce demand by 2.5%.	Efficient use and management of water	Deliverability will depend on voluntary action from customers. This option could in practice be split into a campaign/awareness component, and a leakage management component.

C079	Mandatory restraint	The drought measure is 1 year in 20. This option would prohibit all activities (as listed in the legislation) at the same time in the interests of clarity of messages and equitable application of restrictions to customers [text from 2013 Drought Plan]. The option would only be effective during dry weather (not the full length of the drought). Expected to deliver a 5 % reduction in overall distribution input (a reduced saving since Portsmouth Water introduced a concession for micro-irrigation systems). This option would be very unlikely to be required in combination with raw water storage which would negate the need for mandatory restrictions.	Response to regional events	
C080	Imposition of Drought Direction Restrictions (mandatory commercial restraint).	The drought measure is 1 year in 80. This applied to commercial uses and further domestic restrictions (beyond those imposed by the Temporary Use Ban and as listed in the Drought Direction 2011). This option would require a Drought Order but would then be effective for the remaining duration of the drought. This option would only be applicable during more severe droughts (1:50), at which point it would be expected to reduce DI by a further 5% (subject to operational review). This option would be very unlikely to be required in combination with raw water storage which would negate the need for mandatory restrictions.	Response to regional events	While this would be carried out via a Drought Order, promoting this to non-HH users will remain challenging.

C081	Allotment Rainharvest	This option would provide a subsidy to support funding for large-scale rainwater harvesting for community group water demands (i.e. allotments). Organised groups could apply for the subsidy to support installation of appropriate decentralised water sources (i.e. harvesting and storing rainwater from nearby buildings). This would reduce demand for potable supplies during part or all of the growing season. [Potentially too much uncertainty regarding size of water saving (yield may be low from just one type of group), typical scheme costs, and therefore cost-beneficiary of the option).	Efficient use and management of water		General customer acceptance that is makes sense to implement these types of schemes at community rather than property level. However, all schemes would need to be appraised on a bespoke basis considering the relationship between potential 'demand centre' and opportunities available from which to harvest water (e.g. from collections of terraced properties, from large commercial properties etc.). Other companies have experience providing customers/groups with access to a fund for water efficiency schemes such as this.
C084	Void metering	Install external meters (no access to properties with no occupant). Metering voids enables better assessments of leakage and estimates of illegal use from void properties.	Efficient use and management of water	Y	

D001	Quick Leak Fix	Accelerate the time taken to fix reported leaks. Due to human resource constraints, the time lag between a leak being reported and the leakage team attending and fixing the leak is longer than it could be. Employ additional leakage staff to decrease the time period between which leaks are reported and are fixed. This would reduce the amount of water lost through new leaks as they arise.	Efficient use and management of water	y
D002	Fix Leaks	Increase the number of leakage control staff engaged on 'find and fix' activities to identify and repair more leaks on trunk and distribution mains (the larger mains found within the water supply network). When leaks are identified, pipes are excavated and either repaired or replaced. Reduce the total volume lost through leakage (compared to baseline find and fix).	Efficient use and management of water	y
D003	Incurs Leak Fix- coms	Increase the number of leakage staff engaged on 'finding and fixing' leaks on communication pipes. These are the higher number of smaller pipes in the supply network. Leaks are repaired and the total volume of water lost through leakage is reduced.	Efficient use and management of water	y
D005	District Meters- Key	Install district meters at key points within the distribution network to monitor flows within the distribution network more accurately and identify leaks faster. Increase the number of identified leaks and repairs, and reduce volumes lost through leakage from 36.5 Ml/d down to 31.4 Ml/d. This option on its own does not include use of noise loggers (D004) or other enhanced leakage measures.	Efficient use and management of water	y

D006	Pressure Management	Install additional pressure reduction valves (PRVs) throughout the distribution network to improve pressure control within the distribution system. This option does not include any find and fix measures.	Efficient use and management of water	y
D007	Mains Replacement	Targeted replacement of the parts of the network with greatest leakage. Existing distribution mains would be excavated and replaced with new mains, reducing leakage.	Efficient use and management of water	y
D010	Mains renewal	Enhance the mains leakage risk analysis system to refine decision making on risk based mains renewal. Not all trunk or distribution mains can or should be repaired or replaced. This option specifically targets the parts of the supply network where the cost: benefit ratio of renewal would be most favourable.	Efficient use and management of water	y
D011	District Meters- All	Install additional district meters throughout the distribution network to monitor flows within the distribution network more accurately and identify leaks faster. Increase the number of identified leaks and repairs, and reduce volumes lost through leakage from 36.5 Ml/d down to 21.4 Ml/d. This option on its own does not include use of noise loggers (D004) or other enhanced leakage measures.	Efficent use and management of water	y

