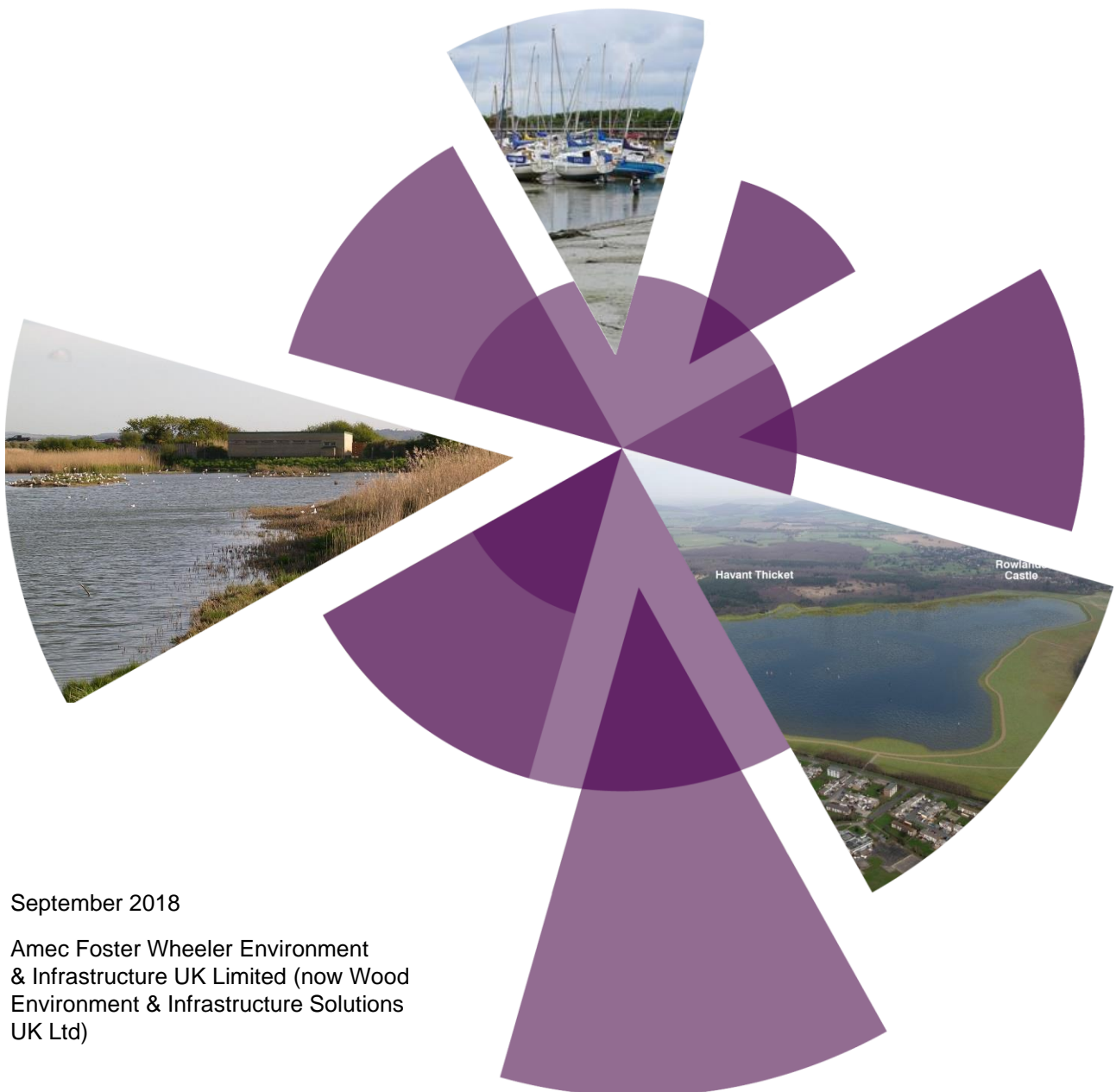




Portsmouth Water

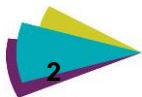
Strategic Environmental Assessment of the Revised Water Resources Management Plan

Environmental Report



September 2018

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Document revisions

No.	Details	Date
1	Draft for Client	November 2017
2	Revised Draft for Client	February 2018
3	Final for Client	February 2018
4	Revised Final	September 2018

Non-Technical Summary

This Non-Technical Summary presents the findings of the Strategic Environmental Assessment (SEA) of the Portsmouth Water draft Water Resources Management Plan contained in the accompanying Environmental Report.

Introduction

Portsmouth Water's Water Resources Management Plan (WRMP) provides a comprehensive assessment of available water supplies and the demand for water well into the future, and sets out Portsmouth Water's strategy for water resource and demand management to ensure supplies of safe, clean drinking water are maintained to customers throughout the company's region. Portsmouth Water completed a draft Water Resources Management Plan (WRMP19) for the period 2020 to 2045. This was issued for a 12 week consultation on 5th March 2018. Following an analysis of the submissions, and further modelling, Portsmouth Water has now produced a revised WRMP.

This Non-Technical Summary (NTS) provides an overview of the Environmental Report produced as part of the Strategic Environmental Assessment (SEA) of the WRMP. The SEA is being carried out on behalf of Portsmouth Water by Water by Wood Environmental & Infrastructure Solutions Limited (Wood), formerly Amec Foster Wheeler Environment and Infrastructure UK Ltd to assess the likely significant economic, social and environmental effects of the WRMP and to identify ways in which adverse effects can be avoided, minimised or mitigated and how any positive effects can be enhanced.

The following sections of this NTS:

- ▶ provide an overview of the WRMP process;
- ▶ describe the SEA process together with how it is to be applied to the WRMP;
- ▶ summarise the key economic, social and environmental issues relevant to the assessment of the WRMP;
- ▶ outline the approach to undertaking the assessment of the WRMP;
- ▶ summarise the potential effects of feasible options for balancing water demand and supply in the Portsmouth Water operational area;
- ▶ summarise the potential effects of the revised preferred options for balancing water demand and supply in the Portsmouth Water operational area; and
- ▶ outline information about the WRMP process including how to respond to consultation on the Environmental Report.

What is the Water Resources Management Plan?

Portsmouth Water delivers some 166 million litres of drinking water per day to a population of over 717,000 people across an area covering 868 square kilometres. In 2015/16, 91 per cent of water supplied to customers was from groundwater springs and boreholes which abstract from the underground chalk of the South Downs. The remaining 9 per cent was sourced from a surface water abstraction on the River Itchen.

Along with all water companies in England and Wales, there is a statutory requirement for Portsmouth Water to prepare, maintain and publish a WRMP that sets out how the balance between water supply and demand, and security of supply will be maintained over the coming 25 years in a way that is economically, socially and environmentally sustainable. These are reviewed on a rolling 5 year basis and Portsmouth Water is currently preparing its WRMP for the period 2020 to 2045. Once published, WRMP19 will replace the current 2014 WRMP.

The Supply Demand Balance (SDB) is applied to water resource zones (WRZ) which are defined in the Water Resource Planning Guideline¹ as “an area within which the abstraction and distribution of supply to meet demand is largely self-contained (with the exception of agreed bulk transfers)...Within a WRZ all parts of the supply system and demand centres (where water is needed) should be connected so that all customers in the WRZ should experience the same risk of supply failure and the same level of service for demand restrictions”. Portsmouth Water’s supply area is operated as a single WRZ. Where the SDB identifies that the WRZ is in deficit over the lifetime of the plan, the WRMP will present management options to address the deficit and maintain the balance of supply and demand. For the draft WRMP, the baseline supply/demand balance showed a deficit at average and peak week. In addition, the Water Resources in the South East (WRSE) identified the need for further bulk supplies from Portsmouth Water to neighbouring companies. Portsmouth Water included bulk supplies that other companies have agreed to in principle. These bulk supplies drive the supply/demand balance and the need for options to meet the demand. Following revisions to the draft WRMP, this remains the case, with a deficit of 3.25MI/d forecast in 2020/21 which rises to 47.83 MI/d in 2044/45.

The process of management option development includes a review of as many potential solutions as possible (the ‘unconstrained list’ of options) to identify ‘feasible’ (constrained) options for each WRZ where deficits are predicted. These ‘feasible’ options are then reviewed to identify ‘preferred options’ to resolve any supply deficits in relation to financial, environmental and social costing.

The SDB for the Portsmouth Water operational area identifies a deficit over the lifetime of the plan. Following screening of the unconstrained options, 24 feasible options were identified for potential consideration to address the deficit.

The types of feasible options considered in preparing WRMP19 were broadly categorised as follows:

- ▶ supply options;
- ▶ customer demand options (including metering and water efficiency); and
- ▶ distribution (including leakage) options.

Informed by the environmental, social and economic assessments and ongoing discussion with stakeholders, the list of feasible options was refined to identify the 15 preferred options for inclusion in the draft WRMP.

Following consultation on the draft WRMP and the responses from the regulators and consultees, further changes were made to the WRMP, including update to the SDB which led to revisions of the preferred options. The 20 revised preferred options proposed in the revised WRMP are detailed in **Table NTS.1**.

Table NTS.1 Revised Preferred Options included in the Revised WRMP

Option Number	Option Type	Option Title	Yield
R013	Supply-side	Havant Thicket Winter Storage Reservoir	23.0 MI/d
R021a	Supply-side	Source O DO Recovery	1.8 MI/d
R022a	Supply-side	Source J Group – Maximising DO	12.5 MI/d
R023a	Supply-side	Source H DO Recovery	2.0 MI/d
R024a	Supply-side	Source C DO recovery scheme	5.5 MI/d
R068	Supply-side	Source S Drought Permit	8.5 MI/d
C005	Customer-side	Smart Metering Trial (NFR)	0.08 MI/d
C006a	Customer-side	Metering on change of occupancy - existing meter pits	0.28 MI/d

¹ Environment Agency and Natural Resources Wales (2016) *Final Water Resources Planning Guideline* [available at: <https://naturalresources.wales/media/678739/ea-nrw-and-defra-wg-ofwat-technical-water-resources-planning-guidelines.pdf>].

Option Number	Option Type	Option Title	Yield
C006b	Customer-side	Metering on change of occupier - all properties	4.68 MI/d
C026a	Customer-side	Water Efficient Appliance Subsidy	0.31 MI/d
C034	Customer-side	Water saving devices – Retrofitting existing toilets (with flush >9l)	0.11 MI/d
C040	Customer-side	Water Saving Devices – Spray Taps	0.07 MI/d
C043	Customer-side	Water saving devices - Trigger nozzles & water butts	0.06 MI/d
C046	Customer-side	Household water efficiency programme (Partnering approach, home visit)	1.23 MI/d
C084	Customer-side	Void metering	0.28 MI/d
C078	Drought	Drought: Voluntary restraint & leakage action	4.3 MI/d
C079	Drought	Drought: Mandatory restraint	8.3 MI/d
C80	Drought	Imposition of Drought Direction Restrictions (mandatory commercial restraint)	8.1 MI/d
D004a	Leakage	Permanent Noise Loggers (Phase 1)	5.4 MI/d
D004b	Leakage	Permanent Noise Loggers (Phase 2)	5.4 MI/d

Further information in respect of the preparation of the WRMP is set out in Section 1.4 of the Environmental Report.

What is Strategic Environmental Assessment?

SEA became a statutory requirement following the adoption of European Union Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment. This was transposed into legislation on 20 July 2004 as Statutory Instrument 2004 No.1633 - The Environmental Assessment of Plans and Programmes Regulations 2004. The purposes of the SEA of the WRMP are to:

- ▶ identify the potentially significant environmental effects of the WRMP in terms of the feasible (constrained) and preferred water resources management options being considered by Portsmouth Water;
- ▶ help identify appropriate measures to avoid, reduce or manage adverse effects and to enhance beneficial effects associated with the implementation of the WRMP wherever possible;
- ▶ give the statutory SEA bodies, stakeholders and the wider public the ability to see and comment upon the effects that the draft WRMP may have on them, their communities and their interests, and encourage them to make responses and suggest improvements to the draft WRMP; and
- ▶ inform Portsmouth Water's selection of water management options to be taken forward into the final WRMP.

What are the key economic, social and environmental issues for the Water Resources Management Plan?

As part of the SEA process, a review has been undertaken to identify the key economic, social and environmental issues which are relevant to the assessment of the WRMP. These issues have been identified from a variety of sources, including a review of baseline data and other relevant plans and programmes. A summary of the issues identified as being most relevant to the assessment of the WRMP are shown in **Table NTS.2**.

Table NTS.2 Key Sustainability Issues Relevant to the WRMP

Topic	Key Sustainability Issues
Biodiversity	<ul style="list-style-type: none"> The need to protect and enhance protected sites designated for nature conservation. The need to protect and enhance non-designated sites. The need to continue to improve the condition of priority habitats to support increases in wildlife, biodiversity and important protected species. The need to maintain/enhance ecological connectivity. The need to work within environmental limits and capacities.
Geology and Soils	<ul style="list-style-type: none"> The need to maintain or improve the quality of soils/agricultural land. The need to protect and enhance sites designated for their geological interest. The need to make use of previously developed land and minimise land take. The need to maintain soil function.
Water	<ul style="list-style-type: none"> The need to maintain and improve water quality. The need to maintain seasonal flows in groundwater and surface water. The need to ensure the continued risk of flooding is mitigated effectively. The need to improve the ecological status of water bodies.
Air Quality and Climate	<ul style="list-style-type: none"> The need to minimise emissions of pollutant gases and particulates and enhance air quality. The need to reduce the need to travel and promote sustainable modes of transport. The need to reduce greenhouse gas emissions arising from implementation of the WRMP. The need to take into account and where possible adapt to the potential effects of climate change. The need to increase environmental resilience to the effects of climate change.
Human Environment	<ul style="list-style-type: none"> The need to ensure that water resource requirements of people and visitors can be met at all times, in a sustainable way. The need to ensure that water resources remain affordable. The need to ensure that the WRMP measures do not impact on the health and well-being of all members of the community. The need to ensure that the WRMP measures do not adversely affect the economy. The need to ensure that vulnerable people are not affected by implementation of the WRMP measures. The need to avoid disruption through effects on the transport network. The need to ensure resilience of water supply/treatment infrastructure against climate change effects.
Material Assets and Resource Use	<ul style="list-style-type: none"> The need to promote water efficiency measures (including metering). The need to ensure that leakage is managed at a sustainable economic level in the region. The need to maintain water supplies to a level where water demand is met. The need to reduce energy consumption. The need to ensure efficient use of resources such as construction materials. The need to minimise waste arisings, promote reuse, recovery and recycling and minimise the impact of wastes on the environment and communities.
Cultural Heritage	<ul style="list-style-type: none"> The need to protect and enhance areas, features, landscapes and sites of archaeological and cultural heritage interest, and their settings.
Landscape	<ul style="list-style-type: none"> The need to protect the natural beauty of the area, especially within designated sites such as Chichester Harbour AONB and South Downs National Park. The need to protect and maintain the landscape distinctiveness of the area.

The key sustainability issues listed in **Table NTS.2** above have informed the framework that has been used to assess the effects of the WRMP.

Section 2 of the Environmental Report summarises the review of plans and programmes relevant to the WRMP and SEA that is contained at Appendix B. Section 3 presents the baseline analysis of social, economic and environmental characteristics, along with how these are likely to change in the future.

How have the effects of the Revised Water Resources Management Plan been assessed?

An assessment framework has been developed to assess the economic, social and environmental effects of the revised WRMP. This framework sets out a number of assessment objectives relating to the key issues identified in **Table NTS.2**. For each objective, guide questions are provided. The guide questions focus the assessment on specific aspects of the objective that reflect issues identified from a review of baseline and contextual information relating to the Portsmouth Water operational area. Indicative significance thresholds have also been developed for each assessment objective.

This information and the proposed approach to assessment was presented in the first output of the SEA of the WRMP, a Scoping Report. This Report was issued for consultation to the SEA statutory consultees for a five week period beginning the 22nd July to 26th August 2016. Five responses were received to this consultation (see **Appendix C**). Following receipt of these responses, the approach to assessment was refined. The final ten assessment objectives against which each of the options has been assessed are shown in **Table NTS.3**.

Table NTS.3 Assessment Framework

SEA Objective	Guide Questions
1. To ensure the protection and enhancement of biodiversity, priority habitats and species	Will the option protect and enhance priority species, habitats and sites designated for their nature conservation value?
	Will the option protect and enhance non-designated sites and local biodiversity?
	Will the option provide opportunities for new habitat creation or restoration and link existing habitats as part of the development process?
	Will the option protect and enhance coastal and marine habitats and species?
	Will the option result in a change in the quality of habitats due to changes in groundwater/river water quality or quantity?
2. To ensure the appropriate and efficient use of land and protect soil quality and geodiversity	Will the option affect riparian vegetation structure?
	Will the option minimise the loss of best and most versatile agricultural land?
	Will the option protect and enhance soil health?
	Will the option minimise conflict with existing land use patterns?
	Will the option minimise land contamination?
3. To protect and enhance water quality and surface and groundwater resources and the ecological status of water bodies	Will the option utilise previously developed (brownfield) land?
	Will the option protect and enhance protected sites designated for their geological interest and wider geodiversity?
	Will the option minimise the demand for water resources?
	Will the option protect and improve surface water, groundwater and coastal water quality?
	Will the option result in changes to river flows?
	Will the option result in changes to groundwater levels?

SEA Objective	Guide Questions
4. To reduce the risk of flooding	Will the option prevent the deterioration of Water Framework Directive (WFD) waterbody status (or potential)?
	Will the option have the potential to cause or exacerbate flooding in the catchment area?
	Will the option have the potential to help alleviate flooding in the catchment area?
	Will the option enhance water infiltration and retention?
5. To limit the causes and effects of climate change and increase resilience to the consequences of climate change	Will the option be at risk of flooding or be affected by flooding, if it occurred?
	Will the option reduce vulnerability to the effects of climate change by appropriate adaptation?
	Will the option increase environmental resilience to the effects of climate change?
	Will the option reduce or minimise greenhouse gas emissions?
6. To maintain and enhance the economic and social wellbeing of the local community	Will the option deliver new infrastructure that is energy efficient or makes use of renewable energy sources?
	Will the option ensure sufficient infrastructure is in place for predicted population increases?
	Will the option create local employment opportunities?
	Will the option support the local and regional economy?
7. To ensure the protection and enhancement of human health	Will the option ensure that an affordable supply of water is maintained and vulnerable customers protected?
	Will the option avoid disruption through effects on the transport network?
	Will the option ensure the continuity of a safe and secure drinking water supply?
	Will the option ensure that surface water and bathing water quality are maintained within statutory standards?
8. To promote the wise use of resources	Will the option adversely affect human health by resulting in increased noise and/or adverse effects on air quality?
	Will the option affect opportunities for recreation and physical activity?
	Will the option minimise the demand for raw materials?
	Will the option lead to reduced leakage from the supply network?
9. To conserve and enhance cultural and historic assets	Will the option improve efficiency in water consumption?
	Will the option seek to minimise the demand for raw materials?
	Will the option reduce or minimise energy use?
	Will the option promote the re-use and recycling of waste materials and reduce the proportion of waste sent to landfill?
10. To conserve and enhance landscape character and other protected features	Will the option promote the use of sustainable design and materials?
	Will the option conserve or enhance the historic environment, including heritage assets such as historic buildings, conservation areas, features, places and spaces, and their settings?
	Will the option conserve or enhance archaeological sites and/or remains?
	Will the option affect public access to, or enjoyment of, features of cultural heritage?
11. To conserve and enhance landscape character and other protected features	Will the option minimise adverse visual impacts?
	Will the option avoid adverse effects on, and enhance where possible, protected/designated landscapes (including woodlands), townscapes or seascapes such as National Parks or AONBs be avoided?
	Will the option affect public access to existing landscape features?

The SEA has used a three stage process to assess the effects of the draft and revised WRMP. The first stage is a high level assessment of all feasible (constrained) water management options (including supply

side, demand side and leakage options) against the 10 SEA objectives. The second stage is a more detailed assessment (where information permits) of the preferred options identified in the draft WRMP. The third stage is an assessment of the revised preferred options that, in combination, form Portsmouth Water's final proposed programme of options.

Each of the feasible options has been assessed against the 10 SEA objectives to identify its potential effects. The assessment has included consideration of the nature of the effect, its timing and geographic scale, the sensitivity of the people or environmental receptor that could be affected, and how long any effect might last. Where quantified information has been available for the feasible option, the assessment has also been informed by reference to defined threshold values. The assessment of effects has been based on the following scale:

Score	Description	Symbol
Significant Positive Effect	Significant positive effect of the Water Resources Management Plan option on this objective	++
Minor Positive Effect	Positive effect of the Water Resources Management Plan option on this objective	+
Neutral	Overall neutral effect of the Water Resources Management Plan option on this objective	0
Minor Negative Effect	Negative effect of the Water Resources Management Plan option on this objective	-
Significant Negative Effect	Significant negative effect of the Water Resources Management Plan option on this objective	--
No Relationship	There is no clear relationship between the Water Resources Management Plan option and the achievement of the objective or the relationship is negligible.	~
Uncertain	The Water Resources Management Plan option has an uncertain relationship to the objective or the relationship is dependent on the way in which the aspect is managed. In addition, insufficient information may be available to enable an assessment to be made.	?
Mixed Effect	Mixed positive and negative effect of the Water Resources Management Plan option on this objective	+/-

The potential effects (positive, negative or neutral) and the significance of the effects of each of the revised preferred options against each of the SEA objectives has been recorded in separate matrices, along with commentary setting out the reasons for the assessment results.

To ensure a consistent approach to interpreting the significance of effects, a series of quantitative and semi-quantitative 'thresholds' have been defined (shown in **Appendix D**) to provide direction on what constitutes a significant effect. These have been employed for both the assessment of the feasible options and preferred options.

Section 4 of the Environmental Report provides further information in relation to the approach to the assessment of the WRMP.

Habitats Regulations Assessment

The Conservation of Habitats and Species Regulations 2017 (the 'Habitats Regulations') require that competent authorities assess the potential impacts of plans and programmes on the Natura 2000 network of European protected sites to determine whether there will be any 'likely significant effects' (LSE) on any European site as a result of the plan's implementation (either on its own or 'in combination' with other plans or projects); and, if so, whether these effects will result in any adverse effects on the site's integrity. The process by which the impacts of a plan or programme are assessed against the conservation objectives of a European site is known as Habitats Regulations Assessment (HRA). WRMPs are not explicitly included within this legislation, although Natural England has previously stated that this requirement should extend to plans such as the WRMP. The Habitats Regulations require every Competent Authority, in the exercise of any of its functions, to have regard to the requirements of the Habitats Directive. Water companies have a statutory duty to prepare WRMPs and are therefore the Competent Authority for a HRA.