D013	Pressure reduction	The SELL assessment identified that there were some (limited) options for further pressure management at a sub-DMA level. The UKWIR long term leakage targets pressure versus expenditure relationship was used to estimate the cost of further pressure reduction. AISC cost curves were derived and used to determine the AISC cost for a further potential leakage reduction of 2.7 Ml/d.	Efficent use and management of water	y	Ongoing pressure management
R013	Havant Thicket Winter Storage Reservoir Option A - 'Standard Design' (23 Ml/d DYAA, 50 Ml/d DYCP).	Havant Thicket Winter Storage Reservoir Option A - 'Standard Design' (23 Ml/d DYAA, 50 Ml/d DYCP).	Hard infrastructure		
R059	Eff reuse indirect Chichester-Lavant	Indirect reuse of treated wastewater effluent from Southern Water's Chichester Wastewater Treatment Works. Water would be treated using membrane treatment processes (Reverse Osmosis) and diverted away from inflows to Chichester Harbour put into the Lavant upstream of the tidal limit (nearby to Chichester). A new intake structure would be constructed on the Lavant upstream of the tidal limit. The treated effluent would provide greater flow in the Lavant, enabling abstraction through the new abstraction point.	Hard infrastructure		Further engagement with Southern Water required to understand the opportunities re. effluent reuse in this case and local constraints.

R068	Drought Permit: Source S	When Swanbourne Lake is already dry (i.e. in a severe drought 1:100 or worse - not dry due to abstraction) increase abstraction from the Source S source from licensed limit of 2.5Ml/d to 8.5 Ml/d or 11.5 Ml/d. This would require a drought permit. Under normal dry conditions abstraction from Source S is limited due to its assumed impact on the SSSI (but artificial) Swanbourne Lake (at Arundel). The Source S source is part of the Source Q Group. The group abstraction licence limited to 41 Ml/d and not more than 2,100 Ml in any period of 60 days. The permit would increase the group limit to 49.5 Ml/d.	Response to regional events

WS_13	Farm water efficiency	Portsmouth Water catchment officers to engage with farmers and members of farm cluster groups about water efficiency. This can include can messaging around ability to reduce mains supply, planning for resilience etc. There is a need to explore to what degree farms are concerned about resilience of supplies and where.	Efficient use and management of water	Engaging with the farming sector would require partnership working with umbrella organisations or membership groups, and the relevant water retailers. No specific programme has been developed at this stage, but PW does have an ambition to continue to develop its water efficiency communications and engagement programme more widely. While quantification of the potential savings from farm efficiency engagement is very site-specific and not possible at the supply-area level, this option is considered a targeting of PW's wider intentions in relation to customer (HH and non-HH) engagement.
WS_14	Spray irrigators - Meon	Target spray irrigators in the Lower reaches of the Meon	Efficent use and management of water	This option is effectively a targeting of option WS_13 Farm water efficiency.

WS_29	Save water stats	Water efficiency messaging to customer: Compare saving water to saving carbon. This could be provided as a statistic on customer bills (e.g. if you save X litres of water; you save X kg of carbon. Public awareness of climate change and the need for energy use reduction is increasing and probably understood more than the need to save water in the UK so messaging about carbon saving might be more successful and better understood than saving water.	Efficient use and management of water	y		This specific type of messaging, linking water user to carbon may be a positive step and influence on behaviour, with cross benefits to other household bills associated with water heating. Within demand reduction strategies, this option is effectively subsumed within a wider increase in communications and customer engagement.
WS_31	Depress using PRVs	Artificially depress pressures during non-peak hours (i.e. night time hours) using PRVs to reduce background leakage and reduce toilet cistern filling levels etc.	Efficient use and management of water		y	
WS_38	Metering - education	Promote water metering in households for education purposes (not affecting bills). This could increase people's awareness of how much water the household uses and may encourage people to use less.	Efficient use and management of water	y		This option describes "not for revenue" metering policies. In the absence of an ability to roll out compulsory metering, such a scheme remains a viable option to encourage greater uptake of metered billing in the longer term, while helping to identify high use and wastage in the shorter term.

WS_41	School education	Promote education regarding water efficiency and the need to reduce water use at school level which could involve encouraging the government to adopt it into the national curriculum. The theory being that children are likely to engage with the messaging ultimately reaching the parents/ household "nudge theory" with regards to water efficiency.	Efficient use and management of water	y		
OF_10	Cascading PRVs	(e.g. at DMA level or even customer level). These could be intelligently controlled so as to compensate settings to balance against the 'live' Supply-Demand availability.	Efficient use and management of water		y	
OF_18	Bill response - leaks	Promote checking (bills) and rapid response repair support.	Efficient use and management of water	y		Encouraging metered customers to regularly review their usage to help identification of leaks and wastage is positive. Effectiveness of this approach would be enhanced as metering (and preferably smart metering) penetration increases. As an example of more proactive customer communication and engagement, this is effectively subsumed within a wider plan to increase water efficiency comms.

EX_01	Golf Courses leakage	Work with golf courses to reduced mains consumption - covering leakage reduction so reducing pressures on peak demand	Efficient use and management of water		There are ongoing projects to collaborate across the water industry with golf courses and the leisure (irrigating) sectors. This is exploring the potential for demand reduction and delivery mechanisms. Partnering/making arrangements with the relevant water retailer is necessary.
EX_04	Large nonHH users leakage	Work with Large non-HH users to reduced mains consumption - covering leakage reduction so reducing pressures on peak demand	Efficient use and management of water	Y	This option specifically targets "larger users" and those characterised with large site areas and scale of internal networks. Levels of leakage are highly variable and site-specific. Quantifying the potential for demand reduction as a result of this option is extremely challenging. Delivery will require collaboration with the relevant water retailer.

EX_05	Large nonHH users water efficiency	Work with Large non-HH users to reduced mains consumption - advice on water efficiency so reducing pressures on peak demand	Efficient use and management of water	Y	Collaboration with the relevant water retailers will be necessary. This option is effectively subsumed within wider plans to increase water efficiency comms and engagement across HH and non-HH users.

EX_06	Large nonHH users rainharvest	Work with Large non-HH users to reduced mains consumption -support to implement rainwater harvesting so reducing pressures on peak demand	Efficient use and management of water		Recent research suggests that rainwater harvesting may be more cost-beneficial than previously thought. Implementation within larger sites/business is likely to be more viable than small sites or household customers. Other water companies have experience providing customers with access to a fund for water efficiency schemes such as this. Roll out of this as a blanket option at the company level would be challenging due to the unique circumstances of each user/site. However, PW plans to continue to work with the water retailers and explore interventions for non-HH customers.
EX_09	Virtual home assessment	Virtual home use assessment. Preceded by questionnaire. Virtual home visit offers advice, recommendations and depending on findings recommends actions, efficiency devices, or a professional plumber visit (e.g. for leaky loo fix).	Efficient use and management of water	Y	Virtual home assessments have been rolled out across a number of companies during the COVID19 pandemic and are proving to be a viable alternative to in-person assessments.

EX_10	Incentivising HH efficiency	Making use of HH metering data. Save water save money - Water Fit. HH users are set challenges and awards (e.g. credit to award to charities via the system).	Efficient use and management of water	Y	Incentivising water efficiency through links to charities or community projects brings opportunities for wider benefits and positive customer relations.
EX_11	Enhanced awareness of use	Increasing awareness of water use - social norms feedback - via supporting information within billing or via web account/apps - enhanced information about water use of customers compared to similar customers, or past use.	Efficient use and management of water	Y	Encouraging metered customers to regularly review their usage and benchmark their use against similar customers is positive. Effectiveness of this approach would be enhanced as metering (and preferably smart metering) penetration increases. As an example of more proactive customer communication and engagement, this is effectively subsumed within a wider plan to increase water efficiency comms.