Alongside the SEA, Wood has undertaken a HRA of the WRMP. The findings of the HRA have been used to inform the assessment of options as part of the SEA process (as summarised in the following sections), and in particular the assessment of options against SEA Objective 1: To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits.

What are the findings of the SEA?

The potential effects of the Feasible Options

The feasible options were assessed against each of the 10 SEA objectives to identify its potential impact. This included six supply options, eleven demand management and water efficiency options, four leakage and three drought options.

Supply feasible options

A table summarising the assessments of the supply feasible options is presented in **Table NTS.4**.

Construction Effects

The implementation of Option R013 would exceed £10m in capital investments regarding the construction of Havant Thicket impound reservoir (IR) which is expected to generate supply chain benefits and a number of employment opportunities as well as increased spend in the local economy by contractors and construction workers. Notwithstanding, HGV movements associated with the development of Havant Thicket IR have the potential to cause traffic disruption within the public road network. Consistent with the definitions of significance, Option R013 has been assessed as having a mixed significant positive effect on SEA Objective 6.

No further significant positive effects were identified during the assessment.

Given the scale of construction activity associated with the construction of Havant Thicket IR, Option R013 was assessed as having a significant negative effect on climate change (SEA Objective 5). This reflects the anticipated emissions of greenhouse gases from vehicle movements, construction plant, and the embodied carbon in raw materials which would collectively produce up to 20.4k tCO₂e. Similarly, the magnitude of change resulting from the ongoing construction of Havant Thicket IR is expected to have a significant negative effect on the surrounding landscape (SEA Objective 10) as recreational and residential receptors may perceive the works as adversely impacting the visual amenity associated with the proximate South Down National Park's setting in addition to altering the local greenfield setting and character.

A significant negative effect against flood risk (SEA Objective 4) was identified for Option R023a. The source boreholes and pumping station where works would be undertaken are located in Flood Zone 3 associated with the River Meon. In consequence activities would be at risk of flooding (1 in 100 or greater annual probability of river flooding); however, the risks of this could be reduced through timing of the proposed activities.

No further significant negative effects were identified during the assessment.

Operational Effects

The design capacity of Options R013 and R022a, 23 Ml/d and 12.5 Ml/d respectively, would help to ensure the continuity of a safe and secure drinking water supply which may in-turn support economic and population growth. In the case of Option R013, the new reservoir could potentially provide new social and recreational facilities and activities in addition to increasing foot traffic within Portsmouth which could provide a minor economic boost to local businesses. Consequently, these options have been assessed as having a significant positive effect on these objectives.

No further significant positive operational effects were identified during the assessment nor were there any significant negative effects established.

Table NTS.4 Supply Feasible Options Assessment Summary

Ref	Option	Construction (C) or Operation (O)	1. Biodiversity	2. Geology and Soils	3. Water Quantity and Quality	4. Flood Risk	5. Climate Change	6. Economic and Social Wellbeing	7. Human Health	8. Waste and Resources	9. Cultural Heritage	10. Landscape
R013	Havant Thicket Winter Storage Reservoir	C	-	-	0	0	--	++/-	-	-	-	--
		O	+/?	0	0	+	+	++	++	-	0	+/?
R021a	Source O DO Recovery	C	0	0	0	0	?/-	0	0	-	0	0
		O	0	0	0	0	0/?	+	+	0/?	0	0
R022a	Source J Group – Maximising DO	C	0	0	0	0	-	0	0/?	-	0	-
		O	0/?	0	0	0	-	++	++	-	0	0
R023a	Source H DO Recovery	C	0	0	0	--	-/0/?	0	0	-	0	0
		O	?	0	?	0	0/?	+	+	0/?	0	0
R024a	Source C DO recovery scheme	C	0	0	0	0	0	0	0	0	0	0

Ref	Option	Construction (C) or Operation (O)	1. Biodiversity	2. Geology and Soils	3. Water Quantity and Quality	4. Flood Risk	5. Climate Change	6. Economic and Social Wellbeing	7. Human Health	8. Waste and Resources	9. Cultural Heritage	10. Landscape
		O	0	0	0	0	+/-	+	+	+/-	0	0
R068	Source S drought permit	C	0	0	0	0	0	0	0	0	0	0
		O	-/?	0	-/?	0	+	+	+	0	0/?	0

Demand and water efficiency feasible options

A table summarising the assessments of the customer demand feasible options is presented in **Table NTS.5**.

Construction Effects

Expenditure related to Options C006 and C075 could be of a scale that could generate substantial benefit to local economic and community wellbeing though utilisation of the local road network as transportation corridors regarding vehicle movements may result in minor disruption of mobility thus a mixed significant positive and minor negative effect on this objective has been identified.

No further significant positive effects were identified during the assessment of the enabling/installation and implementation works associated with the demand management options.

Implementation of the demand management options would require different amounts of raw materials, energy and carbon. As the majority of options would require engineers and/or Portsmouth Water partners/representatives to conduct audits, provide water efficiency advice, and/or retrofit premises with water efficient equipment and metres, there would be greenhouse gas emissions related to vehicle movements. Additionally, the provision and installation of new SMART meters and water efficiency equipment, e.g. dual flush retrofits, spray taps, trigger nozzles, and water butts, would generate carbon emissions arising from embodied carbon. Consequently, emissions associated with C006 and C075 would exceed 1,000 tCO₂e and consistent with the definitions of significance, was assessed as having a significant negative effect on climate change (SEA Objective 5) as well as resource use (SEA Objective 8).

No further significant negative effects were identified during the assessment.

Operational Effects

Energy savings and emission reductions associated with Option C006 were estimated at 2,516 tCO₂e per annum and significant positive effects against climate change (SEA Objective 5) were assessed. Reflecting the energy saved, a significant positive effect was also recorded against resource use (SEA Objective 8).

No other significant effects, whether positive or negative, were identified during the assessment.

Demand reductions associated with the operation of water efficient devices and metering as well as increased water efficiency as a result of more engaged behaviour regarding smart and conscientious water consumption in the Portsmouth Water DMZ would generate savings of between 0.005 MI/d and 4.68 MI/d. No identified options would generate savings in excess of 5 MI/d; therefore, consistent with the definitions of significance, all options were assessed as having a minor positive effect on water quantity and quality (SEA Objectives 3) and resource use (SEA Objective 8).

Demand reductions may reduce greenhouse gas emissions and energy use associated with reduced treatment and pumping of water and lower energy use from heating water in the home. Energy savings and emission reductions associated with Options C006a, C046, C075 and C084 would be up to 722 tCO₂e per annum and for these options, positive effects were identified in respect of climate change (SEA Objective 5).

Savings associated with the reduction water demand, and subsequently, network leakage, through increased water efficiency would help ensure a continual supply of clean drinking water and may additionally support local economic/population growth. Options C006, C046 and C075 would generate savings up to 4.68 MI/d, 1.23 MI/d and 1.40 MI/d, respectively, which has been assessed as having minor positive effects on health (SEA Objective 7) and wellbeing (SEA Objective 6).

Table NTS.5 Customer Demand and Water Efficiency Feasible Options Assessment Summary

Ref	Option	Construction (C) or Operation (O)	1. Biodiversity	2. Geology and Soils	3. Water Quantity and Quality	4. Flood Risk	5. Climate Change	6. Economic and Social Wellbeing	7. Human Health	8. Waste and Resources	9. Cultural Heritage	10. Landscape
C005	Meter all households where a meter or meter box already exists	C	0	0	0	0	-	0	0	-	0	0
		O	0	0	+	0	0	0	0	+	0	0
C006	Metering on change of occupancy – existing meter pits	C	0	0	0	0	--	++/-	0	--	0	0
		O	0	0	+	0	++	+	+	++	0	0
C006a	Metering on change of occupancy – existing meter pits	C	0	0	0	0	-	0	0	-	0	0
		O	0	0	+	0	+	0	0	+	0	0
C026	Subsidy to customers that purchase water efficient appliances (washing machines and dishwashers, showers and WCs)	C	0	0	0	0	0	0	0	0	0	0
		O	0	0	+	0	0	0	0	+	0	0
C034	Water saving devices - Retrofitting existing toilets (with flush >9l)	C	0	0	0	0	0	0	0	0	0	0

Ref	Option	Construction (C) or Operation (O)	1. Biodiversity	2. Geology and Soils	3. Water Quantity and Quality	4. Flood Risk	5. Climate Change	6. Economic and Social Wellbeing	7. Human Health	8. Waste and Resources	9. Cultural Heritage	10. Landscape
	Target metered customers	O	0	0	+	0	0	0	0	+	0	0
C040	Water saving devices – Spray Taps	C	0	0	0	0	0	0	0	0	0	0
		O	0	0	+	0	0	0	0	+	0	0
C043	Water saving devices - Trigger nozzles & water butts	C	0	0	0	0	0	0	0	0	0	0
		O	0	0	+	0	0	0	0	+	0	0
C046	Household water efficiency programme (Partnering approach, home visit)	C	0	0	0	0	0	0	0	0	0	0
		O	0	0	+	0	+	+	+	+	0	0
C069	Target occupants of new build housing with Smart meters & water efficiency advice	C	0	0	0	0	-	0	0	-	0	0
		O	0	0	+	0	0	0	0	+	0	0

Ref	Option	Construction (C) or Operation (O)	1. Biodiversity	2. Geology and Soils	3. Water Quantity and Quality	4. Flood Risk	5. Climate Change	6. Economic and Social Wellbeing	7. Human Health	8. Waste and Resources	9. Cultural Heritage	10. Landscape
C075	Smart metering - replacing existing household water meters & provide water efficiency audit and advice	C	0	0	0	0	-	++/-	0	--	0	0
		O	0	0	+	0	+	+	+	+	0	0
C084	Void metering	C	0	0	0	0	-	0	0	-	0	0
		O	0	0	+	0	+	0	0	+	0	0

Leakage feasible options

A table summarising the assessments of the leakage feasible options is presented in **Table NTS.6**.

Construction Effects

No significant positive effects were identified during the assessment.

Significant negative effects are associated with the construction phase of one option (D011: the installation of district meters and subsequent ALC operations) against climate change (SEA objective 5) and resource use (SEA Objective 8).

Overall, it is expected that implementation of option D011 would result in a large quantity of carbon emissions (depending on the volume of meters/valves installed and/or replaced, length of pipeline targeted for leakage repair, and the intensity of movement throughout the DMZ) which has been assessed as having a significant negative effect on climate change (SEA Objective 5).

Option D011 comprises several infrastructural components including new meters, ancillary valves, and piping which would require a substantial volume of raw materials and energy to implement. Material use and energy requirements are considered to be large, and the option has therefore been assessed as having a significant effect on sustainable resource use (SEA Objective 8). Furthermore, this option would generate construction wastes which may include excavation waste and infrastructural waste (original piping and meters) in addition to fuel usage for vehicles and plant.

No further significant negative effects were identified during the assessment.

Operational Effects

Two of the options (D004a and D011) would generate savings in excess of 5 MI/d; therefore, consistent with the definitions of significance, both were assessed as having a significant positive effect on resource use (SEA Objective 8).

No further significant positive operational effects were identified during the assessment nor were there any significant negative effects established.

Table NTS.6 Leakage Feasible Options Assessment Summary

Ref	Option	Construction (C) or Operation (O)	1. Biodiversity	2. Geology and Soils	3. Water Quantity and Quality	4. Flood Risk	5. Climate Change	6. Economic and Social Wellbeing	7. Human Health	8. Waste and Resources	9. Cultural Heritage	10. Landscape
D004a	Leak detection - Deploy permanent noise loggers (25% coverage)	C	0/?	0	0	0	0/?	0	0/?	0	0	0
		O	0	0	+	0	+	+	+	+	0	0
D004b	Leak detection - Deploy permanent noise loggers (75% coverage)	C	0/?	0	0	0	0/?	+	-/?	0	0	0
		O	0	0	+	0	+	+	+	++	0	0
D005	Leak detection - Partial district metering	C	0/?	0	0	0	-	0	-/?	-	0	0/?
		O	0	0	+	0	+	+	+	+	0	0
D011	Leak detection - Full district metering	C	0/?	0	0	0	--	+/?	-/?	--	0	0/?
		O	0	0	+	0	+	+	+	++	0	0

Drought feasible options

A table summarising the assessments of the drought feasible options is presented in **Table NTS.7**.

Construction Effects

There were no significant or minor positive effects identified during the assessment of the implementation works associated with the drought management options which reflects the options' dependency on knowledge transference to encourage sustainable behaviour in addition to the activation of the statutory Drought Directions 2011 to facilitate the cessation of non-critical water consumption by domestic and commercial customers.

The ALC operation, leakage investigation and reduction activity, included within the scope of C078 is expected to be minor and within short duration. Notwithstanding, the cumulative impacts of noise/vibration disturbance and air quality impacts (dust) resulting from excavation and the transportation of equipment/material may adversely affect human health depending on the scale, duration, and proximity of the works to sensitive receptors. Consequently, implementation of C078 has been assessed as having an uncertain though potentially minor negative effect on health (SEA Objective 7).

No further effects were identified during the assessment.

Operational Effects

The operation of C079 and C80 would lead to a reduction of water demand by domestic and commercial customers through the restriction of non-critical water uses should facilitate a water saving of up to 8.1 MI/d to 8.3 MI/d which could subsequently be utilised elsewhere during times of drought. In addition, there would be operational carbon savings associated with reduced treatment and pumping of water. These options have therefore been assessed as having significant positive effects on the sustainable use of resources (SEA Objective 8).

No further significant positive operational effects were identified during the assessment nor were there any significant negative effects established.

Table NTS.7 Drought Feasible Options Assessment Summary

Ref	Option	Construction (C) or Operation (O)	1. Biodiversity	2. Geology and Soils	3. Water Quantity and Quality	4. Flood Risk	5. Climate Change	6. Economic and Social Wellbeing	7. Human Health	8. Waste and Resources	9. Cultural Heritage	10. Landscape
C078	Drought: Voluntary restraint & leakage action	C	0/?	0	0	0	0	0	-/?	0	0	0/?
		O	0	0	+	0	+	+	+	+	0	0
C079	Drought: Mandatory restraint	C	0	0	0	0	0	0	0	0	0	0
		O	0	0	+	0	+	+	+	++	0	0
C80	Imposition of Drought Direction Restrictions (mandatory commercial restraint)	C	0	0	0	0	0	0	0	0	0	0
		O	0	0	+	0	+	+	+	++	0	0

The Potential Effects of the Revised Preferred Combination of Options

Portsmouth Water identified 15 preferred options balancing water demand and supply deficit in the draft WRMP. Following consultation on the draft WRMP and the responses from the regulators and consultees, further changes were made to the WRMP, which led to revisions of the preferred options and inclusion of six additional customer side and leakage options.

The following section summarises the findings of more detailed assessments of the 20 revised preferred options.

The findings of the detailed assessments of the revised preferred options during construction and operation are presented in **Table NTS.8**. The findings are discussed in more detail below.

Construction

The implementation of Option R013 would exceed £10m in capital investments regarding the construction of Havant Thicket impound reservoir (IR) which is expected to generate supply chain benefits and a number of employment opportunities as well as increased spend in the local economy by contractors and construction workers. Similarly, the implementation of Option C006b would represent a significant capital investment (£21.5m, albeit over 20 years) which is expected to generate a number of long term jobs and which could have effects on the local economy. Notwithstanding, HGV movements associated with the development of Havant Thicket IR and the implementation of Option C006b have the potential to cause traffic disruption within the public road network. Consistent with the definitions of significance (see **Appendix D**), Options R013 and C006b have been assessed as having a mixed significant positive effect on SEA Objective 6. No further significant positive effects were identified during the assessment of the construction of the options.

Given the scale of construction activity associated with the construction of Havant Thicket IR (Option R013) and the number of meters implemented in Option C006b, both options were assessed as having a significant negative effect on climate change (SEA Objective 5). This reflects the anticipated emissions of greenhouse gases from vehicle movements, construction plant, and the embodied carbon in raw materials which would collectively produce up to 20.4k tCO₂e for Option R013 and 2.3ktCO₂e for Option C006b. Option C006b was also assessed as having a significant negative effect against waste and resources (SEA Objective 8).

The magnitude of change resulting from the ongoing construction of Havant Thicket IR is expected to have a significant negative effect on the surrounding landscape (SEA Objective 10) as recreational and residential receptors may perceive the works as adversely impacting the visual amenity associated with the proximate South Down National Park's setting in addition to altering the local greenfield setting and character.

A significant negative effect against flood risk (SEA Objective 4) was identified for Option R023a. The source boreholes and pumping station where works would be undertaken are located in Flood Zone 3 associated with the River Meon. In consequence activities would be at risk of flooding (1 in 100 or greater annual probability of river flooding); however, the risks of this could be reduced through timing of the proposed activities.

No further significant negative effects were identified during the assessment of the construction of the options.

Operation

The design capacity of Options R013 and R022a, 23 MI/d and 12.5 MI/d respectively, would help to ensure the continuity of a safe and secure drinking water supply which may in-turn support economic and population growth. In the case of Option R013, the new reservoir could potentially provide new social and recreational facilities and activities in addition to increasing foot traffic within Portsmouth which could provide a minor economic boost to local businesses. Consequently, these options have been assessed as having a significant positive effect on these objectives.

The operation of C079 and C80 would generate reductions of water demand by domestic and commercial customers through the restriction of non-critical water uses should facilitate a water saving of up to 8.1 MI/d to 8.3 MI/d which could subsequently be utilised elsewhere during times of drought. Similarly, D004a and D004b would generate notable water savings through leakage reduction. As all four options would generate savings in excess of 5 MI/d; therefore, consistent with the definitions of significance, they were assessed as having a significant positive effect on resource use (SEA Objective 8).

No further significant positive operational effects were identified during the assessment nor were there any significant negative effects established.

Cumulative Effects

The cumulative effects of the preferred options at this stage reflect the significance and scale of the construction and operation of R013.

Table NTS.8 Revised Preferred Combination of Options

Ref	Option	Construction (C) or Operation (O)	1. Biodiversity	2. Geology and Soils	3. Water Quantity and Quality	4. Flood Risk	5. Climate Change	6. Economic and Social Wellbeing	7. Human Health	8. Waste and Resources	9. Cultural Heritage	10. Landscape
R013	Havant Thicket Winter Storage Reservoir	C	-	-	0	0	--	++/-	-	-	-	--
		O	+/?	0	0	+	+	++	++	-	0	+/?
R021a	Source O DO Recovery	C	0	0	0	0	-/?	0	0	-	0	0
		O	0	0	0	0	0/?	+	+	0/?	0	0
R022a	Source J Group – Maximising DO	C	0	0	0	0	-	0	0/?	-	0	-
		O	0/?	0	0	0	-	++	++	-	0	0
R023a	Source H DO Recovery	C	0	0	0	--	-/0/?	0	0	-	0	0
		O	?	0	?	0	0/?	+	+	0/?	0	0
R024a	Source C DO recovery scheme	C	0	0	0	0	-/0/?	0	0	-	0	0

Ref	Option	Construction (C) or Operation (O)	1. Biodiversity	2. Geology and Soils	3. Water Quantity and Quality	4. Flood Risk	5. Climate Change	6. Economic and Social Wellbeing	7. Human Health	8. Waste and Resources	9. Cultural Heritage	10. Landscape
		O	0	0	0	0	+/-	+	+	+/-	0	0
R068	Source S drought permit	C	0	0	0	0	0	0	0	0	0	0
		O	-/?	0	-/?	0	+	+	+	0	0/?	0
C005	Smart Metering Trial (NFR)	C	0	0	0	0	-	+	0	-	0	0
		O	0	0	+	0	0	0	0	0	0	0
C006a	Metering on change of occupancy - existing meter pits	C	0	0	0	0	-	0	0	-	0	0
		O	0	0	+	0	+	0	0	+	0	0
C006b	Metering on change of occupier - all properties	C	0	0	0	0	--	++/-	0	--	0	0
		O	0	0	+	0	++	+	+	++	0	0
C026	Subsidy to customers that purchase water efficient	C	0	0	0	0	-	0	0	-	0	0

Ref	Option	Construction (C) or Operation (O)	1. Biodiversity	2. Geology and Soils	3. Water Quantity and Quality	4. Flood Risk	5. Climate Change	6. Economic and Social Wellbeing	7. Human Health	8. Waste and Resources	9. Cultural Heritage	10. Landscape
	appliances (washing machines and dishwashers, showers and WCs)	O	0	0	+	0	+	0	0	+	0	0
C034	Water saving devices - Retrofitting existing toilets (with flush >9l) Target metered customers	C	0	0	0	0	0	0	0	0	0	0
		O	0	0	+	0	0	0	0	+	0	0
C040	Water saving devices – Spray Taps	C	0	0	0	0	0	0	0	0	0	0
		O	0	0	+	0	0	0	0	+	0	0
C043	Water saving devices - Trigger nozzles & water butts	C	0	0	0	0	0	0	0	0	0	0
		O	0	0	+	0	0	0	0	+	0	0
C046	Household water efficiency programme (Partnering approach, home visit)	C	0	0	0	0	-	0	0	-	0	0
		O	0	0	+	0	+	+	+	+	0	0

Ref	Option	Construction (C) or Operation (O)	1. Biodiversity	2. Geology and Soils	3. Water Quantity and Quality	4. Flood Risk	5. Climate Change	6. Economic and Social Wellbeing	7. Human Health	8. Waste and Resources	9. Cultural Heritage	10. Landscape
C078	Drought: Voluntary restraint & leakage action	C	0/?	0	0	0	0	0	-/?	0	0	0/?
		O	0	0	+	0	+	+	+	+	0	0
C079	Drought: Mandatory restraint	C	0	0	0	0	0	0	0	0	0	0
		O	0	0	+	0	+	+	+	++	0	0
C80	Imposition of Drought Direction Restrictions (mandatory commercial restraint)	C	0	0	0	0	0	0	0	0	0	0
		O	0	0	+	0	+	+	+	++	0	0
C084	Void metering	C	0	0	0	0	-	0	0	-	0	0
		O	0	0	+	0	+	0	0	+	0	0
D004a	Permanent Noise Loggers (Phase 1)	C	0/?	0	0	0	0/?	+	0	0	0	0
		O	0	0	+	0	+	+	+	++	0	0

Ref	Option	Construction (C) or Operation (O)	1. Biodiversity	2. Geology and Soils	3. Water Quantity and Quality	4. Flood Risk	5. Climate Change	6. Economic and Social Wellbeing	7. Human Health	8. Waste and Resources	9. Cultural Heritage	10. Landscape
D004b	Permanent Noise Loggers (Phase 2)	C	0/?	0	0	0	0/?	+	0	0	0	0
		O	0	0	+	0	+	+	+	++	0	0
Cumulative Effects		C	-/?	-	0	0	--	++/-	-	-	-	--
		O	+/?	0	+	+	+	++	++	++/-	0	+/?