EX_15a	HT-SRN Source A transfer 10MLD	Dependent upon Havant Thicket and construction of SRN Source A transfer (larger size), SWS would supply Portsmouth Water with an offtake. A new surface water treatment plant would be needed within PW's supply area for subsequent distribution.	Hard infrastructure		This option is dependent on construction of Havant Thicket winter storage reservoir, the proposed Havant Thicket to SRN Source A raw water transfer and further agreements with Southern Water in relation to increased draw from the reservoir.
EX_16	Business assessments	Similar to home assessments, PW to offer assessments of non-HH users' water efficiency (focusing on non-process uses), offering advice on water efficiency and measures to take. - May be extended to offer subsidised efficiency devices.	Efficient use and management of water	Y	
EX_17a	Farl to Reservoir B 10	Increased draw from Havant Thicket reservoir via Source B2 to increased treatment capacity at Works A treatment works. Pass forward treated water to Reservoir B.	Hard infrastructure		This option is dependent on construction of Havant Thicket winter storage reservoir, and further agreements with Southern Water in relation to increased draw from the reservoir.

EX_17b	Farl to Reservoir B 20	Increased draw from Havant Thicket reservoir via Source B2 to increased treatment capacity at Works A treatment works. Pass forward treated water to Reservoir B.	Hard infrastructure	This option is dependent on construction of Havant Thicket winter storage reservoir, and further agreements with Southern Water in relation to increased draw from the reservoir.
EX_17c	Farl to Reservoir B 30	Increased draw from Havant Thicket reservoir via Source B2 to increased treatment capacity at Works A treatment works. Pass forward treated water to Reservoir B.	Hard infrastructure	This option is dependent on construction of Havant Thicket winter storage reservoir, and further agreements with Southern Water in relation to increased draw from the reservoir.
EX_15b	HT-SRN Source A transfer 20MLD	Dependent upon Havant Thicket and construction of SRN Source A transfer (larger size), SWS would supply Portsmouth Water with an offtake. A new surface water treatment plant would be needed within PW's supply area for subsequent distribution.	Hard infrastructure	This option is dependent on construction of Havant Thicket winter storage reservoir, the proposed Havant Thicket to SRN Source A raw water transfer and further agreements with Southern Water in relation to increased draw from the reservoir.

EX_15c	HT-SRN Source A transfer 30MLD	Dependent upon Havant Thicket and construction of SRN Source A transfer (larger size), SWS would supply Portsmouth Water with an offtake. A new surface water treatment plant would be needed within PW's supply area for subsequent distribution.	Hard infrastructure		This option is dependent on construction of Havant Thicket winter storage reservoir, the proposed Havant Thicket to SRN Source A raw water transfer and further agreements with Southern Water in relation to increased draw from the reservoir.
EX_15d	HT-SRN Source A transfer 40MLD	Dependent upon Havant Thicket and construction of SRN Source A transfer (larger size), SWS would supply Portsmouth Water with an offtake. A new surface water treatment plant would be needed within PW's supply area for subsequent distribution.	Hard infrastructure		This option is dependent on construction of Havant Thicket winter storage reservoir, the proposed Havant Thicket to SRN Source A raw water transfer and further agreements with Southern Water in relation to increased draw from the reservoir.
EX_18a	Optant existing pit	Optant metering programme. Installation of meter where a meter pit already exists, and switch to metered billing.	Efficent use and management of water	y	
EX-18b	Optant new pit	Optant metering programme. Installation of meter for properties where a new meter pit is needed, and switch to metered billing.	Efficent use and management of water	y	Increased cost per unit over those with existing meter pits.
EX-_19	Meter dumb to smart	Replace existing dumb meters within HH customer base with smart meters.	Efficent use and management of water	y	

EX_20	Virtual non-HH audit	Virtual non-HH customer use assessment. Preceded by questionnaire. Virtual business visit offers advice, recommendations and depending on findings recommends actions, efficiency devices, or a professional plumber visit (e.g. for leaky loo fix). Focus on "domestic" water uses within businesses (i.e. bathrooms, kitchens).	Efficent use and management of water	y	
EX_21a	Farl Treatment	Increased treatment capacity at Works A to accommodate increased draw from Havant Thicket Reservoir and pass forward of treated water to Reservoir B.	Hard infrastructure		Detailed design is yet to take place and as such, high levels of uncertainty remain regarding the deliverability of new treatment capacity. As part of the wider scheme working with Southern Water and the adoption of the option as a phased development, this has a certain level of adaptability within it.