Summary of Effects

The summary of the construction and operational effects of the preferred combination of options outlined in **Table NTS.8** illustrates the balance that needs to be struck between the likely significant negative effects arising during the construction phase and the resulting significant positive effects from their subsequent operation. It is worth noting that the identified cumulative effects of construction maybe overly cautious as the effects are actually spread over the plan period 2020 – 2045 (as different options are implemented through the lifetime of the Plan) with largely short term effects occurring as each option is implemented.

Using the findings of the SEA

The assessments have helped to highlight the range of potential environmental and social effects associated with the draft and revised WRMP, including those that had been quantified and those that could only be identified qualitatively. The assessments outlined in this report highlighted where there are the potential significant negative and positive effects of the WRMP. Further, the assessments have helped to identify where there are more minor effects and how some of the potential negative impacts can be mitigated and positive effects enhanced. The selection of the revised preferred options have drawn on the findings of the assessment, where relevant, to select options that address the supply demand balance deficit in the least environmental disruptive way.

What are the next steps in the SEA process?

This revised Environmental Report has been completed to assess the changes to the WRMP. It also includes changes made in response to comments received from the consultation.

The revised WRMP has been submitted to the Secretary of State for Environment, Food and Rural Affairs. A statement of response will also be submitted containing all the consultation submissions received and Portsmouth Water's response. The statement of response and revised WRMP will be set to the Environment Agency for review. A decision will then be taken as to whether the revised WRMP can be published or whether further work is required before it can be published.

As soon as is reasonable practicable after the publication of the final WRMP, Portsmouth Water will also publish a Post Adoption Statement which is the final output of the SEA process. This will summarise

- ▶ how environmental considerations have been integrated into the plan or programme;
- ▶ how the Environmental Report has been taken into account;
- ▶ how opinions expressed in response to consultation have been taken into account;
- ▶ how the results of any transboundary consultations entered into have been taken into account;
- ▶ the reasons for choosing the plan or programme as adopted, in the light of the other reasonable alternatives dealt with; and
- ▶ the measures that are to be taken to monitor the significant environmental effects of the implementation of the plan or programme.

As the WRMP is implemented, Portsmouth Water will monitor its effects on the environment through their existing processes, helping to ensure that the potential impacts identified in the SEA are considered in practice.

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1. Introduction

1.1 Overview

Portsmouth Water Ltd (Portsmouth Water) is developing its next Water Resources Management Plan (WRMP19). The WRMP will set out how the balance between water supply and demand and security of supply will be maintained for the 25 year period 2020 to 2045 in a manner that is economically, socially and environmentally sustainable. As part of the preparation of WRMP19, Portsmouth Water completed a draft Water Resources Management Plan (WRMP19) for the period 2020 to 2045. This was issued for a 12 week consultation on 5th March 2018. Following an analysis of the submissions, and further modelling, Portsmouth Water has now produced a revised WRMP.

Wood Environment & Infrastructure Solutions UK Limited (Wood), formerly Amec Foster Wheeler Environment and Infrastructure UK Ltd., has been commissioned by Portsmouth Water to undertake a Strategic Environmental Assessment (SEA) of the WRMP. The SEA assesses the likely economic, social and environmental effects of the WRMP and identifies ways in which adverse effects can be avoided, minimised or mitigated and how any positive effects can be enhanced. In doing so, it will help to inform the selection of water management options within the plan.

1.2 Purpose of this Environmental Report

This Environmental Report has been produced as part of the process of developing the Portsmouth Waters' Water Resource Management Plan (WRMP). It complies with the requirements of the Strategic Environmental Assessment Directive as interpreted in the UK by *The Environmental Assessment of Plans and Programmes Regulations 2004*. These regulations are a statutory requirement for plans or programmes which could have significant environmental implications, and the process helps to identify where there are potential impacts and how any negative impacts might be mitigated. The assessment has been used to inform the choice of options within the WRMP to manage the supply and demand of water in the Portsmouth Water area over the 25 year planning period (2020 – 2045).

This Environmental Report sets out:

- ▶ A review relevant plans, programmes, policies and strategies which could influence the WRMP (**Section 2**);
- ▶ The baseline information that sets the context for the assessment (**Section 3**);
- ▶ Details of the methods employed in undertaking the assessment (**Section 4**);
- ▶ The potential effects of feasible options for balancing water demand and supply for the Portsmouth Water operational area (**Section 5**);
- ▶ The potential effects of the revised preferred options for balancing water demand and supply for deficit WRZs and the cumulative effects for the Portsmouth Water operational area (**Section 6**); and
- ▶ Where adverse effects have been identified, mitigating measures have been proposed. Information about the WRMP process going forward and how to comment on this report is also provided (**Section 7**).

1.3 Water Resources Management Planning

Requirements for a Water Resources Management Plan

The Water Industry Act 1991, as amended by the Water Act 2003, requires all water companies to prepare, maintain and publish statutory WRMPs. The plans set out how water companies intend to maintain the

balance between water supply and demand and ensure security of supply over the next 25 years and beyond in a way that is economically, socially and environmentally sustainable.

Part III of the Water Industry Act 1991 states the following role for water companies in water supply:

“37.—(1) It shall be the duty of every water undertaker to develop and maintain an efficient and economical system of water supply within its area and to ensure that all such arrangements have been made—

(a) for providing supplies of water to premises in that area and for making such supplies available to persons who demand them; and

(b) for maintaining, improving and extending the water undertaker's water mains and other pipes, as are necessary for securing that the undertaker is and continues to be able to meet its obligations under this Part.

37A.—(2) A water resources management plan is a plan for how the water undertaker will manage and develop water resources so as to be able, and continue to be able, to meet its obligations under this Part.”

The Water Resources Planning Guideline² produced by the Environment Agency and Natural Resources Wales provides a framework for the development and presentation of water company plans. Ofwat also uses WRMPs to assess the supply-demand balance as part of the Periodic Review of price limits.

Water Resources Management Planning Stages

The Water Resources Planning Guideline sets out the process for developing a WRMP. This highlights the following key stages:

- ▶ **Early engagement:** Before preparing its draft WRMP, the water company should undertake early engagement with its board, regulators, customers and interested parties. During this stage, the methods and approaches to the development of the WRMP should be discussed with the Environment Agency with a view to preparing a method statement.
- ▶ **Pre-consultation:** Pre-consultation must be undertaken with the Environment Agency and Secretary of State for the Environment, Food and Rural Affairs (if the plan affects sites in England) and Natural Resources Wales and Welsh Ministers (if the plan affects sites in Wales), Ofwat and any licensed water supplier that supplies water to premises in the plan area. Pre-consultation may also be undertaken with other stakeholders at this stage.
- ▶ **Write draft WRMP:** The draft WRMP is prepared taking into account issues raised during consultation and following any written direction from the Secretary of State.
- ▶ **Submit draft WRMP:** The draft WRMP is submitted to the Secretary of State, along with a statement declaring any aspects of the plan the water company believes to be commercially confidential.
- ▶ **Publish draft WRMP:** Once instructed to do so by the Secretary of State, the draft WRMP is published for public consultation in accordance with the Water Resources Management Plan Regulations 2007.
- ▶ **Carry out public consultation:** The water company has 26 weeks to consult on its draft WRMP and produce a statement of response. Typically, draft plans are consulted on over a 12 week period but this depends on the complexity of the plan.
- ▶ **Publish statement of response:** The water company is required to provide a statement of response to the representations received during consultation and any forwarded by the Secretary of State. A water company may decide to publish a revised WRMP at this stage.

² Environment Agency and Natural Resources Wales (2016) *Final Water Resources Planning Guideline* [available at: <https://naturalresources.wales/media/678739/ea-nrw-and-defra-wg-ofwat-technical-water-resources-planning-guidelines.pdf>] (accessed October 2016)].

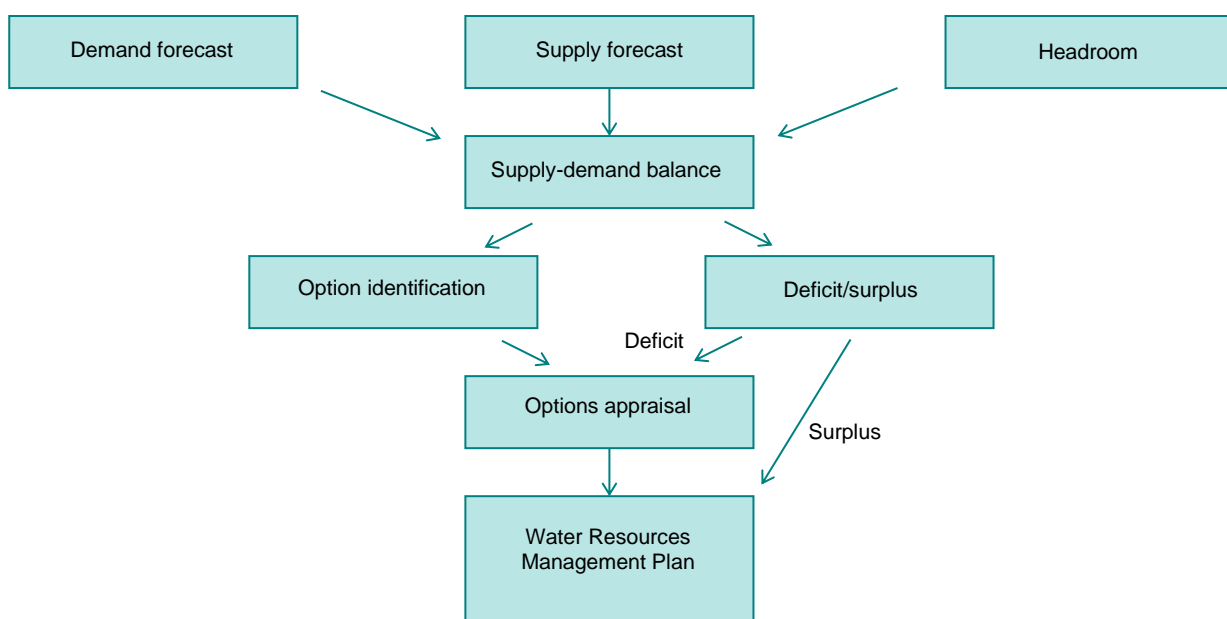
- **Submit draft final WRMP:** The statement of response must be submitted to the Secretary of State together with the revised draft final WRMP (if appropriate). The Secretary of State will in turn send the response to the Environment Agency for review. The Secretary of State will review the draft plan, the representations made and statement of response, along with technical advice from the regulators and decide whether it can be published. Further work may be required before the plan is published. If necessary, a public hearing or public inquiry will be held to resolve any issues that are particularly complex or controversial or where the draft WRMP has caused particular local interest.
- **Publish final WRMP:** The final WRMP is published when the Secretary of State directs the water company to do so.

Figure 1.1 shows the key elements in developing a WRMP. The process of developing a WRMP requires an estimation of baseline supply forecast to be prepared, along with an estimation of baseline demand forecast. The uncertainties within the forecast are assessed and the target headroom allowance required is then estimated. The calculation of the baseline supply demand balance for each year of the plan's period are then used to determine if there are any years or critical periods where there is likely to be a supply-demand balance deficit.

Once this information has been established, a long list of demand and supply options which could be used to manage the supply demand balance deficit is considered. Options are discounted based on their unfeasibility using economic, technological and environmental criteria until a feasible (constrained) list of options that could be used is presented. The capital, operating and social and environmental costs (including carbon costs) of each of the feasible options are assessed using industry standard methodologies. Investment modelling is then undertaken which takes account of the capital, operation and social and environmental costs of the options to determine a least-cost water resources strategy. Further scenario modelling and sensitivity testing is then applied to the strategy to determine the robustness of the proposals.

The preferred planning solution for managing supply and demand to meet the required balance and target headroom was presented in the draft WRMP for formal consultation. Following an analysis of the consultation submissions, and further modelling, Portsmouth Water has now produced a revised WRMP. Where there are changes to the preferred options in the plan, further justification of their inclusion and timing for implementation has been provided.

Figure 1.1 Summary of the Water Resources Management Planning Stages



1.4 Portsmouth Water's Water Resource Management Plan

Portsmouth Water delivers some 166 million litres of drinking water per day to a population of over 717,000 people across an area covering 868 square kilometres. In 2015/16, 91 per cent of water supplied to customers was from groundwater springs and boreholes which abstract from the underground chalk of the South Downs. The remaining 9 per cent was sourced from a surface water abstraction on the River Itchen.

The WRMP will detail how Portsmouth Water will maintain the balance between demand for water from its customers and the resources available to it over the next 25 years. The WRMP will present management options by water resource zone (WRZ). WRZs are defined in the Water Resources Planning Guideline as *"an area within which the abstraction and distribution of supply to meet demand is largely self-contained (with the exception of agreed bulk transfers)...Within a WRZ all parts of the supply system and demand centres (where water is needed) should be connected so that all customers in the WRZ should experience the same risk of supply failure and the same level of service for demand restrictions"*.

A single WRZ covers the Portsmouth Water operational area which is shown in **Figure 1.2**.

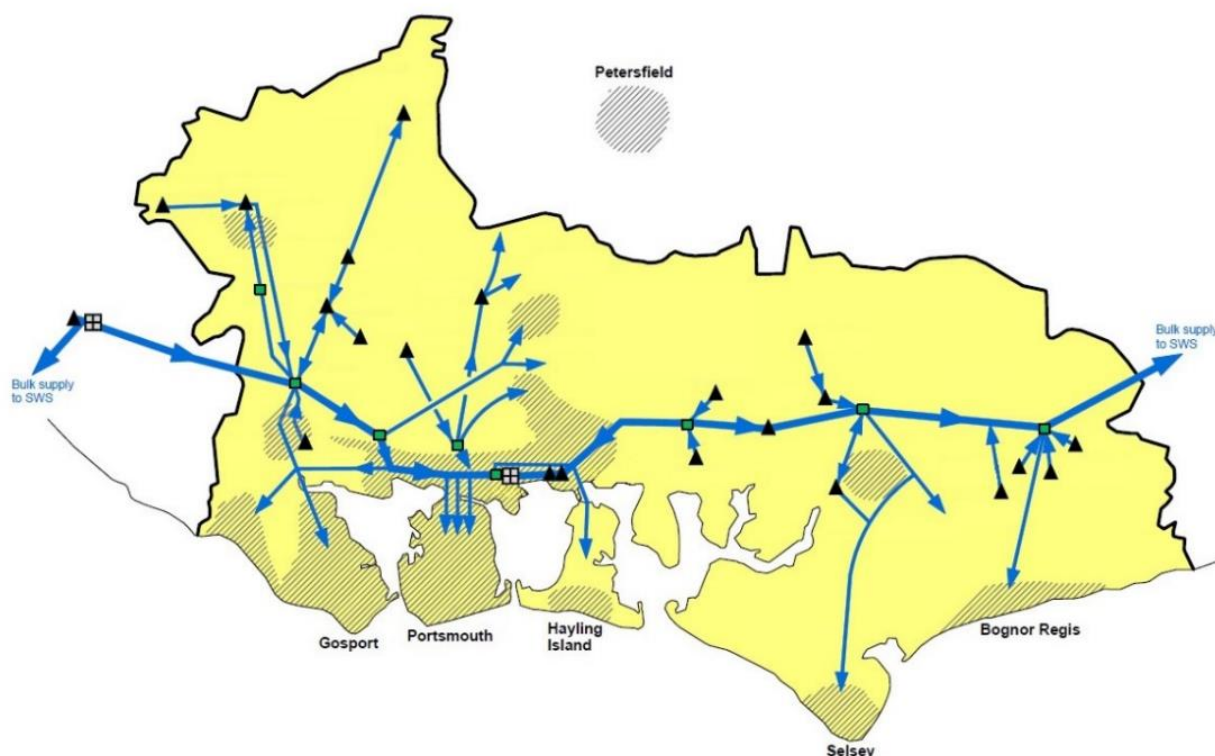


Figure 1.2 Portsmouth Water Operational Area

The Current Water Resources Management Plan

Portsmouth Water's 2014 WRMP identified that a supply-demand surplus would be maintained over the 25 year period covered by the plan to 2040. As a result, the company did not need to implement water management options to meet the increased demand in its own WRZ during this period.

The 2014 WRMP was developed in conjunction with the regional water resources work of the Water Resources in the South East (WRSE) group. The WRSE group comprises of the seven water companies in South East England and is led by the Environment Agency. The group investigates the potential for regional solutions to meet the water needs of the region. Portsmouth Water's draft 2014 WRMP included an 'Alternative Illustrative Plan' to show how Portsmouth Water's plan could change should regional solutions identified by the WRSE group be implemented in the Company's operational area. The 'Alternative Illustrative Plan' was not carried forward into the published WRMP.

Water Resources Management Plan 2019

Portsmouth Water is preparing the WRMP for the period from 2020 to 2045 (and beyond). As described in **Section 1.3**, the WRMP process identifies potential shortages in the future availability of water and sets out the possible solutions required to maintain the balance between water supply and future demand.

The baseline supply side forecast for the WRMP includes a reassessment of Deployable Output of the 22 Company water sources. It includes:-

- ▶ An assessment of the impact of climate change on each source.
- ▶ Quantifying the impact of any short term loss of production referred to as 'outage'.
- ▶ An assessment of the use of water in the treatment process itself.

The overall assessment has resulted in a lower estimate of the Deployable Output and water available for use than in the previous, WRMP14, plan by 7%.

The detailed demand forecast included the completion of property and population forecasts for the planning period 2020-2045. The results indicate that the PWOA will see a similar increase in both properties and population over the planning period to that estimated in the previous plan, WRMP14. Taking into account proposals for metering, the forecast for household demand will fall over the planning period from 140 litres per head per day to 135 litres per head per day by 2024/25. Non-household demand is also forecast to fall over the planning period. Leakage has been reassessed as part of a wider industry revised harmonisation programme. This results in an increase leakage estimate of 35 MI/d.

For the draft WRMP, the baseline supply/demand balance showed a deficit at average and peak week. In addition, the WRSE has identified the need for further bulk supplies from Portsmouth Water to neighbouring water companies (Southern Water). Portsmouth Water included bulk supplies that Southern Water agreed to in principle as follows:

- ▶ By end of 2017/18 the Company will provide Southern Water with two bulk supplies, both for 15 MI/d to their Sussex and Hampshire zones. Two additional supplies to Southern Water, of 9 MI/d and 21 MI/d into their Hampshire zone in 2022/23 and 2028/29 respectively; the water will come from Source A on the River Itchen and effectively take all available water from that source for Southern Water's needs. The total bulk supply to Southern Water will therefore be up to a total of 60 MI/d by 2030.
- ▶ There is, however, some uncertainty over the requirements for these additional supplies to Southern Water as it has challenged the Environment Agency proposals to reduce its abstraction licences on the Test and Itchen. A public enquiry is planned for March 2018.

These bulk supplies drive the supply/demand balance and the need for options to meet the demand, and whilst there are some uncertainties, it was assumed for the purposes of the draft WRMP that the requirements were confirmed and both supply and demand options would need to be developed and implemented. These core assumptions remain unchanged for the revised WRMP, although there has been further update, with a deficit of 3.25MI/d forecast in 2020/21 which would rise to 47.83 MI/d in 2044/45.

The process of management option development includes a review of as many potential solutions as possible (the 'unconstrained list' of options) to identify 'feasible' (constrained) options for the PWOA. Robust and objective screening criteria are used to assess the list of unconstrained options and filter this to produce a smaller list of feasible options. These 'feasible' options are then reviewed (using the findings of the relevant assessments, modelling and environmental and social costings) to identify 'a preferred programme of options' to resolve any supply deficits.

Following screening of the unconstrained options, 24 feasible options were identified for potential consideration to address the deficit.

The types of feasible options considered in preparing WRMP19 were broadly categorised as follows:

- ▶ supply options;
- ▶ customer demand options (including metering and water efficiency); and

- distribution (including leakage) options.

Informed by the environmental, social and economic assessments and ongoing discussion with stakeholders, the list of feasible options was refined to identify 15 preferred options that were included in the draft WRMP.

Following consultation on the draft WRMP and the responses from the regulators and consultees, further changes were made to the WRMP, which led to revisions of the preferred options. The 20 revised preferred options proposed in the revised WRMP are detailed in **Table 1.1**.

Table 1.1 Revised Preferred Options included in the Revised WRMP

Option Number	Option Type	Option Title	Yield
R013	Supply-side	Havant Thicket Winter Storage Reservoir	23.0 MI/d
R021a	Supply-side	Source O DO Recovery	1.8 MI/d
R022a	Supply-side	Source J Group – Maximising DO	12.5 MI/d
R023a	Supply-side	Source H DO Recovery	2.0 MI/d
R024a	Supply-side	Source C DO recovery scheme	5.5 MI/d
R068	Supply-side	Source S Drought Permit	8.5 MI/d
C005	Customer-side	Smart Metering Trial (NFR)	0.08 MI/d
C006a	Customer-side	Metering on change of occupancy - existing meter pits	0.28 MI/d
C006b	Customer-side	Metering on change of occupier - all properties	4.68 MI/d
C026a	Customer-side	Water Efficient Appliance Subsidy	0.31 MI/d
C034	Customer-side	Water saving devices – Retrofitting existing toilets (with flush >9l)	0.11 MI/d
C040	Customer-side	Water Saving Devices – Spray Taps	0.07 MI/d
C043	Customer-side	Water saving devices - Trigger nozzles & water butts	0.06 MI/d
C046	Customer-side	Household water efficiency programme (Partnering approach, home visit)	1.23 MI/d
C084	Customer-side	Void metering	0.28 MI/d
C078	Drought	Drought: Voluntary restraint & leakage action	4.3 MI/d
C079	Drought	Drought: Mandatory restraint	8.3 MI/d
C80	Drought	Imposition of Drought Direction Restrictions (mandatory commercial restraint)	8.1 MI/d
D004a	Leakage	Permanent Noise Loggers (Phase 1)	5.4 MI/d
D004b	Leakage	Permanent Noise Loggers (Phase 2)	5.4 MI/d

1.5 Strategic Environmental Assessment

Overview

SEA became a statutory requirement following the adoption of Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment. This was transposed into legislation on 20 July 2004 as Statutory Instrument 2004 No.1633 - The Environmental Assessment of Plans and Programmes Regulations 2004.

The objective of the SEA Directive is *“to provide for a high level of protection of the environment and to contribute to the integration of environmental considerations into the preparation and adoption of plans and programmes with a view of contributing towards sustainable development”*.

Throughout the course of the development of the plan, policy or programme, the aim of SEA is to identify the potential impact of options proposed in the plan in terms of their environmental, economic and social effects. If any adverse effects are identified, these options can then be avoided or proposals modified to manage or mitigate adverse effects.