EX_21b	Farl Treatment	Increased treatment capacity at Works A to accommodate increased draw from Havant Thicket Reservoir and pass forward of treated water to Reservoir B. - subsequent enhancement	Hard infrastructure	Detailed design is yet to take place and as such, high levels of uncertainty remain regarding the deliverability of new treatment capacity. As part of the wider scheme working with Southern Water and the adoption of the option as a phased development, this has a certain level of adaptability within it.
EX_22a	Reservoir C Treatment	Additional WTW capacity for HT to SRN Source A spur to Reservoir C	Hard infrastructure	Detailed design is yet to take place and as such, high levels of uncertainty remain regarding the deliverability of new treatment capacity. As part of the wider scheme working with Southern Water and the adoption of the option as a phased development, this has a certain level of adaptability within it.

EX_22b	Reservoir C Treatment	Additional WTW capacity for HT to SRN Source A spur to Reservoir C - subsequent enhancements	Hard infrastructure	Detailed design is yet to take place and as such, high levels of uncertainty remain regarding the deliverability of new treatment capacity. As part of the wider scheme working with Southern Water and the adoption of the option as a phased development, this has a certain level of adaptability within it.

Appendix C New option submission form

Identifying new schemes and options for WRMP24

Use this form to submit your suggestions for new or improved schemes and options for consideration as our Water Resources Management Plan (WRMP24) is developed.
Please provide whatever level of detail you can, but be specific where possible. Details can be worked on as the process progresses, and simply capturing a wide range of ideas now is an important step in making sure Portsmouth Water is able to create a resilient plan.
Providing your contact details on this form means that we can follow up on your idea.

What type of suggestions are we looking for?
All ideas are welcome. At this stage please don't be limited in your thinking. Anything that helps address the challenges of a growing demand for water, tightening constraints on existing sources of water and an ambition to improve resilience for the water environment and for a range of water users are all valid. Broadly we are grouping options into the following categories:

Catchment management and blue-green infrastructure	Efficient use and management of water	Infrastructure and assets – access more water
Schemes that promote increased water availability e.g. supporting river flows, habitat creation on Chalk streams Wetland creation/flood storage, Use of SuDs to increase recharge of aquifers Multi-sector schemes that lead to better distribution of available water e.g. supporting farmers to build reservoirs to reduce reliance on Portsmouth Water supply Catchment-based measures that make supplies more resilient.	Household and district metering Changing tariffs Water use assessments and advice for households and businesses Behaviour change campaigns and incentives Retrofits and provision of efficient devices Find and fix household and non-household leaks Leakage management and novel approaches	Addressing constraints to operations Reservoirs Aquifer storage Identification of unused sources held by other users Additional abstraction Water transfers Effluent reuse Desalination Better use of existing source

Idea submission form

Your details *Name, email address, telephone*	
Option or scheme description *Provide enough detail so that we understand the broadly what your idea is. Be specific on details if you have them*	
Source or inspiration for your idea *Provide enough detail so that we understand the broadly what your idea is. Be specific on details if you have them.*	
Benefits of the scheme or option *Can you tell us how much water it will yield or save?* *Is it particularly useful during a drought?* *Does it benefit a particular river, or other water-using sector, or benefit a particular group of customers?*	
Location details *Provide what you can. Grid references, place/site name, a map.* *Attach other files is necessary*	
Any other details or reference to useful information	

Addendum A - Source O Booster Option

Following Wood's option appraisal review, there has been the addition of another option, Source O Booster. This option is therefore added as an addendum to the Wood report.

Source O booster is a network reinforcement option generated to unlock unutilised deployed output (DO). This will allow an increase in DO pumping from 10Ml/d to 25Ml/d, as investigations have demonstrated previously, the Source O Boosters have reached 24Ml/d.

Table 7 displays the Feasible Option table for this option, in line with the details contained in the main report for the other Options considered.

Table 7: Feasible Option table for Source O Booster.

Reference	Option Name	Option Description	Generic Option Group	Flag - now part of demand reduction strategy baskets (HH and non-HH consumption) - y/n	Flag - now likely to be part of leakage reduction strategy - y/n	Comments relating to screening tests
PRT_PRT_HI-ROC_ALL_ALL_Source O booster	Source O Booster	A network reinforcement option generated to unlock unutilised deployed output (DO).	Hard Infrastructure	n	n	