Applying SEA to Water Resources Management Plans

The SEA Directive requires *“an environmental assessment ... of certain plans and programmes which are likely to have significant effects on the environment”* (Article 1). Plans and programmes are defined as those:

- ▶ *“which are subject to preparation and/or adoption by an authority at national, regional or local level or which are prepared by an authority for adoption, through a legislative procedure by Parliament or Government; and*
- ▶ *which are required by legislative, regulatory or administrative provisions”* (Article 2(a)).

Guidance produced by the European Commission (EC)³ indicates that in preparing long-term plans for ensuring water resources, privatised utilities companies can be considered an authority because they are providing services that would be carried out by public authorities in a non-privatised regime. The preparation of a WRMP is a statutory requirement and therefore meets the requirements of Article 2(a) of the Directive.

Plans and programmes that may have significant effects on the environment are identified as those:

- ▶ *“which are prepared for... water management... and which set the framework for future development consent of projects listed in Annexes I and II to Directive 85/337/EEC [the Environmental Impact Assessment Directive]; or*
- ▶ *which, in view of the likely effect on sites, have been determined to require an assessment pursuant to Article 6 or 7 of Directive 92/43/EEC [the Habitats Directive]”* (Article 3, paragraph 2(a)).

Broadly, this includes plans that may include development of infrastructure to source, store, or transfer water, or may affect sites that have European designations (Special Areas of Conservation (SACs), Special Protection Areas (SPAs), and Ramsar sites and candidate sites).

Government⁴, industry⁵ and regulator⁶ guidance set out that there is a requirement for water companies, as responsible authorities, to determine whether their WRMPs fall within the scope of the SEA Regulations and whether an SEA must be undertaken. Portsmouth Water has determined that an SEA of WRMP19 is required based on the scope of the potential effects that could arise. In addition, it is noted that the latest

³ EC (2003) *Implementation of Directive 2001/42 on the Assessment of the Effects of Certain Plans and Programmes on the Environment*.

⁴ ODPM et al (2005) *A Practical Guide to the Strategic Environmental Assessment Directive*.

⁵ UKWIR (2012) *Strategic Environmental Assessment and Habitats Regulations Assessment - Guidance for Water Resources Management Plans and Drought Plans (WR/02/A)*.

⁶ Environment Agency and Natural Resources Wales (2016) *Final Water Resources Planning Guideline*.

Water Resources Planning Guideline states that “SEA is mandatory if [the water company operates] wholly or mainly in England”.⁶ Undertaking an SEA is consistent with the intention of this guidance.

Stages of Strategic Environmental Assessment

SEA comprises five key stages:

- ▶ **Stage A:** Scoping;
- ▶ **Stage B:** Develop and Refine Alternatives and Assess Effects;
- ▶ **Stage C:** Prepare Environmental Report;
- ▶ **Stage D:** Consult on the Draft Plan and Environmental Report and Prepare the Post Adoption (SEA) Statement; and
- ▶ **Stage E:** Monitor Environmental Effects.

The processes and interrelationships between the key stages of SEA and development of WRMPs are shown in **Figure 1.3**.

The first stage of SEA (**Stage A**) is the production of a Scoping Report. This reviews plans and programmes that could affect the WRMP or be affected by it, outlines baseline information for the plan area and sets out the proposed framework for assessing potential environmental effects.

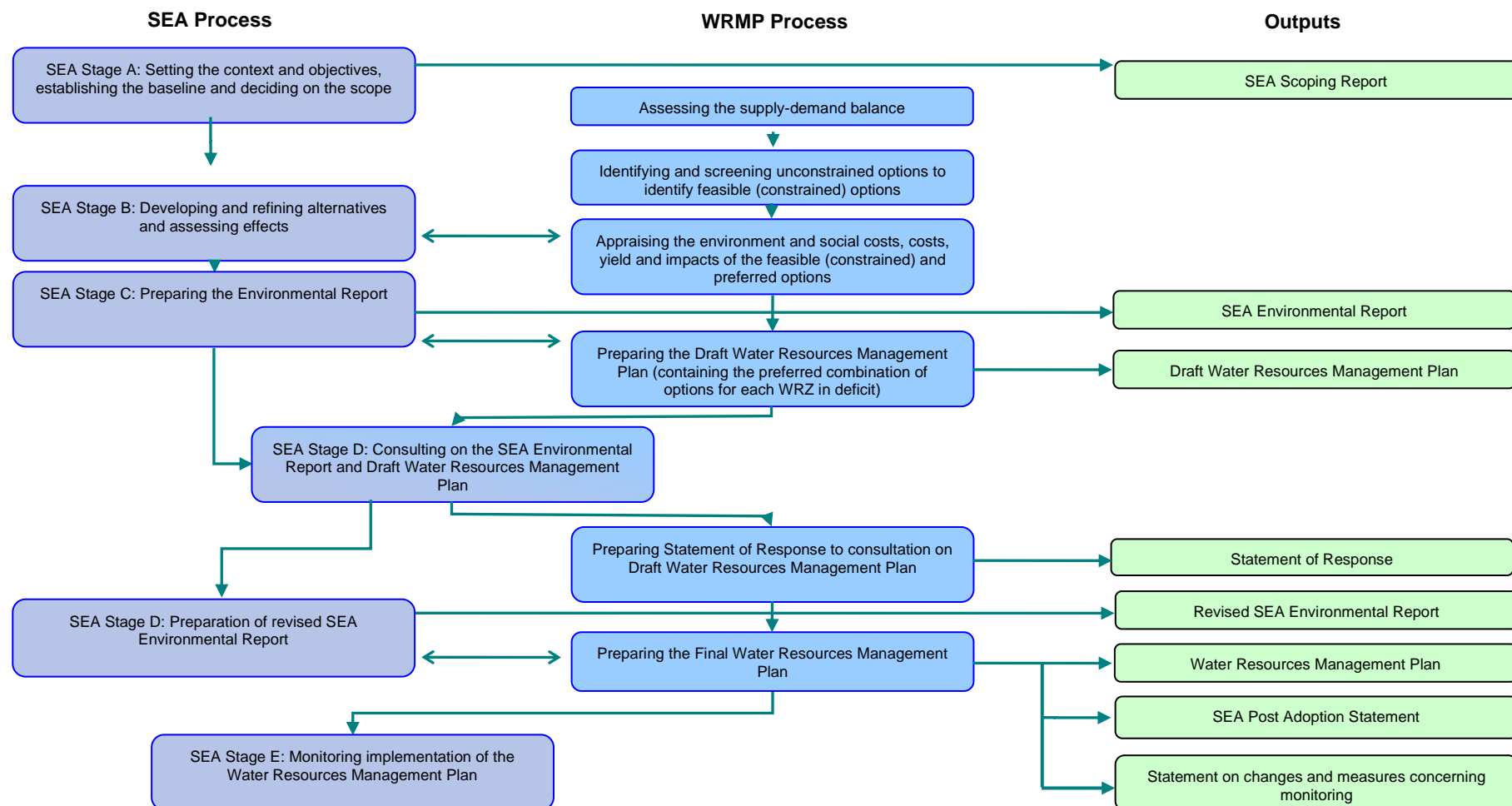
Portsmouth Water published the SEA Scoping Report for the WRMP for a consultation period beginning the 22nd July to 26th August 2016. Five responses were received (see **Appendix C**). The responses resulted in amendments to the baseline information and assessment framework that has been used to assess the options.

The draft WRMP was subject to assessment using the amended assessment framework (**Stage B**). The SEA assessed the effects of the draft WRMP in two stages, commensurate with the development of the plan itself. The first stage comprised a high level assessment of all feasible (constrained) water management options. A more detailed assessment was then undertaken of the preferred options identified in the draft WRMP. The findings of the assessment were presented in the Environmental Report (**Stage C**) to accompany the draft WRMP. The Environmental Report has then been revised to include an assessment of the revised preferred options that, in combination, form Portsmouth Water’s final proposed programme of options.

The draft WRMP and accompanying documents including the Environmental Report were published for consultation (**Stage D**) which concluded on 25th May 2018. Following consultation, Portsmouth Water has prepared a Statement of Response to the representations received during the consultation period setting out how and why the draft WRMP has or has not been revised to take account of the consultation responses. Portsmouth Water has also completed and submitted a revised WRMP to the Secretary of State. This Environmental Report relates to the revised WRMP. Following direction from the Secretary of State, Portsmouth Water will publish the final WRMP and implement it accordingly. In conjunction with publishing the final WRMP, Portsmouth Water will also issue a Post Adoption Statement. This will set out the results of the consultation and SEA process and the extent to which the findings of the SEA have been accommodated in the final WRMP.

The SEA then requires monitoring of any resulting environmental effects of the WRMP (**Stage E**).

Figure 1.3 Linking the SEA and WRMP Development



1.6 Consultation Responses to the draft WRMP and Environmental Report

Portsmouth Water issued the draft WRMP19 for public consultation from the 5th March to 25th May 2018. The draft WRMP was accompanied by a range of documents and assessments including the Environmental Report and the HRA Report.

Four responses (from the Environment Agency, Natural England, the Hampshire and Isle of Wight Wildlife Trust and the Sussex Wildlife Trust) were received to the Environmental Report. Comments were made on:

- ▶ the integration of the SEA with the preparation of the WRMP; and
- ▶ the assessment of specific options and the treatment of specific assessment topics.

More detail (and the responses to them) are provided in **Appendix C**.

Where relevant and appropriate, this revised Environmental Report has been amended to reflect the comments made on the previous Environment Report.

1.7 Habitats Regulations Assessment and Water Framework Directive Assessment

Habitats Regulations Assessment

The *Conservation of Habitats and Species Regulations 2017* (the 'Habitats Regulations') requires that competent authorities assess the potential impacts of plans and programmes on the Natura 2000 network of European protected sites⁷ to determine whether there will be any 'likely significant effects' on any European site as a result of the plan's implementation (either on its own or 'in combination' with other plans or projects); and, if so, whether these effects will result in any adverse effects on the site's integrity. The process by which the impacts of a plan or programme are assessed against the conservation objectives of a European site is known as Habitats Regulations Assessment (HRA)⁸. WRMPs are not explicitly included within this legislation, although Natural England has previously stated that this requirement should extend to plans such as WRMPs. The Habitats Regulations require every Competent Authority, in the exercise of any of its functions, to have regard to the requirements of the Habitats Directive. Water companies have a statutory duty to prepare WRMPs and are therefore the Competent Authority for HRA of their WRMPs.

In accordance with the Habitats Regulations, what is commonly referred to as a HRA screening exercise has been undertaken to identify whether the WRMP will have any likely significant effects on any European sites, either alone or 'in combination' with other projects or plans. Where there are likely significant effects, a more detailed Appropriate Assessment will be required where any adverse effects on the integrity of any European site will be considered.

The HRA is reported separately from the SEA of the WRMP but importantly has helped inform the assessment, particularly in respect of the potential effects of options on biodiversity.

1.8 Environmental Report Structure

This Environmental Report is structured as follows:

⁷ A European Site is any classified Special Protected Area (SPA) and any Special Area of Conservation (SAC) from the point where the Commission and the Government agree the site as a Site of Community Importance. SPAs and SACs have been created under the EC Birds Directive and Habitats Directive. In the UK they form part of a larger European network called Natura 2000. HRA is also required, as a matter of Government policy, for potential SPAs (pSPAs), possible SACs (pSACs) and listed Ramsar Sites for the purpose of considering development proposals affecting them (National Planning Policy Framework paragraph 118). As such, pSPAs, pSACs and Ramsar Sites must also be considered by any HRA. Within this report "European site" is used as a generic term for all of the above designated sites.

⁸ 'Appropriate Assessment' has been historically used as an umbrella term to describe the process of assessment as a whole. The whole process is now more accurately termed 'Habitats Regulations Assessment' (HRA), and 'Appropriate Assessment' is used to indicate a specific stage of HRA.

- ▶ **Non-Technical Summary** - Provides a summary of the Environmental Report, including information on both the WRMP and the SEA;
- ▶ **Section 1: Introduction** - Includes a summary of the WRMP, an overview of SEA and report contents. **Appendix A** provides a review of the requirements of the SEA Directive, how the work to date meets those and how future work will address remaining requirements;
- ▶ **Section 2: Review of Plans and Programmes** - Provides an overview of the review of those plans and programmes relevant to the WRMP and SEA that is contained at **Appendix B**;
- ▶ **Section 3: Baseline Analysis** - Presents the baseline analysis of social, economic and environmental characteristics and identifies the key sustainability issues relevant to the WRMP and SEA;
- ▶ **Section 4: Approach to the Assessment** - Outlines the approach to the SEA of the WRMP including the assessment framework and how consultation on the Scoping Report influenced the approach. **Appendix C** set out the results of the consultation on the Scoping Report (and the consultation on the Environmental Report published to accompany the draft WRMP). **Appendix D** presents information on the definition of significance that has guided the assessment;
- ▶ **Section 5: Assessment of Feasible Options** describes the feasible options and presents the results of the assessment. Assessment matrices are presented in **Appendix E**;
- ▶ **Section 6: Assessment of the Revised Preferred Options** describes the revised preferred options and presents the results of the assessment. Assessment matrices are presented in **Appendix F**. Consideration is also given to the potential for secondary, cumulative and synergistic effects and the role of mitigation and enhancement. The reasons for selecting the revised preferred option and rejection of other options is also set out;
- ▶ **Section 7: Next Steps and Proposals for Monitoring** - Details the next steps in the SEA process and comments on the requirements for monitoring associated with the SEA Directive.

Compliance with the SEA Regulations

This Environmental Report has been prepared to meet the requirements of the SEA Directive and associated Regulations. It fulfils the requirements of Stage A, as outlined within the Quality Assurance Checklist presented at **Appendix A**.

1.1 This Environmental Report

SEA regulation 13 states

“(1) Every draft plan or programme for which an environmental report has been prepared in accordance with regulation 12 and its accompanying environmental report (“the relevant documents”) shall be made available for the purposes of consultation”.

In compliance with this regulation, the draft WRMP was accompanied by an Environmental Report.

However, consistent with the WRMP guidance and the stages in the development of the WRMP, the revised WRMP is not being issued for consultation. In consequence this revised Environmental Report is not being issued for consultation. However, it is being provided to the regulators to demonstrate that the likely significant effects on the environment of the revisions to the WRMP preferred options have been identified, described and assessed.

2. Review of Plans and Programmes

2.1 Introduction

The SEA Regulations require a report containing “an outline of the contents, main objectives of the plan or programme and relationship with other relevant plans and programmes” (Schedule 2(1)) as well as “The environmental protection objectives, established at international (European) Community or Member State level, which are relevant to the plan or programme and the way those objectives and any environmental considerations have been taken into account during its preparation” (Schedule 2(5)).

One of the first steps in undertaking the SEA of the WRMP is therefore to identify and review other relevant plans and programmes which could influence the plan. These may be plans and programmes at an international/European, national, regional or sub-regional level, commensurate with the scope of the WRMP. The review aims to identify the relationships between the WRMP and these other documents i.e. how the WRMP could be affected by the other plans’ and programmes’ aims, objectives and/or targets, or how it could contribute to the achievement of their environmental and sustainability objectives. It is also a valuable source of information to support the completion of the social, economic and environmental baseline analysis and to determine the key issues for the WRMP and SEA (see **Section 3**).

The Scoping Report included a review of plans and programmes and this has been updated in light of comments on that work and more recent developments in policy. The completed review of plans and programmes has been used to provide the policy context for the assessment process and helped to inform the development of objectives that underpin the assessment framework (see **Section 4**).

2.2 Review of Plans and Programmes

Over 100 international/European, national, regional/sub-regional and local level plans and programmes have been reviewed in preparing this Environmental Report. These are listed in **Table 2.1**, with the results of the review provided in **Appendix B**.

Table 2.1 Review of Plans and Programmes Reviewed for the SEA of the WRMP

Review of Plans and Programmes
International / European Plans and Programmes <ul style="list-style-type: none"> • The Bonn Convention (or CMS) 1975 • Bern Convention (1979) • Ramsar Convention (1971) • UNESCO World Heritage Convention (1972) • Kyoto Protocol 1997 • Aarhus Convention (1998) • The Convention for the Protection of the Architectural Heritage of Europe (Granada Convention 1987) • The European Convention on the Protection of Archaeological Heritage (Valetta Convention 1992) • World Commission on Environment and Development (1987): Our Common Future (The Brundtland Report) • United Nations Convention on Biodiversity (the Rio Convention, 1992) • The World Summit on Sustainable Development (WSSD), Johannesburg, September 2002 - Commitments arising from Johannesburg Summit (2002) • European Landscape Convention 2000 (became binding March 2007) • The Paris Agreement (2016)
European Union (EU) Directives, Strategies & Policy Packages <ul style="list-style-type: none"> • European Commission (EC) (2006) Thematic Strategy for Soil Protection EU Directives on Environmental Impact Assessment (Codified Directive 2011/92/EU and Revised Directive 2014/52/EU)

Review of Plans and Programmes

- EC (2011) A Resource- Efficient Europe- Flagship Initiative Under the Europe 2020 Strategy, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions (COM 2011/21)
- EC (2011) A Roadmap for Moving to a Competitive Low Carbon Economy in 2050
- EC (2013) Strategy on Adaptation to Climate Change
- EC (2014) A Policy Framework for Climate and Energy in the Period from 2020 to 2030
- EC (2015) 'Closing the loop - An EU Action Plan for the Circular Economy' policy package
- EU (1991) Directive 91/271/EEC for Urban Waste-water Treatment
- EU (1991) Nitrates Directive (91/676/EEC)
- EU (1992) Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC) & Subsequent Amendments
- EU (1998) Drinking Water Directive (98/83/EC)
- EU (1999) Directive on the Landfill of Waste (99/31/EC)
- EU (2000) Water Framework Directive (2000/60/EC)
- EU (2001) Directive on the Assessment of the Effects of Certain Plans and Programmes on the Environment (SEA Directive) (2001/42/EC)
- EU (2001) National Emissions Ceiling Directive 2001/81/EC
- EU (2002) Environmental Noise Directive (Directive 2002/49/EC)
- EU (2002) Directive 2002/91/EC on the Energy Performance of Buildings
- EU (2004) Environmental Liability Directive (2004/35/EC)
- EU (2005) Thematic Strategy on Air Pollution
- EU (2006) Bathing Waters Directive 2006/7/EC
- EU (2006) Mining Waste Directive 2006/21/EC
- EU (2006) Animal health requirements for aquaculture animals and products thereof, and on the prevention and control of certain diseases in aquatic animals (2006/88/EC)
- EU (2006) Directive 2006/118EC on the protection of groundwater against pollution and deterioration
- EU (2006) Renewed EU Sustainable Development Strategy
- EU (2007) Floods Directive 2007/60/EC
- EU (2007) The Eel Directive 2007/1100/EC
- EU (2008) Air Quality Directive (2008/50/EC) and previous directives (96/62/EC; 99/30/EC; 2000/69/EC & 2002/3/EC)
- EU (2008) Marine Strategy Framework Directive 2008/56/EC
- EU (2008) Directive on Waste (Directive 75/442/EEC, 2006/12/EC 2008/98/EC as amended)
- EU (2008) Environmental Quality Standards Directive 2008/105/EC
- EU (2009) Directive on the Conservation of Wild Birds (09/147/EC) (codified version of Council Directive 79/409/EEC as amended)
- EU (2009) Renewable Energy Directive (2009/28/EC)
- EU (2009) Birds Directive (2009/147/EC)
- EU (2010) Energy 2020 - A Strategy for Competitive, Sustainable and Secure Energy
- EU (2010) Europe 2020 : A strategy for smart, sustainable and inclusive growth
- EU (2010) The Industrial Emissions Directive (2010/75/EU)
- EU (2011) EU Biodiversity Strategy to 2020 – towards implementation
- EU (2011) A Roadmap for Moving to a Competitive Low Carbon Economy in 2050
- EU (2012) Energy Efficiency Directive (2012/27/EU)
- EU (2014) Seventh Environmental Action Programme
- EU (2015) Invasive Alien Species Regulation (1143/2014/EU)

National Plans and Programmes

- **Department of Business, Energy and Industrial Strategy (BEIS) (2010) CRC Energy Efficiency Scheme**
- **BEIS (2011) National Policy Statements for Energy Infrastructure**
- **Department for Communities and Local Government (DCLG) (2014) National Planning Policy for Waste**
- Department for Food and Rural Affairs (Defra) (2006) Shoreline Management Plan Guidance
- Defra (2007) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland
- Defra (2010) Air Pollution: Action in a Changing Climate
- Defra (2011) Biodiversity 2020: A strategy for England's wildlife and ecosystem services
- Defra (2011) Mainstreaming Sustainable Development
- Defra (2011) Marine Policy Statement
- Defra (2011) Natural Environment White Paper: The Natural Choice: Securing the Value of Nature
- Defra (2012) National Policy Statement for Waste Water
- Defra (2012) UK post 2010 Biodiversity Framework
- Defra (2013) The National Adaptation Programme – Making the Country Resilient to a Changing Climate
- Defra (2013) Waste Management Plan for England
- Defra (2016) Creating a Great Place for Living – Enabling Resilience in the Water Sector
- Defra, Scottish Government, Welsh Government (2015) The Great Britain Invasive non-native Species Strategy
- Department for Transport (2011) National Policy Statement for Ports
- Environment Agency (2008) Better Sea Trout and Salmon Fisheries: Our Strategy for 2008-2021
- Environment Agency (2009) Water for People and the Environment: Water Resource Strategy for England and Wales
- Environment Agency (2011) National Flood and Coastal Erosion Risk Management Strategy for England

Review of Plans and Programmes

- Environment Agency (2011) Enjoying Water- Strategic Priorities for Water Related Recreational in London and the South East England
- Environment Agency (2013) Managing Water Extraction
- Environment Agency and Natural Resources Wales (2016) Water Resources Planning Guideline
- Environment Agency (2015) Drought Response: Our Framework for England
- Environment Agency Restoring Sustainable Abstraction Programme
- Environment Agency Areas of Water Stress: Final Classification
- HM Government (1979) Ancient Monuments and Archaeological Areas Act
- HM Government (1981) Wildlife and Countryside Act 1981
- HM Government (1990) Planning (Listed Buildings and Conservation Areas) Act 1990
- HM Government (1994) UK Biodiversity Action Plan (BAP)
- HM Government (2000) Countryside and Rights of Way Act 2000
- HM Government (2003) Water Act 2003
- HM Government (2005) UK Sustainable Development Strategy
- HM Government (2006) The Natural Environment and Rural Communities (NERC) Act 2006
- HM Government (2007) Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007 (as amended 2010)
- HM Government (2008) The Climate Change Act 2008
- HM Government (2008) Future Water: The Government's Water Strategy for England
- HM Government (2009) The UK Renewable Energy Strategy
- HM Government (2009) Marine and Coastal Access Act 2009
- HM Government (2010) Flood and Water Management Act 2010
- HM Government (2011) UK Marine Policy Statement
- HM Government (2011) Water for Life: White Paper
- HM Government (2011) UK Renewable Energy Roadmap
- HM Government (2011) Carbon Plan: Delivering our Low Carbon Future
- HM Government (2015) Infrastructure Act 2015
- HM Government (2016) The Culture White Paper
- HM Government (2016) Environmental Permitting (England and Wales) Regulations 2016 SI 1154
- HM Government (2017) Conservation of Habitats & Species Regulations 2017
- HM Government (2018) A Green Future: Our 25 Year Plan to Improve the Environment
- HM Treasury (2016) National Infrastructure Delivery Plan
- JNCC and Defra (2012) UK Post-2010 Biodiversity Framework
- **Ministry for Housing, Communities and Local Government (MHCLG) (2018) National Planning Policy Framework**
- Ofwat (2008) Water Supply and Demand Policy
- Ofwat (2016) Our Regulatory approach for water and wastewater services in England and Wales.
- Natural England (2011) UK Geodiversity Action Plan
- Water UK (2016) Water Resources Long Term Planning Framework 2015-2065

Regional Plans and Programmes

- Environment Agency (2009) South East Hampshire Catchment Flood Management Plan; Arun and Western Streams Catchment Flood Management Plan
 - Environment Agency (2012) Application of SEA Principles to the modelling options of the Water Resources for the South East
 - Environment Agency (2013) Arun and Western Streams Abstraction Licensing Strategy
 - Environment Agency (2013) East Hampshire Abstraction Licensing Strategy
 - Environment Agency and Defra (2015) River Basin Management Plan South East River Basin District
 - Environment Agency (2016) Flood Risk Management Plan South East River Basin District
 - Water Resources in the South East Group (2016) An Overview of the WRSE
 - Water Companies (various) Drought Plans:
 - Portsmouth Water Drought Plan (2013);
 - Southern Water Final Drought Plan (2013); and
 - South East Water Drought Plan (2013).
 - Water Companies (various) Water Resources Management Plans:
 - Southern Water (2014) Water Resources Management Plan; and
- South East Water (2014) Water Resources Management Plan.

Sub-Regional / Local Plans and Programmes

- Chichester Harbour Conservancy Chichester Harbour AONB Management Plan 2014-2019
- Biodiversity Action Plans (BAPs) (various)
- Arun District Council (2003) Arun District Local Plan 2003 and emerging Local Plan
- Chichester District Council (2015) Local Plan: Key Policies
- Chichester District Council et.al (2010) North Solent Shoreline Management Plan
- East Hampshire District Council and South Downs National Park Authority (2014) Local Plan Part 1 Joint Core Strategy
- Eastleigh Borough Council (2016) Draft Eastleigh Borough Local Plan 2011-2029 & Forthcoming Local Plan

Review of Plans and Programmes

- Fareham Borough Council (various) Local Plan (including Core Strategy (2011), Development Sites and Policies (2015), and Welborne Plan (2015))
- Gosport Borough Council (2015) Local Plan
- Hampshire County Council (2013) Hampshire Local Flood Risk Management Strategy
- Havant Borough Council (various) including Core Strategy and Allocations
- Partnership for Urban South Hampshire (2008) Integrated Water Management Strategy
- Partnership for Urban South Hampshire (2010/2012) Green Infrastructure Strategy and Implementation Framework
- Portsmouth City Council (2012) The Portsmouth Plan
- Portsmouth City Council (2015) Local Flood Risk Management Strategy
- Solent Local Enterprise Partnership (2014) Solent Strategic Economic Plan
- South Downs National Park (2013) Partnership Management Plan
- South Downs National Park Authority (emerging) South Downs National Park Local Plan
- West Sussex County Council (2013) West Sussex Local Flood Risk Management Strategy
- Winchester Borough Council and South Downs National Park Authority (2013) Local Plan Part 1 Joint Core Strategy and Local Plan Part 2 (adopted 2017)

2.3 Policy Objectives Relevant to the Water Resources Management Plan

The review of plans and programmes presented in **Appendix B** has identified a number of objectives and policy messages relevant to the WRMP. Reflecting the topics identified in Annex I of the SEA Directive and Schedule 2 of the SEA Regulations, these objectives and messages are set out for the following topic areas:

- ▶ Biodiversity;
- ▶ Geology, Land Use and Soils;
- ▶ Water;
- ▶ Air Quality and Climate;
- ▶ Human Environment (including population and human health);
- ▶ Material Assets and Resource Use;
- ▶ Cultural Heritage; and
- ▶ Landscape.

The policy objectives and messages identified from the review of plans and programmes are summarised in **Table 2.2**. It is important that the assessment takes these into account as this will help to highlight any areas where the WRMP will help or hinder the achievement of the objectives of the other plans. Only the key sources are included; however, it is acknowledged that many other plans and programmes could also be included. The relevance of the key objectives and policy measures to the assessment of the WRMP is also indicated in **Table 2.2**.

Table 2.2 Key Policy Objectives Identified in Other Plans and Programmes Relevant to the Assessment of the Draft WRMP

Key Objectives and Policy Messages	Key Sources	Relevant to the Assessment of the WRMP?
Biodiversity		
Conservation and enhancement of the levels and variety of biodiversity, including designated sites, priority species and habitats	EU Biodiversity Strategy; UK post 2010 Biodiversity Framework; Biodiversity 2020; Rural Strategy; Better Sea Trout and Salmon Fisheries; Water Resource Strategy for England and Wales; UK Marine Policy Statement; Wildlife and Countryside Act; Conservation of Habitats and Species Regulations; UK Sustainable Development Strategy; National Planning Policy Framework; A Green Future: Our 25 Year Plan to Improve the Environment; Local Biodiversity Action Plans; Local Authority Land Use Plans; South Downs National Park	Yes

Key Objectives and Policy Messages	Key Sources	Relevant to the Assessment of the WRMP?
	Partnership Management Plan; AONB Management Plans; Green Infrastructure Strategy.	
Geology and Soils		
Protection and enhancement of geology and soil quality	Rural Strategy; UK Sustainable Development Strategy; National Planning Policy Framework; Local Authority Land Use Plans; South Downs National Park Partnership Management Plan; AONB Management Plans; Green Infrastructure Strategy.	Yes
Water		
Protection and enhancement of all water supplies and resources	Water Framework Directive; Water Act 2003; Water for Life: White Paper; Water Resource Planning Guideline; UK Sustainable Development Strategy; A Green Future: Our 25 Year Plan to Improve the Environment; Restoring Sustainable Abstraction Programmes; Water Act; Managing Water Extraction; National Planning Policy Framework; River Basin Management Plan South East River Basin District; Water Company Drought Plans (various); Water Company Water Resource Management Plans (various); Abstraction Licensing Strategies (various); Local Authority Land Use Plans (various).	Yes
Promoting the efficient use of water	Water Framework Directive; Water Act 2003; Water for Life: White Paper; Water Resource Planning Guideline; UK Sustainable Development Strategy; Restoring Sustainable Abstraction Programmes; Water Act; Managing Water Extraction; National Planning Policy Framework; River Basin Management Plan South East River Basin District; Water Company Drought Plans (various); Water Company Water Resource Management Plans (various); Abstraction Licensing Strategies (various); Local Authority Land Use Plans (various).	Yes
Minimising flood risk and improving flood control infrastructure	Water Framework Directive; Flood and Water Management Act 2010; National Planning Policy Framework; Making Space for Water- Taking forward a New Government Strategy for Flood and Coastal Erosion Risk Management in England; National Flood and Coastal Erosion Risk Management Strategy for England; UK Sustainable Development Strategy; Climate Change Act; Water Resource Management Plans (various); River Basin Management Plans (various); Catchment Flood Management Plans (various); North Solent Shoreline Management Plan; Local Flood Risk Management Strategies (various); Local Authority Land Use Plans (various).	Yes
Air Quality and Climate		
Ensuring air quality is maintained or enhanced and that emissions of air pollutants are kept to a minimum	The Air Quality Strategy for England, Scotland, Wales and Northern Ireland; UK Sustainable Development Strategy; National Planning Policy Framework; Local Authority Land Use Plans (various).	Potentially
Minimising the effects of climate change on natural resources, inhabitants and the economy	Climate Change Act 2008; National Planning Policy Framework; UK Sustainable Development Strategy; Flood and Water Management Act 2010; Making Space for Water- Taking forward a New Government Strategy for Flood and Coastal Erosion Risk Management in England; National Flood and Coastal Erosion Risk Management Strategy for England; Water Resource Management Plans (various); River Basin Management Plans (various); Catchment Flood Management Plans (various); North Solent Shoreline Management Plan; Local Flood Risk Management Strategies (various); Local Authority Land Use Plans (various).	Yes
Minimising emissions of greenhouse gases that may cause climate change	Climate Change Act 2008; National Planning Policy Framework; UK Sustainable Development Strategy; The UK Renewable Energy Strategy; Local Authority Land Use Plans (various).	Yes
Human Environment		
Addressing deprivation and reducing inequality through regeneration	National Planning Policy Framework; Rural Strategy; Solent Strategic Economic Plan; Local Authority Land Use Plans (various).	No
Promoting improvements to health and well-being for members of the community	National Planning Policy Framework; Local Authority Land Use Plans (various).	Yes

Key Objectives and Policy Messages	Key Sources	Relevant to the Assessment of the WRMP?
Ensuring social equality and prosperity for all	National Planning Policy Framework; Solent Strategic Economic Plan; Local Authority Land Use Plans (various).	No
Providing high quality services, community facilities and social infrastructure that is accessible to all	National Planning Policy Framework; Solent Strategic Economic Plan; Local Authority Land Use Plans (various).	Yes
Minimising noise pollution	National Planning Policy Framework; Local Authority Land Use Plans (various).	Yes
Improving economic competitiveness and promoting productivity	National Planning Policy Framework; Solent Strategic Economic Plan; Local Authority Land Use Plans (various).	Yes
Achieving sustainable economic growth and promoting key sectors in the local economy which conserve and enhance the environment	National Planning Policy Framework; Solent Strategic Economic Plan; Local Authority Land Use Plans (various).	Yes
Improving and expanding the tourism economy	National Planning Policy Framework; Solent Strategic Economic Plan; South Downs National Park Partnership Management Plan; AONB Management Plans (various); Local Authority Land Use Plans (various).	No
Providing training and development opportunities for all	National Planning Policy Framework; Solent Strategic Economic Plan; Local Authority Land Use Plans (various).	No
Maximising job opportunities for all and enhancing the quality of employment opportunities	National Planning Policy Framework; Solent Strategic Economic Plan; Local Authority Land Use Plans (various).	Yes
Promoting sustainable transport which supports regeneration and economic growth	National Planning Policy Framework; Local Authority Land Use Plans (various).	No
Material Assets and Resource Use		
Minimising waste production, promoting re-use and recycling	National Planning Policy for Waste; Waste Management Plan for England; Local Authority Land Use Plans (various).	Yes
Promoting the most effective and efficient use of natural resources	National Planning Policy for Waste; Waste Management Plan for England; Local Authority Land Use Plans (various).	Yes
Promoting the use of sustainable/renewable energy	Climate Change Act 2008; National Planning Policy Framework; UK Sustainable Development Strategy; The UK Renewable Energy Strategy; Local Authority Land Use Plans (various).	Yes
Promoting the use of sustainable design and construction and encouraging energy efficiency	National Planning Policy Framework; UK Sustainable Development Strategy; Local Authority Land Use Plans (various).	Yes
Cultural Heritage		
Conserving and enhancing cultural heritage and archaeological sites	National Planning Policy Framework; the Convention for the Protection of the Architectural Heritage of Europe, the Ancient Monuments and Archaeological Areas Act 1979, the Planning (Listed Buildings and Conservation Areas) Act 1990, the South Downs National Park Partnership Management Plan and the Chichester Harbour AONB Management Plan, Local Authority Land Use Plans (various).	Yes
Landscape		
Protecting and enhancing the quality and distinctiveness of natural landscapes and environmental resources	National Planning Policy Framework; South Downs National Park Partnership Management Plan; AONB Management Plans (various); Local Authority Land Use Plans (various).	Yes

3. Baseline Analysis

3.1 Introduction

The SEA Regulations require a report containing ‘*The relevant aspects of the current state of the environment and the likely evolution thereof without implementation of the plan or programme*’ (Schedule 2(2)), ‘*The environmental characteristics of areas likely to be significantly affected*’ (Schedule 2(3)), and ‘*Any existing environmental problems which are relevant to the plan or programme including, in particular, those relating to any areas of a particular environmental importance, such as areas designated pursuant to Council Directive 79/409/EEC on the conservation of wild birds(1) and the Habitats Directive*’ (Schedule 2(4)).

In this context, an essential part of the SEA process is the identification of the current baseline conditions and their likely evolution. Only with a knowledge of existing conditions, and a consideration of their likely evolution, can the effects of the WRMP be identified and appraised and its subsequent success or otherwise be monitored. This is also useful in determining the key issues for each topic that should be taken forward in the SEA, through the SEA objectives and guide questions.

This section of the report identifies and characterises current environmental baseline conditions, along with how these are likely to change in the future. The analysis is presented for the following topics:

- ▶ Biodiversity;
- ▶ Geology, Land Use and Soils;
- ▶ Water;
- ▶ Air Quality and Climate;
- ▶ Human Environment (including population and human health);
- ▶ Material Assets and Resource Use;
- ▶ Cultural Heritage; and
- ▶ Landscape.

The data have been drawn from a variety of sources, including a number of the plans and programmes reviewed as part of the SEA process (see **Section** Error! Reference source not found. and **Appendix B**). Where appropriate, figures are referenced in this overview. The key sustainability issues arising from the review of baseline conditions are summarised for each topic. The information included in this section has been updated from that presented in the Scoping Report (July 2016) and also reflects comments on the Scoping Report which are summarised in **Appendix C** of this Environmental Report.

3.2 Portsmouth Water Operational Area

The Portsmouth Water Operational Area (PWOA) is spread across a number of administrative areas located in both Hampshire and West Sussex Counties and includes the Itchen WTW (see **Figure 1.2** for a map of the PWOA). Customers within ten local authorities are served by Portsmouth Water, three of which are solely served by Portsmouth Water (Portsmouth City Council, Havant Borough Council and Gosport Borough Council). Customers within the remaining seven authorities (Eastleigh Borough Council, South Downs National Park Authority, Fareham Borough Council, Winchester City Council, East Hampshire District Council, Chichester District Council and Arun District Council) are served only in part by Portsmouth Water.

Where possible, baseline information has been provided for areas/sites only found within the PWOA, such as designated nature conservation sites, or for resources used directly by Portsmouth Water. However, given the nature of the publicly available data (which is not always disaggregated to the spatial level required to conform to the PWOA boundary), this is not possible for all aspects of the baseline. In these cases, information has been presented at the next available administrative level, for example for non-designated biodiversity sites, the information at a County level (for Hampshire and Sussex) has been used.

3.3 Biodiversity, Fauna and Flora

Baseline Characteristics

Biodiversity is defined as the variety of plants (flora) and animals (fauna) in an area, and their associated habitats. The importance of preserving biodiversity is recognised from an international to a local level. Biodiversity is important in its own right, and has value in terms of quality of life and amenity.

Statutory Designated Sites

In the PWOA, there are a large number of sites that are designated as internationally, nationally or locally important for biodiversity (listed below in

Table 3.1 and shown in **Figure 3.1**). These protected areas fall into three categories:

- ▶ protected areas that are established through international agreements (including Ramsar Sites, which are afforded the same degree of protection as European sites);
- ▶ protected areas that are established under EU directives of other European initiatives (including Special Protection Areas (SPAs) and Special Areas of Conservation (SACs)); and
- ▶ protected areas that are established under national legislation (Sites of Special Scientific Interest (SSSIs), Marine Conservation Zones and National Nature Reserves).

Sites of European importance (SPAs and SACs) are designated to conserve natural habitats and species of wildlife which are rare, endangered or vulnerable in the European Community. In the UK, these form part of the 'Natura 2000' network of sites protected under the EC Habitats Directive (1992). There are ten 'Natura 2000' sites within the PWOA including six SACs and four SPAs⁹. Other internationally important sites include four Ramsar Sites (Solent & Southampton Water; Portsmouth Harbour; Pagham Harbour; and Chichester & Langstone Harbours).

There is a high number of SSSIs within Hampshire; 14.5 per cent of the total area within the County is covered by SSSIs, which is about twice the national average¹⁰. Within the PWOA, there are 39 SSSIs, which are in varying condition:

- ▶ 23 are classified as mostly in favourable condition;
- ▶ 16 are classified as mostly unfavourable recovering;
- ▶ no sites are classified as mostly unfavourable no change, unfavourable declining, partially or wholly destroyed¹¹.

It is acknowledged that the information above relies on many assessments that date back to 2010 or earlier. For water dependent sites in particular these assessments may not reflect the current situation due to revision of favourable condition standards for river and lake SACs and SSSIs, and more recent environmental information from work on the updated River Basin Management Plan. The reported condition assessments for water dependent SSSIs should thus be treated with caution as recent water quality assessments of designated features at whole site level indicate a potential area shift to unfavourable conditions due to eutrophication pressure regarding nitrogen input.

In addition, there are 5 National Nature Reserves and 28 Local Nature Reserves within the PWOA. South Downs National Park, meanwhile, was designated in 2010 and covers an area of over 1,600 km² ¹².

⁹ JNCC (2017) Protected Sites <http://jncc.defra.gov.uk/> (accessed October 2017).

¹⁰ Hampshire County Council Preliminary Flood Risk Assessment <http://documents.hants.gov.uk/flood-water-management/watercourses/PFRARportsavedJan2016.pdf> (accessed November 2017).

¹¹ Natural England Designated Sites Reports <https://designatedsites.naturalengland.org.uk/> (accessed June 2016).

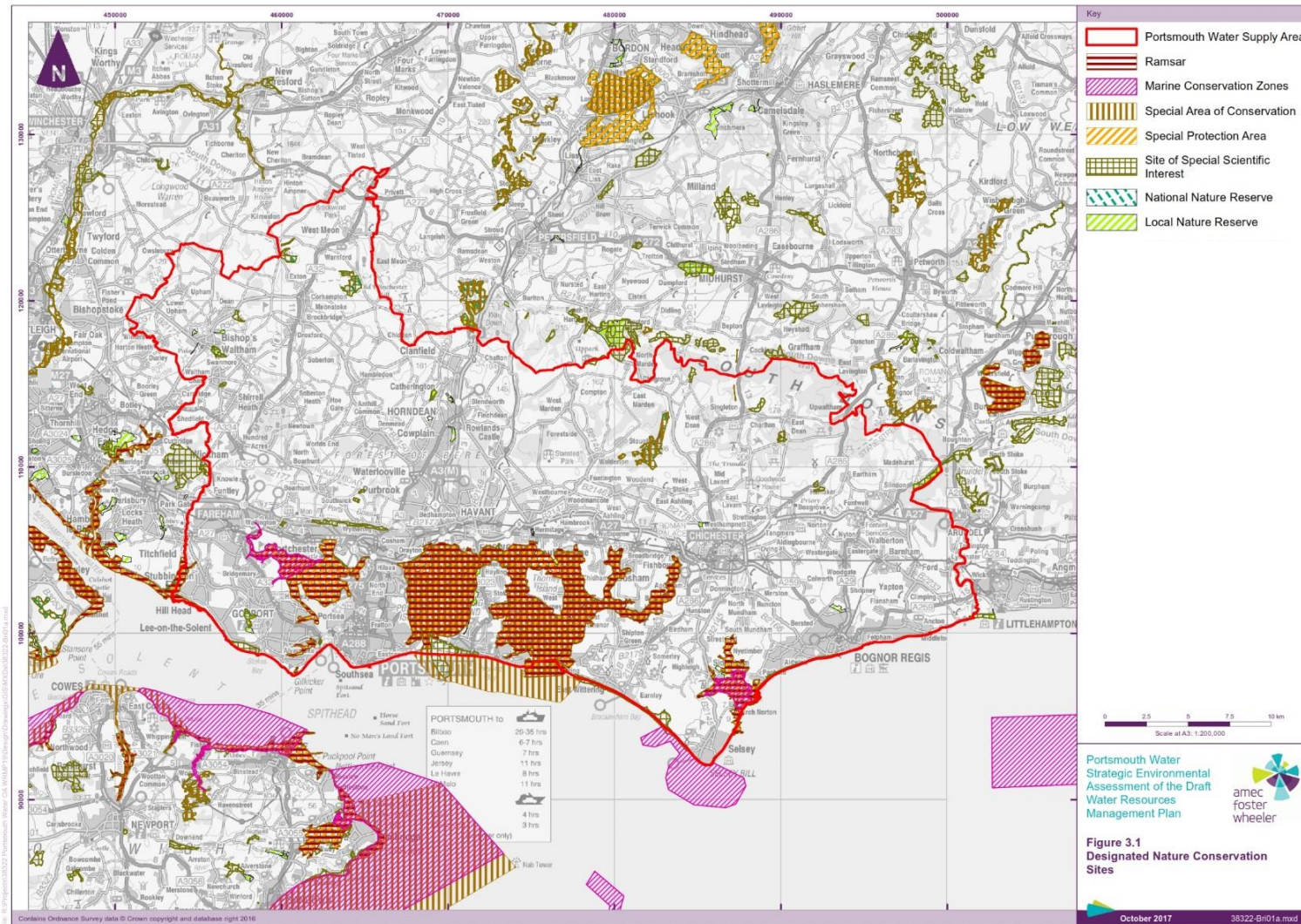
¹² <http://www.nationalparks.gov.uk/students/whatisanationalpark/factsandfigures> (accessed June 2016).

Table 3.1 List of Designated Nature Conservation Sites within the Portsmouth Water Operational Area

Sites Designated for Nature Conservation		
Ramsar Sites & Special Protection Areas (SPAs)		
Chichester and Langstone Harbours	Pagham Harbour	Portsmouth Harbour
Solent & Southampton Water		
Special Areas of Conservation (SAC)		
Butser Hill	Kingley Vale	Solent & Isle of Wight Lagoons
Singleton and Cocking Tunnels	Solent Maritime	River Itchen
National Parks		
South Downs		
National Nature Reserves		
Beacon Hill	Butser Hill	Kingley Vale
Old Winchester Hill	Titchfield Haven	
Marine Conservation Zones (MCZ)		
Fareham Creek	Pagham Harbour	Selsey Bill and the Hounds
Sites of Special Scientific Interest		
Bracklesham Bay	Browdown	Butser Hill
Chichester Harbour	Catherington Down	Climping Beach
Downend Chalk Pit	Fairmile Bottom	East Dean Park Wood
Felpham	Halnaker Chalk Pit	Gilkicker Lagoon
Harting Downs	Galley Down Wood	Langstone Harbour
Kingley Vale	Lee-on-the Solent to Itchen Estuary	Levin Down
Hook Heath Meadows	Lye Heath Marsh	Portsmouth
Portsmouth Harbour	Peake Wood	Old Winchester Hill
Pads Wood	Selsey, East Beach	Sinah Common
The Moors, Bishop's Waltham	The Wild Grounds	Titchfield Haven
Waltham Chase Meadows	West Dean Woods	Warblington Meadow
Beacon Hill, Warnford	Bognor Reef	Pagham Harbour
Eartham Pit, Boxgrove	Singleton and Cocking Tunnels	River Itchen
Local Nature Reserves		
Bishops Waltham Branch Line	Brandy Hole Copse	Brook Meadow (Emsworth)
Catherington Down	Catherington Lith	Claylands
Dundridge Meadows	Eames Farm	Fairmile Bottom
Farlington Marshes	Gutner Point	Harting Down

Hayling Billy	Hazleton Common	Nutborne Marshes
Oxenbourne Down	Pagham Harbour	Pilsey Island
Sandy Point	The Brooks	The Kench, Hayling Island
The Moors, Bishops Waltham	The Wild Grounds	Titchfield Haven
West Hayling	West of the River Alver	Yeoll's Copse
West Beach (part of Climping Beach SSSI)		

Figure 3.1 Designated Nature Conservation Sites



As part of the Environment Agency's responsibilities under the Habitats Directive, they are required to conduct Review of Consents (RoC) to review all existing permits and consents in order to ensure they do not have an adverse effect on SACs and SPAs. The outcomes of the RoC is described in **Section 3.5**.

Non-statutory Protected Sites and Other Biodiversity

Sites of Importance for Nature Conservation (SINCs) are areas outside of statutory designated sites which are important for locally valued wildlife within the wider national network. Important habitats within Hampshire and West Sussex include heathland, ancient woodland, chalk rivers, old meadows, coastal habitats and wetlands. As at October 2017, Hampshire had 4,065 SINCs equating to 9% of land within the County¹³.

Biodiversity Action Plans (BAPs) aim to protect, restore and where possible enhance biological systems and include Species Action Plans (SAPs) and Habitat Action Plans (HAPs). The PWOA falls within the Hampshire and Sussex BAP areas. Within Hampshire there are 28 SAPs¹⁴ and 14 HAPs¹⁵. Within Sussex there are 21 HAPs¹⁶.

As at 31st March 2016, there were a total of 25 priority habitats in Hampshire covering an area of 81,862 ha (21 per cent of the total area of the County), the most extensive priority habitats being lowland mixed deciduous woodland (covering 36,006 ha), lowland heathland (11,813 ha) and coastal and floodplain grazing marsh (9,561 ha). Monitoring of population trends for 50 notable species in the County (including 30 UK Priority Species) over the period 2002-2012 reveals that 49 per cent were classified as being in stable condition whilst 4 per cent were increasing. The populations of a total of 35 per cent of notable species were, however, decreasing (the populations of the remaining 10 per cent of notable species were either fluctuating or unknown).¹⁷

A recent Natural England report¹⁸ brings together various information sources on the distribution of priority river habitat, including survey in the South Downs area that overlaps with the PWOA. The results of that work are shown in Figure 3.1a.

¹³ <https://www.hants.gov.uk/landplanningandenvironment/environment/biodiversity/informationcentre/sincs> (accessed October 2017).

¹⁴ <http://www.hampshirebiodiversity.org.uk/species.htm> (assessed November 2017)

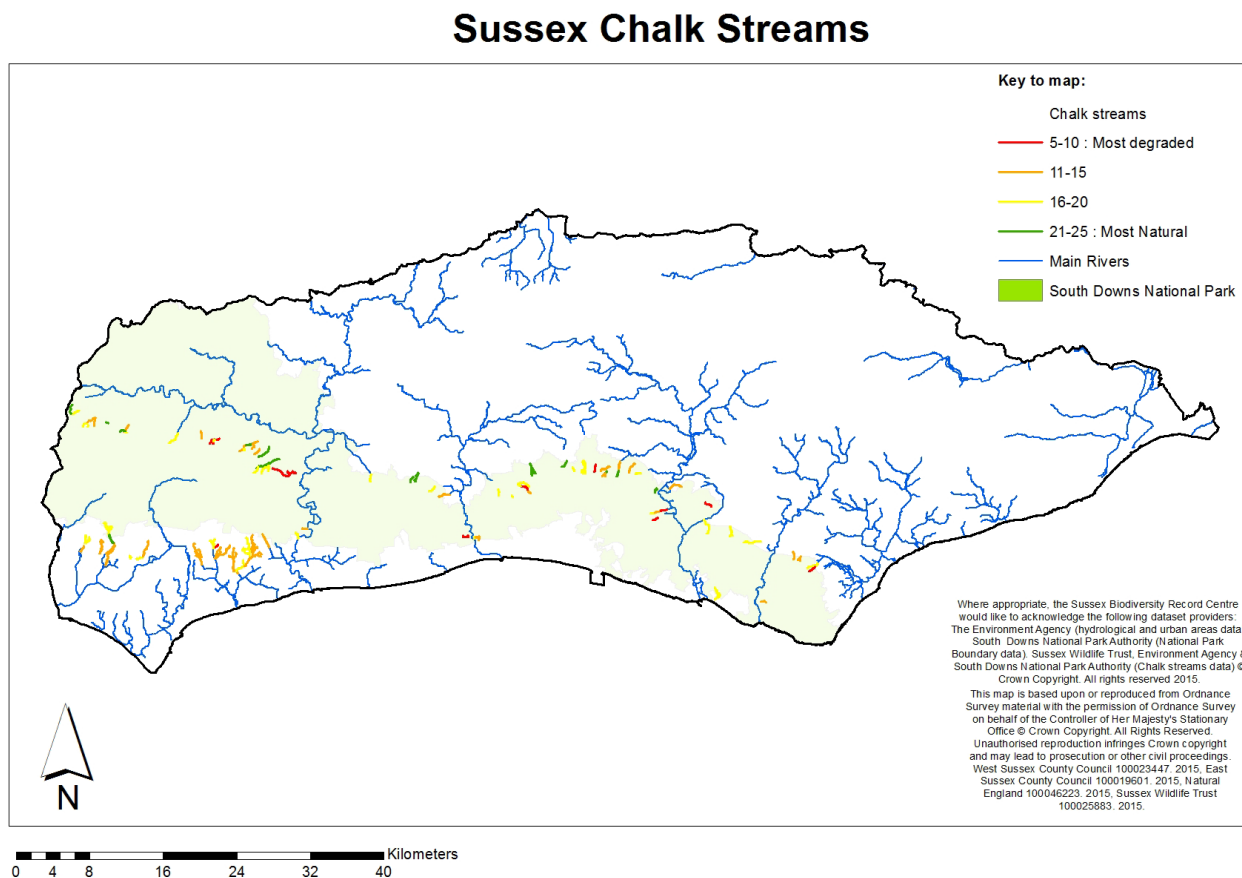
¹⁵ <http://www.hampshirebiodiversity.org.uk/habitats.html> (assessed November 2017)

¹⁶ <http://sxbrc.org.uk/biodiversity/habitatdata/> (accessed June 2016).

¹⁷ <http://documents.hants.gov.uk/biodiversity/HBICAnnualBiodiversityMonitoringReport2015-16.pdf> (accessed October 2017)

¹⁸ <http://publications.naturalengland.org.uk/publication/5104941191397376>

Figure 3.1a Distribution of Sussex Chalk Streams



A report on the Wetland Potential of Sussex, published in 2012, provides an overview of issues facing wetlands and also utilised a Habit Potential Model to identify the potential for restoration in the Arun and Rother Catchment. This identified the potential for 30,000 ha of land within the catchment to contribute to the provision of nine key wetland habitats, currently 3,000 ha of wetland exist in the catchment.¹⁹

Sussex chalk streams have a unique character, with steeply sloping, fast flowing streams associated with ancient woodland and woody debris reminiscent of northern UK streams. One of the most natural examples of a chalk spring head in the UK is also found in Sussex. The area has 'Knuckerholes' which are thought to be holes which go directly into the aquifer.²⁰

The Sussex Rare Species Inventory, meanwhile, covers a total of 3,400 species²¹ selected according to strict criteria of rarity associated with their occurrence in Sussex whilst the Protected Species Register includes a total of 99 species which have, or whose habitats have, legal protection, but are not "rare".²²

Likely Evolution of the Baseline without the WRMP

- ▶ Many designated nature conservation sites in the PWOA are in favourable/unfavourable recovering condition. However, a large proportion of Hampshire's notable species are declining whilst rare and sensitive species in Sussex are also in decline;
- ▶ The most common threats to species and habitat include:
 - ▶ non-native species;

¹⁹ <https://assets.sussexwildlifetrust.org.uk//the-state-of-sussex-wetlands-report-final-1.pdf> (accessed October 2017)

²⁰ <https://assets.sussexwildlifetrust.org.uk//chalk-streams-and-rivers-1.pdf> (accessed October 2017)

²¹ <http://sxbrc.org.uk/biodiversity/speciesinventories/rsi.php> (accessed October 2017)

²² For further information see <http://sxbrc.org.uk/biodiversity/speciesinventories/> (accessed June 2016).

- ▶ nutrient enrichment;
- ▶ climate change;
- ▶ lack of sustainable management;
- ▶ agricultural intensification; and
- ▶ habitat loss and fragmentation.

Key Sustainability Issues Relevant to the WRMP

The key sustainability issues arising from the baseline assessment for biodiversity are:

- ▶ the need to protect and enhance protected sites designated for nature conservation;
- ▶ the need to protect and enhance non-designated sites;
- ▶ the need to continue to improve the condition of priority habitats to support increases in wildlife, biodiversity and important protected species;
- ▶ the need to maintain/enhance ecological connectivity; and
- ▶ the need to work within environmental limits and capacities.

3.4 Geology and Soils

Baseline Characteristics

Geology

Chalk dominates much of the geology within the PWOA forming characteristic hills, scarps and downlands. The hydrogeology of the PWOA area is dominated by the Chalk aquifer. The groundwater in the Chalk provides water abstracted for public supply and feeds many rivers, streams and wetlands in the area. Southern Hampshire (including most of Gosport and Portsmouth) and parts of Chichester and Arun are characterised by softer clays and sands of the Bracklesham and Barton Group and Solent Group²³.

Within Hampshire and West Sussex there are 25 and 34 Geological Conservation Review (GCR) Sites respectively²⁴, i.e. sites that are often SSSIs and selected on the basis of their national and international importance.

Soils and Land Use

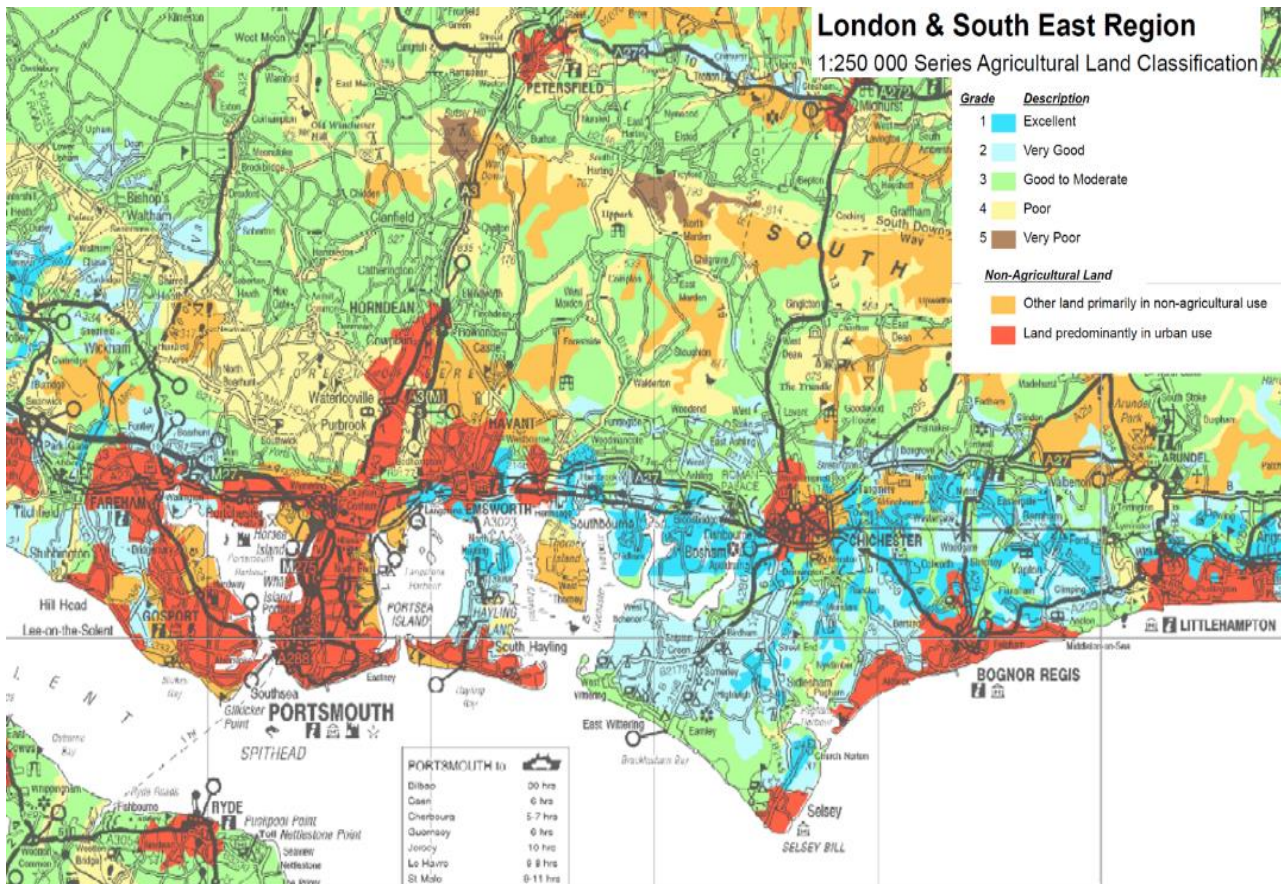
The PWOA includes substantial areas of urban development where there is limited agricultural land. This is most obvious for the Portsmouth and Gosport local authorities which are almost devoid of agricultural land. However, the low lying areas between the South Downs and the coast include Best and Most Valuable (BMV) agricultural land of grade 1 (excellent) and grade 2 (very good) quality, outside of built up areas. The land in the northern parts of the PWOA contains predominantly grade 3 (good/moderate) and some grade 4 (poor), as well as land that is not agriculturally used within the National Park (see **Figure 3.2**)²⁵.

²³ Hampshire Integrated Character Assessment <http://www3.hants.gov.uk/landscape-and-heritage/planning-the-landscape/landscape-character/hampshire-integrated-character-assessment.htm> and West Sussex Simplified Bedrock Geology <https://www.westsussex.gov.uk/idoc.ashx?docid=ccd26feb-da23-407e-969f-7a8fea3ee08a&version=-1> (accessed June 2016).

²⁴ JNCC (2011) <http://jncc.defra.gov.uk/default.aspx?page=4177&authority=UKJ33> and <http://jncc.defra.gov.uk/default.aspx?page=4177&authority=UKJ24> (accessed June 2016).

²⁵ Portsmouth Water Ltd (2009) *Water Resources Management Plan Strategic Environmental Assessment – Environmental Report*, Arup, Solihull.

Figure 3.2 Agricultural Land Classification across the PWOA



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PUSH (Partnership for Urban South Hampshire) concluded that there will be a requirement for 105,000 to 111,000 new homes in South Hampshire until 2036²⁶. However, the projected number of houses to be built in this period that are reported in the local plans, falls short of these housing requirements (see **Section 3.7**)

Likely Evolution of the Baseline

- ▶ Key threats to soils include draining soils, intensive agriculture, changes in land management, climate change, burning and extraction of peat, construction, and pollution.
- ▶ Loss of nitrate from agricultural soils can lead to failure of drinking water standards and contribute to eutrophication in estuaries and the sea. Eutrophication can also be caused by excess phosphate entering water bodies, usually via soil erosion.
- ▶ Soils need to be safeguarded to protect their abilities to support plants and animals, store carbon, and provide other important ecosystem services.
- ▶ The need for greenfield land to accommodate housing and economic development may lead to a loss of greenspace and soils.
- ▶ New development could increase pressure on geological assets.

Key Sustainability Issues Relevant to the WRMP

The key sustainability issues arising from the baseline assessment for geology and soils are:

²⁶ PUSH (2014) South Hampshire Strategic Housing Market Assessment – Final Report.
http://www.push.gov.uk/south_hampshire_shma_final_report_16.1.14_.pdf

- ▶ the need to maintain or improve the quality of soils/agricultural land;
- ▶ the need to protect and enhance sites designated for their geological interest;
- ▶ the need to make use of previously developed land and minimise land take; and
- ▶ the need to maintain soil function.

3.5 Water

Baseline Characteristics

Water Resources

Portsmouth Water delivers some 166 million litres of drinking water per day to a population of over 717,000 people across an area covering 868 square kilometres. The area supplied by the company stretches through Hampshire and West Sussex from the River Meon in the West to the River Arun in the East²⁷. Portsmouth Water manages its water supplies and demand across a single WRZ. Within the WRMP area, there are 21 water sources (consisting of 1 group of springs, 1 river, and 19 borehole and well sites).

Within the PWOA, there are four principal rivers: River Itchen; River Hamble; River Meon; and River Wallington, although Portsmouth Water only abstracts water from the Itchen. There are also a number of other smaller rivers, streams and springs. Of particular importance for water abstractions are the Source B Springs, which are thought to be the largest group of springs used for domestic and public water supply in Europe, producing up to 35 per cent of the water used by Portsmouth Water customers²⁸. Water from the springs at Source B is treated at the Works A; while the Source A Works treats surface water, boreholes and wells which abstract from the underlying chalk. Portsmouth Water has 19 well and borehole sites strategically situated throughout its operational area. The boreholes principally consist of a deep vertical shaft which intercepts water flowing through the cracks and fissures of the Chalk aquifer. Pumps are installed deep below ground to lift the water to the surface for treatment before it is pumped to underground storage reservoirs.

In 2016/2017, Portsmouth Water abstracted 64,595 million litres of water. **Table 3.2** shows how the total water abstracted in 2016/17 was divided between each of the sources within the WRMP area.

Table 3.2 Licences and Actual Abstractions by Portsmouth Water in 2016/17, MI/Yr

Source	Source Type	Source Licence	Actual 2016/17 Abstractions (million litres)	Group Licence	Group Actual 2016/17
Source C	Well / Borehole	7,487	6,568	7,487	6,568
Source D	Well / Borehole	640	0		
Source H	Well / Borehole	3,328	3	3,294	2,408
Source E	Well / Borehole	166	27		
Source A	River Abstraction	15,916	7,745		
Source I	Well / Borehole	2,491	566		
Source F	Well / Borehole	3,294	2,406		
Source G	Well / Borehole	695	2		

²⁷ Portsmouth Water: <https://www.portsmouthwater.co.uk/about-us/key-facts/> (accessed June 2016).

²⁸ Portsmouth Water <https://www.portsmouthwater.co.uk/havant-thicket-reservoir/extra-info/> (accessed June 2016).

Source	Source Type	Source Licence	Actual 2016/17 Abstractions (million litres)	Group Licence	Group Actual 2016/17
Source J	Well / Borehole	8,296	3,854		
Source K	Well / Borehole	4,148	1,407		
Source B Springs	Springs	35,770	18,211		
Source N	Well / Borehole	9,955	7,610		
Source U	Well / Borehole	1,364	278		
Source P	Well / Borehole	3,741	2,089	23,740	18,043
Source O	Well / Borehole	2,920	1,849		
Source L & Source M	Well / Borehole	9,950	6,217		
Source Q	Well / Borehole	10,358*	1,645		
Source R	Well / Borehole	10,358*	1,134		
Source S	Well / Borehole	10,358*	592	10,358	5,763
Source T	Well / Borehole	10,358*	2,392		
Total		116,066	64,595	44,879	32,782

Source: Portsmouth Water Limited Annual Water Supply Review 2016/17 <https://www.portsmouthwater.co.uk/2017/09/05/annual-water-supply-review-201617/> (accessed October 2017)

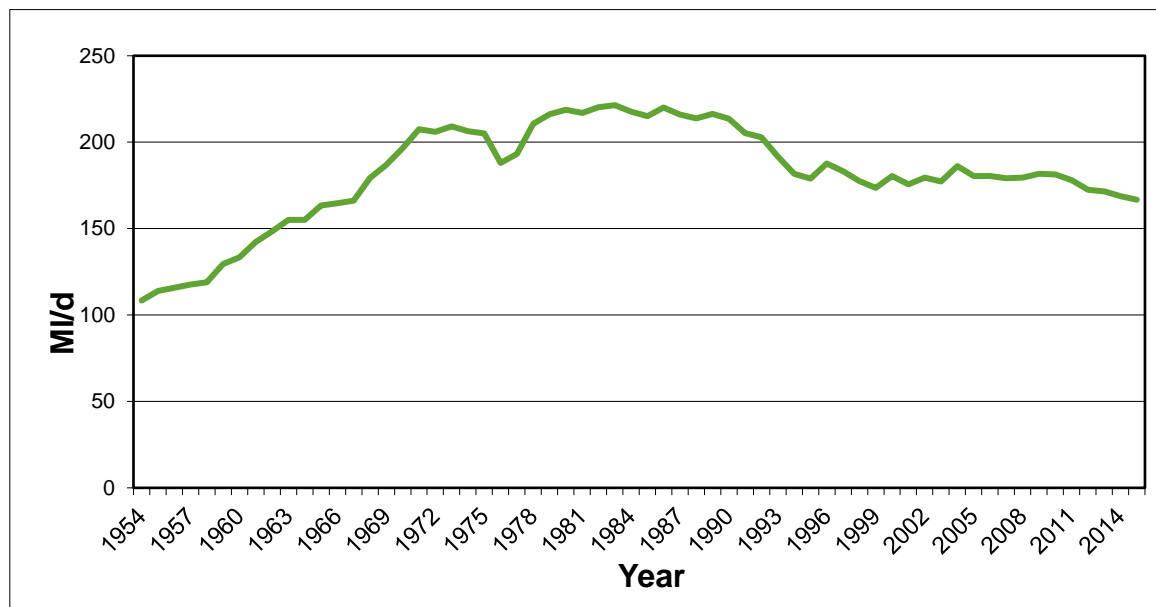
*Source Q, Source R, Source S and Source T are subject to a combined group licence of 10358 Ml/yr.

Figure 3.3 shows that the annual average demand for water has decreased from a maximum of around 218 mega litres per day (Ml/d) in the 1980s to an average of around 180 Ml/d in 2000-2010 and falling to 166 Ml/d in 2015. In 2016/17 overall demand averaged 170 Ml/d.²⁹ Part of the reduction in demand has been driven by a reduction in manufacturing in the early 1990s³⁰.

²⁹ <https://www.portsmouthwater.co.uk/wp-content/uploads/2015/05/WRMP-Annual-Review-June-2017.pdf> (accessed October 2017)

³⁰ Portsmouth Water (2014) Final Water Resources Management Plan 2014.

Figure 3.3 Portsmouth Water Annual Average Water Demand (MI/d) informed by Distribution Input, 1954 to 2015



Water Transfers

As Portsmouth Water currently has no large raw water storage reservoirs, peak water demands must be balanced from the 21 sources within the WRMP area. The company is able to transfer water within the operational area through the following key transfers:

- ▶ from the Gosport and Waterlooville area to the Portsmouth area from Reservoir A rated at 32 MI/d;
- ▶ from the Portsmouth and Havant area to the Gosport and Waterlooville area via Booster A rated at 10 MI/d;
- ▶ from the Chichester and Bognor Regis area to the Portsmouth area from Reservoir B via Havant rated at 18 MI/d;
- ▶ from the Chichester and Bognor Regis area to the Gosport and Waterlooville area at Leigh Park rated at 4 MI/d;
- ▶ from the Gosport and Waterlooville area to the Chichester and Bognor Regis area from Reservoir A through Leigh Park rated at 10 MI/d.

Portsmouth Water provide a bulk supply export of up to 25 million litres per day from its WRZ to Southern Water's area of supply in West Sussex.

Water Quality

Drinking water quality across England and Wales has improved since 1990 and has been maintained at a high standard since 2004. The percentage of tests failing the quality standards was only 0.04 per cent in 2016³¹, compared to 1.00 per cent in 1990³². For the period from 1st January 2016 to 31st December 2016,

³¹ Drinking Water Inspectorate (2017) Summary of the Chief Inspector's report for drinking water in England, July 2017 http://www.dwi.gov.uk/about/annual-report/2016/Drinking_water_2016_Public%20water_supplies_England.pdf (accessed October 2017)

³² Drinking Water Inspectorate (2015) Drinking water quality in England: the position after 25 years of regulation. <http://www.dwi.gov.uk/about/annual-report/2014/sum-eng.pdf> (accessed July 2016).

11 of the 13 Sampling Zones within Portsmouth Water's operational area had 100 per cent pass rates, the remaining 2 zones had pass rates of 99.89 per cent (Portsmouth North) and 99.94% (Havant).³³

Safeguard zones serve to manage the risk of water quality deterioration in drinking water protected areas. The 2015 update to the South East River Basin Management Plan³⁴ reports that following improved monitoring, more drinking water protected areas are now classified as at risk of water quality deterioration or poor chemical status (for groundwater only).

Coastal Water Quality

Each year between May and September the Environment Agency takes samples from coastal sites across England and Wales to assess the bathing water quality as part of their responsibilities under the EU Bathing Waters Directive. Within the PWOA, there are 16 of these bathing water sample sites. In 2016, six of these sites were classified as good, one was classified as sufficient and the rest were classified as excellent³⁵.

The coastal and estuary waters assessed in the South East River Basin were classified as being of high (28%), good (51%) and moderate (11%) chemical water quality, with the remaining classifications either not requiring assessment (5%), scoring moderate or less (2%) or supporting good status (1%).³⁶ In the East Hampshire Catchment³⁷, the following rivers were identified as not achieving Good Status:

- ▶ Alver, which in 2014 had a classification status of 'bad', due to the effects of diffuse pollution sources on dissolve oxygen levels and invertebrates communities;
- ▶ Hermitage Stream, which in 2014 had a classification status of 'moderate', due to the effects of diffuse and point pollution sources on ammonia and phosphate levels and invertebrates communities;
- ▶ Lavant, which in 2014 had a classification status of 'poor', due to the effects of physical modifications on fish populations;
- ▶ Main River Hamble, which in 2014 had a classification status of 'poor' (in some stretches), due to the effects of diffuse and point pollution sources on phosphate levels;
- ▶ Meon, which in 2014 had a classification status of 'poor', due to the effects of diffuse pollution sources and flow changes on the hydrological regime, macrophytes and phytobenthos;
- ▶ Moors Stream, which in 2014 had a classification status of 'does not support good status', due to the effects of flow changes on the hydrological regime;
- ▶ Potwell Tributary, which in 2014 had a classification status of 'poor' in some of its stretches, due to the effects of physical modifications on fish populations;
- ▶ Titchfield Haven, which in 2014 had a classification status of 'does not support good status', due to unknown effects on the hydrological regime;
- ▶ Upper Hamble, which in 2014 had a classification status of 'moderate/poor', due to the effects of diffuse pollution sources and physical modifications on phosphate levels, invertebrate communities and fish populations;
- ▶ Upper Wallington, which in 2014 had a classification status of 'does not support good status', due to the effects of flow changes on hydrological regime, macrophytes and phytobenthos; and
- ▶ Wallington below Southwick, which in 2014 had a classification status of 'moderate', due to the effects of diffuse and point source pollution on phosphate levels.

³³ Portsmouth Water: Water Quality Results in Your Area <https://www.portsmouthwater.co.uk/about-us/water-quality/hardness-water-quality-results-in-your-area/> (accessed October 2017).

³⁴ Environment Agency (2015) River Basin Management Plan – South East River Basin District.

³⁵ <https://environment.data.gov.uk/bwg/profiles/data.html> (accessed October 2017)

³⁶ Environment Agency WFD Classification Data for South East River Basin District <http://environment.data.gov.uk/catchment-planning/RiverBasinDistrict/7> (accessed July 2016).

³⁷ Environment Agency Catchment Data Explorer – accessed for the East Hampshire catchment: <http://environment.data.gov.uk/catchment-planning/ManagementCatchment/3034> (accessed November 2017)

Groundwater Quality

The 2009 South East River Basin Management Plan highlighted that groundwater in the southern part of the plan area and towards the northern boundary was classified as being of poor chemical quality. However, groundwater in the Chalk was of a very high water quality, although water from several of Portsmouth Water's other groundwater sources had elevated levels of nitrate due to localised pollution including agricultural pollutants. The 2015 update to the South East River Basin Management Plan³⁴ reports that none of the groundwater bodies have deteriorated since 2009.

The vast majority of the PWOA has been designated as a Nitrate Vulnerable Zone (NVZ) under the Nitrates Directive³⁸. The Environment Agency, Natural England and Portsmouth Water have led successful campaigns to reduce pollution by targeting farms and industrial premises in vulnerable areas³⁹. Portsmouth Water and the Environment Agency continue to work together on the Downs and Harbours Clean Water Partnership⁴⁰.

Water Availability

The Environment Agency produces Catchment Abstraction Management Strategies (CAMS) to determine water availability and inform water abstraction licence and discharge consent strategy. Within each CAMS, data regarding long term flow duration curves and river flow objectives are assessed to determine whether or not water is available for abstraction and if the respective area is over abstracted or over licensed. Portsmouth Water's WRMP is covered by two CAMS areas; the East Hampshire CAMS⁴¹ and the Arun & Western Streams CAMS⁴². The results of the assessment contained in each CAMS are shown in **Table 3.3** for groundwater abstractions; and in **Figure 3.4** and **Figure 3.5** for surface water abstractions.

Table 3.3 Water Availability – Licence Restrictions on Groundwater Abstractions

Area	Resource Availability Status
East Hampshire CAMS Area	
East Hampshire Chalk	Restricted water available for licensing - presumption against new consumptive groundwater abstractions from the Chalk.
Arun & Western Stream Upper Greensand	New licences will only be granted if impacts on other licence holders abstracting from the Upper Greensand and the upper tributaries of the River Rother are considered to be acceptable.
South East Hants Bracklesham Group	Water available for licensing. It is unlikely that there will be any potential for significant, reliable abstractions from this unit. There is no specific policy for this aquifer but surface water HOFs are not applicable. Decisions about an application will be made on a case by case basis.
South Hants Lambeth Group	
East Hants Lambeth Group	
Arun & Western Streams CAMS Area	
Chichester-Worthing-Portsdown Chalk	Restricted water available - no new consumptive licences will be granted.
Lower Greensand Arun & Western Streams	Restricted water available - no new consumptive licences will be granted.
Arun & Western Streams Hastings Bed	Water available for licensing. New licences can be considered depending on impacts on other abstractors and on surface water. The Environment Agency has no specific policy for these secondary aquifers. These aquifers are highly complex due to faulting and geological variability and there is limited information on outflows and water levels. They also only yield comparatively small volumes of water, although it is noted that these can be locally

³⁸ Environment Agency: What's in your backyard? Maps <http://maps.environment-agency.gov.uk/wiyby/wiybyController?x=357683&y=355134&scale=1&layerGroups=default&ep=map&textonly=off&lang=e&topic=nvz#x=475899&y=107894&lg=1.10&scale=5> (accessed June 2016).

³⁹ Environment Agency (2003) East Hampshire CAMS <http://publications.environment-agency.gov.uk/pdf/GESO0503BNMR-E-E.pdf>
⁴⁰ <http://www.cleanwaterpartnership.co.uk/> (accessed June 2016).

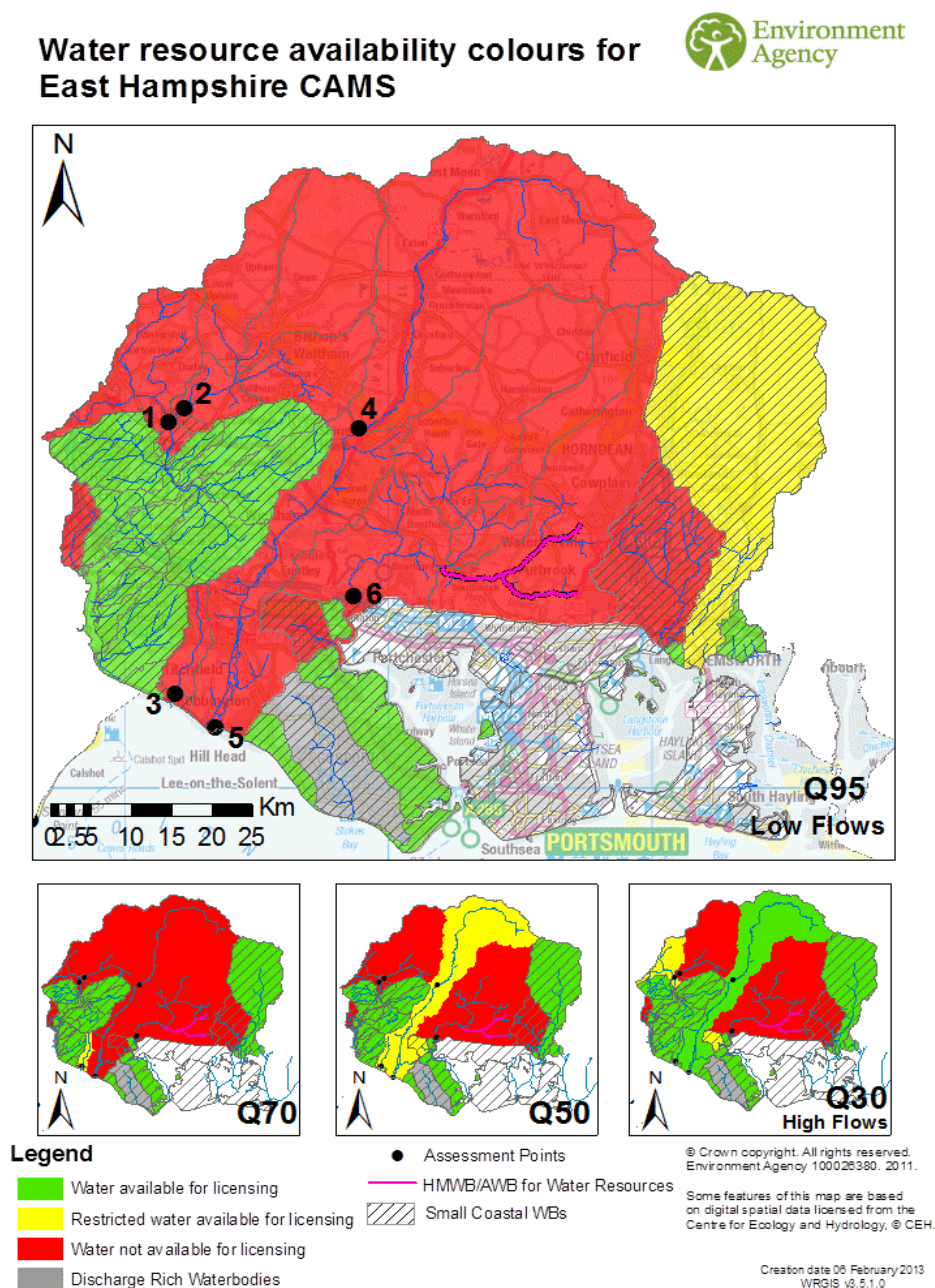
⁴¹ Environment Agency (2013) East Hampshire Abstraction Licensing Strategy.

⁴² Environment Agency (2013) Arun & Western Streams Abstraction Licensing Strategy.

Area	Resource Availability Status
	important. Decisions about an application will be made on a case by case basis.
Littlehampton Anticline (West & East)	West: Restricted water available for licensing - no new consumptive licences will be granted. East: Water available for licensing. New licences can be considered depending on impacts on other abstractors and on surface water. Decisions about an application will be made on a case by case basis.

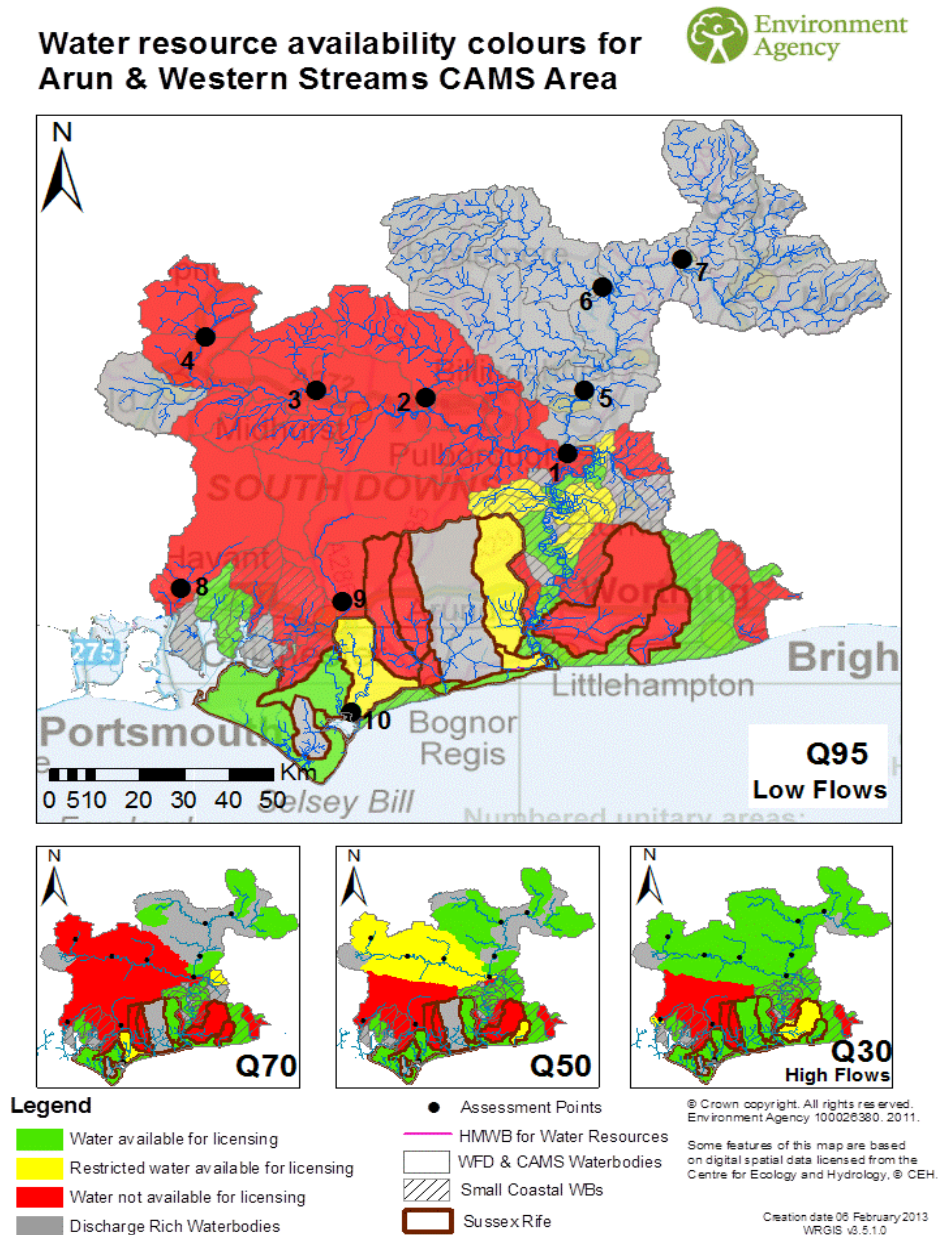
Sources: Environment Agency (2013) East Hampshire Abstraction Licensing Strategy; Environment Agency (2013) Arun & Western Streams Abstraction Licensing Strategy.

Figure 3.4 Water Resource Availability for East Hampshire CAMS Areas



Source: Environment Agency (2013) East Hampshire Abstraction Licensing Strategy.

Figure 3.5 Water Resource Availability for Arun & Western Stream CAMS Areas



Source: Environment Agency (2013) Arun & Western Streams Abstraction Licensing Strategy.

Since the production of the CAMS assessments, Portsmouth Water has agreed licence modifications at:

- ▶ Source N;
- ▶ Source U;
- ▶ Works A;
- ▶ Source P;
- ▶ Source M;
- ▶ Source L;
- ▶ Source B;

- ▶ Source A (River Itchen);
- ▶ Source I; and
- ▶ Source F.

These modifications were needed to comply with the Site Action Plans for the Harbours and the River Itchen resulting from the Habitats Directive Review of Consents (RoC). The varied licences now conform to the requirements of the Habitats Directive (see Review of Consent below).

Portsmouth Water carried out further studies as part of the Water Framework Directive River Basin Management Plan. These studies included the River Ems and the River Hamble, a river restoration scheme has been completed on the River Ems and a second on the River Hamble is due to start this Autumn.

Review of Consent

Under the Habitats Directive, the Environment Agency is required to review all the consents (the RoC) that it regulates to ensure that there are no detrimental impacts on the conservation interests of designated sites including SPAs and SACs. Discharge consents and water abstraction licences are included within this review. Where the Environment Agency is unable to demonstrate that abstraction licences and discharge consents are not having an adverse impact on these designated sites, it has the power to enforce consent amendments.

A result of the initial RoC was that group licence conditions were set for source groups. The current group licences are:

- ▶ Source B Springs;
- ▶ Source C and Source D;
- ▶ Source F and Source G;
- ▶ QRST Group (Source T, Source Q, Source R and Source S);
- ▶ LMNOP Group (Source P, Source O, Source L and Source M, Source N and Source U).

The outcome of the RoC process relevant to Portsmouth Water is summarised in **Table 3.4**.

Table 3.4 Summary of Environment Agency's Review of Consent

Abstraction	Type	Comments
River Itchen	River	The Source A surface water abstraction, on the River Itchen, is subject to a Hands Off Flow (HOF) condition of 198 Ml/d. This was set as part of the Habitats Regulation Review of Consents Site Action Plan. Portsmouth Water has fully implemented this requirement as a Licence Variation (September 2011).
Source B	Spring	Source B spring source has a Hands Off Flow (HOF) condition where Portsmouth Water can no longer abstract water if the fresh water flows to the harbours fall below a prescribed level. The main part of this condition relates to the Lake A which has a HOF of 6.0 Ml/d. The second part relates to the Stream A which has a HOF of 1.3 Ml/d (February 2010).
LMNOP Group (Source P, Source O, Source L and Source M, Source N and Source U)	Groundwater	The LMNOP Group includes six source works and has additional seasonal abstraction conditions at Source P. The LMNOP Group licence is the first licence to have a Hands Off Flow (HOF) condition included in the licence. The Source N licence also has a further condition associated with a compensation flow that must be provided to the River Ems when the flow in the river falls below 4.1 Ml/d.

Source: Portsmouth Water (2014) Final Water Resources Management Plan 2014.

Portsmouth Water completed a comprehensive investigation into "Post Implementation Monitoring" (PIM) of Habitats Directive sites and an investigation into "Water Framework Directive" (WFD) catchments at risk. The conclusions of the PIM/WFD investigations were published in March 2013 and options appraisals were

completed for the River Ems and River Hamble in August 2013. The Environment Agency's National Environment Programme (NEP) includes two WFD schemes for Portsmouth Water with an estimated deployable output (DO) impact of 6.0 MI/d.

Portsmouth Water had instructed Amec Foster Wheeler (formerly AMEC) to carry out further investigations on the impact of abstraction on Harbours as part of the Post Implementation Monitoring (PIM) process. The following sites were studied:

- ▶ Hamble Estuary, where no adverse effects were found;
- ▶ Titchfield Haven, where no adverse effects were found, but the site was shown to be sensitive to water level and habitat management;
- ▶ Hill Head Harbour, where freshwater flows will always be maintained due to the operation of tidal flaps and to satisfy the requirements for the SPA; and
- ▶ Fareham Creek, where the abstraction at Source I was shown to have an adverse effect and the licence conditions have been modified in response.

In addition, a compensation flow requirement has been added to Source G depending on the flow in the River Meon. The Habitats Directive investigations have now been completed and no further modifications driven by the Habitats Directive or WFD are expected. Four further licences are currently being adjusted to modernise units.

Flood Risk

The PWOA is subject to flooding in certain locations.

Figure 3.6 shows which areas are at risk from flooding from rivers or the sea. Three levels of risk are shown:

- ▶ Flood Zone 3 (dark blue) shows the area that could be affected by flooding, either from rivers or the sea, if there were no flood defences. This area could be flooded by:
 - ▶ the sea by a flood that has a 0.5 per cent (1 in 200) or greater chance of happening each year; or
 - ▶ a river by a flood that has a 1 per cent (1 in 100) or greater chance of happening each year.
- ▶ Flood Zone 2 shows the additional extent of an extreme flood from rivers or the sea. These outlying areas are likely to be affected by a major flood, with up to a 0.1 per cent (1 in 1000) chance of occurring each year.
- ▶ Flood Zone 1: where there is no blue shading, this shows the area where flooding from rivers and the sea is very unlikely. There is less than a 0.1 per cent (1 in 1000) chance of flooding occurring each year.

Figure 3.6 Flood Risk from Rivers and the Sea within the Portsmouth Water Operational Area



Source: Environment Agency What's in your back yard? Maps <http://maps.environment-agency.gov.uk/wiyby/wiybyController?x=357683&y=355134&scale=1&layerGroups=default&ep=map&textonly=off&lang=en&topic=floodmap#x=475502&y=109217&lg=1,10,&scale=5> (accessed June 2016)

The flood risk from surface water across the POWA is shown in **Figure 3.7**. Surface water flood risk is predominantly localised and risk is highest at the bottom of valleys where surface water flows concentrate. The risk is graded from High to Very Low.

Figure 3.7 Flood Risk from Surface Water within the Portsmouth Water Operational Area



Source: Environment Agency What's in your back yard? <http://watermaps.environment-agency.gov.uk/wiyby/wiyby.aspx?layerGroups=default&lang=en&topic=ufrmsw&scale=5&ep=map&y=109217&x=475502#x=475502&y=109217&scale=5> (accessed June 2016)

Likely Evolution of the Baseline

- ▶ Under the Water Framework Directive, rivers in England and Wales are required to have achieved 'good ecological status' by 2015. Where this was not possible and subject to criteria set out in the Directive, the aim is to achieve good status by 2021 or 2027. 24 per cent of waterbodies in the East Hampshire catchment and 25 per cent in the Arun & Western Streams catchment achieved good ecological status by 2015⁴³;
- ▶ The PWOA is within an area of restricted water availability, with many water resources management units assessed as being over-abstracted, over-licensed or having no water available at low flows. The investigations and modifications to abstraction licences demonstrate the presence of water-sensitive habitats and species. Future development and demand for water may put further pressure on these habitats and species;
- ▶ Within East Hampshire, the priority issues are diffuse pollution, heavily modified river channels reducing fish passage and habitat and landfill sites near protected areas. The local catchment partnership plans the following measures to address these issues:
 - ▶ 3 projects are planned on the River Hamble to improve fish passage and habitat quality, and to reduce diffuse pollution impacts on the river and downstream estuary (Wangfield Lane fish refuge and habitat creation; Durley Mill fish pass; and Upper Hamble River Restoration). Portsmouth Water are contributing to the river restoration project in association with the Rivers Trust and the Wild Trout Trust.
 - ▶ The Meon Valley Partnership is working to get the Meon to good status by tackling invasive non-native plants, diffuse pollution and low flow issues. Habitat improvement works are planned to mitigate the concrete-lined channels at East Meon and the impacts of rural land use. More fish passage improvements are also intended.
 - ▶ A river restoration project on Hermitage Stream is planned to address water quality, fish failures and to improve the constrained concrete channel. Designs are prepared and construction money is being sought by a funding officer.
 - ▶ On the River Alver, the local partnership is planning to improve water quality that is affected by the surrounding landfill, keep water levels high and stable enough to support the upstream wetland and improve flood defences.
- ▶ Within the Arun & Western Streams catchment, the priority issues are fish passage, diffuse pollution and invasive non-native species (INNS). The local catchment partnership plans the following measures to address these issues:
 - ▶ Portsmouth Water have made improvements to the operation of the River Ems augmentation scheme and restoration on the upper Ems in the Arun Western Streams catchment. This will mitigate the impacts of low flows, which are exacerbated by its Source N and Source U abstractions for public water supply. The water body is designated as heavily modified for flood protection purposes and is currently classified at poor status. The proposed augmentation improvements are to move the discharge location upstream, increase the volume of water that is discharged and change the flow condition of the licence so that the augmentation flow is triggered and implemented at a higher flow level to provide more environmental protection'. This will ensure clean water is discharged and a greater length of water body is supported. Alongside reduced flow, poor habitat quality is another major factor causing the River Ems to fail under WFD. It is recognised that restoration works are also needed to ensure maximum benefit is gained from the increased flows. Increasing the length of the water body supported by augmentation will contribute to habitat improvements, in particular the recruitment of juvenile fish species. Both increasing the augmentation flow during dry periods and improving the in channel diversity of the habitat will increase the resilience and range of fish and invertebrate populations. Portsmouth Water is to carry out

⁴³ Data from <https://uk-air.defra.gov.uk/aqma/list?la=all&country=england&pollutant=all> (Accessed October 2017)

these measures and, together with other measures planned, are predicted to get the overall water body status to good ecological potential by 2021.

- ▶ Portsmouth Water, ARRT and the Wild Trout Trust (WTT) have completed a river restoration project at the Deepsprings to Racton Park Dell reach of the River Ems in conjunction with work to improve flows.
- ▶ A suite of fish passage improvements on the lower Ems, implemented by ARRT and the WTT.
- ▶ Continued implementation through the Heritage Lottery Funded Arun and Rother Connections (ARC) Project.
- ▶ The UK Climate Programme 2009 (UKCP09) projections for the medium emissions scenario central estimate (50 per cent probability) is that:
 - Winter mean precipitation will increase by 22 per cent by the 2080s. It is very unlikely to increase by less than 4 per cent and is very unlikely to increase by more than 51 per cent;
 - Summer mean precipitation will reduce by 23 per cent by the 2080s. It is very unlikely that summer mean precipitation will reduce by more than 48 per cent and it is very unlikely that it will increase by more than 7 per cent),⁴⁴ and
- ▶ Studies have suggested an increase in water demand nationally by 2050 by 2 – 5% for domestic consumption, 4 – 6% for industrial and commercial use and 26% for agriculture.⁴⁵

Key Sustainability Issues Relevant to the WRMP

The key sustainability issues arising from the baseline assessment for water are:

- ▶ the need to maintain and improve water quality;
- ▶ the need to maintain seasonal flows in groundwater and surface water;
- ▶ the need to ensure the continued risk of flooding is mitigated effectively; and
- ▶ the need to improve the ecological status of water bodies.

3.6 Air Quality and Climate

Baseline Characteristics

Air Quality

The emission of pollutants to air can pose a hazard to human health (e.g. respiratory illnesses and lung conditions) and can also have a negative impact on the environment (e.g. changes to ecosystems and damage to vegetation when present within the atmosphere in excess of certain concentrations). Pollutant thresholds are set as objectives and include pollutants such as nitrogen dioxide (NO₂), sulphur dioxide (SO₂) volatile organic compounds (VOCs) and fine particles (known as 'particulates'). Air Quality Management Areas (AQMA) are declared in specific locations where atmospheric concentrations of one or more pollutants are either close to or exceeding statutory objectives set out within the *Air Quality Strategy for England, Scotland, Wales and Northern Ireland*.

Within the PWOA, 11 AQMA have been designated, in all cases for exceedance of NO₂, within the following Council areas⁴⁶:

⁴⁴ UKCP09 Key Findings <http://ukclimateprojections.metoffice.gov.uk/23908?emission=medium> (accessed June 2016).

⁴⁵ Adaptation Sub-Committee of the Committee on Climate Change (2017) UK Climate Risk Assessment Evidence Report: Chapter 4 Infrastructure

⁴⁶ Defra Air Quality Management Areas (AQMA) Interactive Map <https://uk-air.defra.gov.uk/aqma/maps> (accessed June 2016).

- ▶ Five declared by Portsmouth City Council (reduced from 13 in 2011);
- ▶ Three declared by Chichester District Council;
- ▶ Two declared by Fareham Borough Council.

Climate Change

Climate change could cause significant environmental effects within the PWOA. The UK Climate Programme 2009 (UKCP09) provides climate information for different emissions scenarios (high, medium, low) and differing levels of uncertainty. For South East England under medium emissions by the 2080s, UKCP09 projections indicate that:

- ▶ the central estimate (50 per cent probability level) of increase in winter mean temperature is 3°C; it is very unlikely to be less than 1.6°C (10 per cent probability level) and is very unlikely to be more than 4.7°C (90 per cent probability level);
- ▶ the central estimate of increase in summer mean temperature is 3.9°C; it is very unlikely to be less than 2°C and is very unlikely to be more than 6.5°C;
- ▶ the central estimate of change in winter mean precipitation is 22 per cent; it is very unlikely to be less than 4 per cent and is very unlikely to be more than 51 per cent; and
- ▶ the central estimate of change in summer mean precipitation is –23 per cent; it is very unlikely to be less than –48 per cent and is very unlikely to be more than 7 per cent.⁴⁷

Extreme weather events such as droughts, floods, storms and strong winds are also predicted to increase in frequency and severity.

Currently, 12,500 residential properties and over 1,000 commercial properties in Portsmouth are located in the tidal flood risk zone. Sea level rise predictions forecast that in 2115 nearly 31,000 residential and 2,000 commercial properties in the City will be at risk.⁴⁸

Greenhouse gases including CO₂ emitted from human actions are a major contributor to climate change. In 2015, CO₂ emissions for Hampshire and West Sussex were estimated at 6.7 tonnes of CO₂ per capita and 4.1 tonnes of CO₂ per capita respectively. For those local authorities entirely served by Portsmouth Water, the per capita emissions were less than the mean for the South East region (5.4 t CO₂) (Portsmouth = 4.1 t CO₂, Gosport = 2.9 t CO₂, Havant = 4.0 t CO₂)⁴⁹. Portsmouth Water's gross operating greenhouse gas emissions have fallen from 12,592 tCO₂e in 2014/15 to 11,079 tCO₂e in 2016/17.⁵⁰ The largest component of the company's emissions is electricity and Portsmouth Water is focussing on reducing its electricity requirement⁵¹.

Actions associated with infrastructure work such as building water treatment works, renewing pipes and infrastructure can also require large quantities of materials which contain embodied carbon as a result of transport and manufacturing processes.

Likely Evolution of the Baseline

Air Quality

- ▶ For AQMAs within the PWOA in the first decade of this century there has been a general trend of decreasing NO₂ levels. However, over the later five years the levels of NO₂ have been increasing, although some of this increase may be attributed to meteorological conditions;

⁴⁷ <http://ukclimateprojections.metoffice.gov.uk/21708?projections=23833> (accessed October 2017)

⁴⁸ Portsmouth City Council (March 2015) Local Flood Risk Management Strategy

⁴⁹ Department for Energy and Climate Change (June 2017) UK local authority and regional carbon dioxide emissions national statistics: 2005-15

⁵⁰ Portsmouth Water Limited (2017) Annual Reports and Accounts

⁵¹ Portsmouth Water Limited (July 2016) Outcome Delivery Incentives Report

- Air quality monitoring in Fareham in 2013 showed a downward trend with the thresholds for NO₂ concentrations slightly exceeded. It is hoped that changes to road layouts and improvements to bus services will mean a continuation of decreasing pollutants⁵².

Climate Change

- Under the Kyoto Protocol, the UK agreed a legally binding target to reduce its greenhouse gas emissions to 12.5 per cent below the base year level over the period 2008-2012 (the base year is comprised of 1990 for CO₂, methane and nitrous oxide, and 1995 for fluorinated compounds);
- The UK has a domestic goal of reducing emissions of CO₂ by at least 34 per cent below 1990 levels by 2020. Portsmouth City Council has a commitment to reduce its carbon footprint by 30 per cent over the five year period (2010/11-2016/17). The Council reports a reduction of 15% for 2014/15 compared to the 2010/11 base year. The reduction was achieved through a significant decrease in natural gas and diesel used for heating purposes through energy efficiency and heating management⁵³;
- The UK Climate Change Act has now set legally binding targets for the UK to reduce greenhouse gas emissions by at least 80 per cent by 2050, and CO₂ emissions by at least 26 percent by 2020, both set against a 1990 baseline. It also requires the Government to set five year carbon budgets in order to set out a trajectory for emissions reductions to 2050. The first three budgets were set in May 2009 covering the periods 2008-12, 2013-17 and 2018-2022, equivalent to 23 per cent, 29 per cent and 35 per cent reductions in carbon emissions compared to 1990 levels respectively. The fourth carbon budget was brought into effect in June 2011 and set the carbon budget for the 2023-2027 budgetary period at 1,950 MtCO₂e. This would be a 50 per cent reduction on 1990 levels by 2025⁵⁴. The Government has recently proposed the fifth carbon budget for the period covering 2028-2032 to be set at 1,725 MtCO₂e, equating to a 57% reduction relative to 1990⁵⁵;
- The UK Government has agreed to an EU-wide target of 20 per cent renewable energy by 2020 – including a binding 10 per cent target for the transport sector. The European Commission has proposed that the UK share of this target would be to achieve 15 per cent of the UK's energy from renewables by 2020 which is equivalent to almost a ten-fold increase in renewable energy consumption from current levels. The Partnership for Urban South Hampshire (PUSH) undertook a study which found that currently less than 1 per cent of energy in South Hampshire comes from renewable sources⁵⁶;
- There is a degree of conflict between increasing the level of treatment of waste water required to meet stricter environmental quality standards and the energy use and associated emissions that result from the improved treatment processes;
- Portsmouth Water is committed to increasing the percentage of its energy obtained from renewable resources and, wherever practicable, to reducing electrical consumption. Currently, the company operates solar arrays at 5 water treatment works, purchases 100% of its energy from 'Green' energy sources (biomass) and in June 2015 completed its Energy Savings Opportunities Scheme (ESOS). Portsmouth Water will continue to investigate the feasibility of sustainable wind and solar energy projects and other renewable technologies where cost effective and continue to work towards further reductions in power consumption.
- The changes in average temperatures and rainfall as a result of climate change are likely to cause hotter, drier summers which will potentially result in:

⁵² Fareham Borough Council (2014) Air Quality Progress Report for Fareham Borough Council.

⁵³ Portsmouth City Council's 2014/15 Greenhouse Gas Emissions <https://www.portsmouth.gov.uk/ext/documents-external/cmu-greenhouse-gas-report-2014-15.pdf> (accessed July 2016)

⁵⁴ HM Government (2011) The Carbon Plan: Delivering our Low Carbon Future

⁵⁵ HM Government Guidance on Carbon Budgets <https://www.gov.uk/guidance/carbon-budgets> (accessed July 2016)

⁵⁶ Feasibility of an Energy and Climate Change Strategy for Urban South Hampshire (2008) http://www.push.gov.uk/issue_to_client_final_push_report_09.09.2008.pdf (Accessed November 2017)

- ▶ increased maximum summer temperatures that are likely to lead to increased thermal discomfort in buildings;
- ▶ increased health problems in the summer, including heat related deaths and those linked to high air pollution. Elevated summer temperatures cause health problems both directly and indirectly, via elevated levels of air pollutants;
- ▶ increased summer water shortages as summer rainfall decreases; and
- ▶ growth in summer tourism.
- ▶ Milder winters are expected to result in:
 - ▶ a reduction in the number and severity of annual frosts and snowfall, caused by the likely increased temperatures during the winter months which could lead to longer growing seasons for suitable crops and grasslands;
 - ▶ less cold weather transport disruption;
 - ▶ reduced demand for winter heating;
 - ▶ less cold weather related illnesses;
 - ▶ increased river and urban flooding, due to the increased incidence and severity of extreme rainfall events; and
 - ▶ increased pressure on sewer systems with associated water quality impacts.

Key Sustainability Issues Relevant to the WRMP

The key sustainability issues arising from the baseline assessment for air quality and climate are:

- ▶ the need to minimise emissions of pollutant gases and particulates and enhance air quality;
- ▶ the need to reduce the need to travel and promote sustainable modes of transport;
- ▶ the need to reduce greenhouse gas emissions arising from implementation of the WRMP;
- ▶ the need to take into account and where possible adapt to the potential effects of climate change; and
- ▶ the need to increase environmental resilience to the effects of climate change.

3.7 Human Environment

Baseline Characteristics

Community

Portsmouth Water currently serves in excess of 716,990 people, of which 205,056 live within Portsmouth, 120,684 within Havant and 82,622 in Gosport⁵⁷. The remaining circa 289,600 people (41% of the total population served) live within the local authorities of Fareham, Winchester, East Hampshire, Chichester, Arun and Eastleigh.

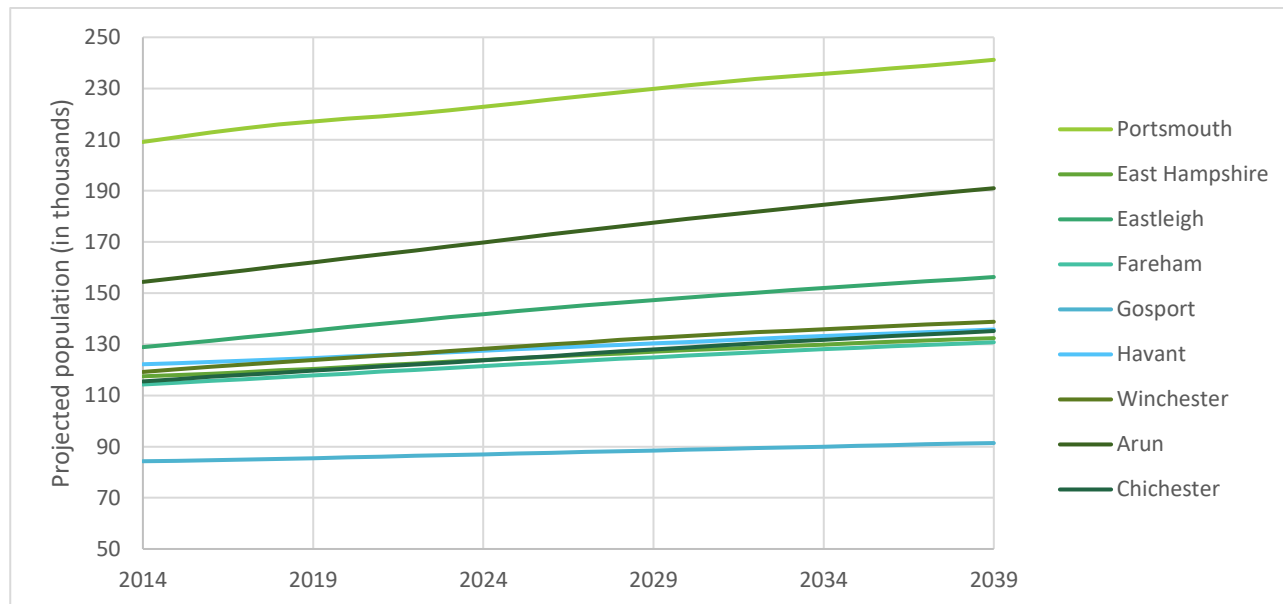
The South East region has the third largest predicted absolute increase in population after London and the East of England. The population in the South East is predicted to raise by 72,240 per year from 2014 to 2024, equating to an 8.1 per cent increase.⁵⁸ The majority of local authorities within the PWOA have similar projected increases in population as the rest of the South East, with the greatest increases in population

⁵⁷ NOMIS (2016) <http://www.nomisweb.co.uk> (accessed June 2016).

⁵⁸ Office for National Statistics (2016) Subnational population projections for England: 2014-based projections <http://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/bulletins/subnationalpopulationprojectionsforengland/2014basedprojections#projections-for-regions-london-region-is-projected-to-grow-the-fastest> (accessed July 2016).

projected in Eastleigh and Arun at 10 per cent. However, the projected growth in population is less great in Gosport, Havant and East Hampshire with population increases of 3 per cent, 4 per cent and 5 per cent, respectively⁵⁹ (**Figure 3.8**).

Figure 3.8 Population Projections to 2014-2039 for Local Authorities across PWOA



Source: Office for National Statistics (2016) Subnational Population Projections for Local Authorities in England: Table 2

<https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/datasets/localauthoritiesinenglandtable2> (accessed July 2016).

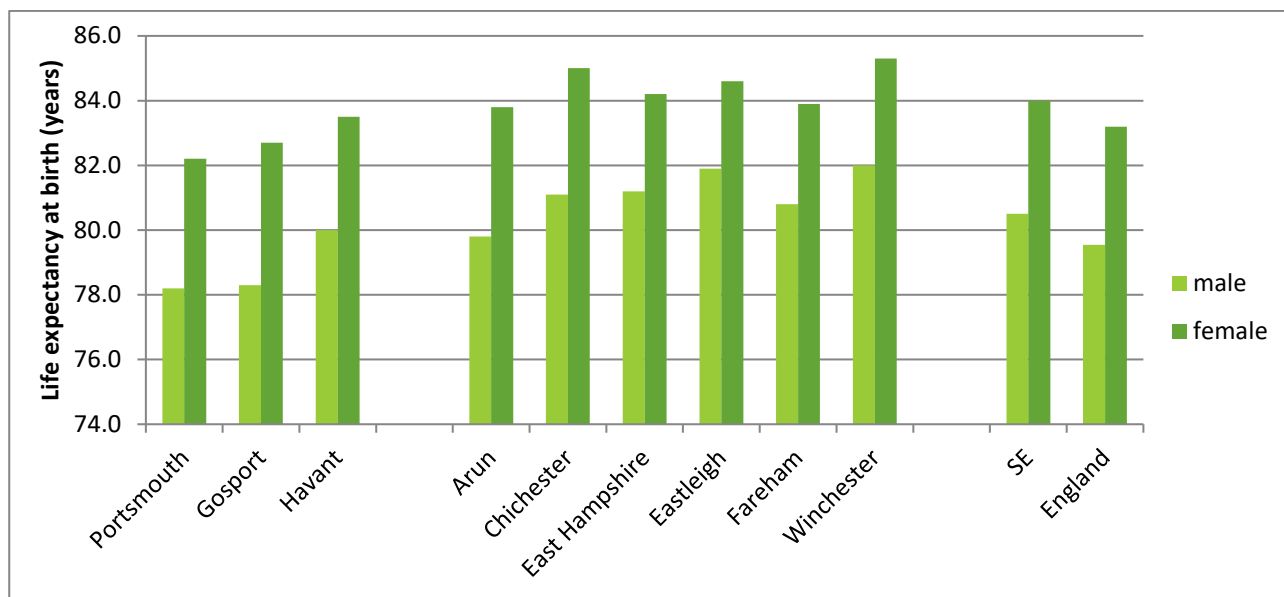
Health

As shown in **Figure 3.9**, the life expectancy for men and women is less for some of the local authorities within the PWOA than compared to the South East mean of 80.5 years for men and 84.0 years for women. This is especially the case for those local authorities who are wholly within the PWOA: Portsmouth City Council, Gosport Borough Council and Havant Borough Council and reflect a range of socio-economic factors.

⁵⁹ Office for National Statistics (2016) Subnational Population Projections for Local Authorities in England: Table 2

<https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/datasets/localauthoritiesinenglandtable2> (accessed July 2016).

Figure 3.9 Life Expectancy at Birth (for persons born in period 2012-14)

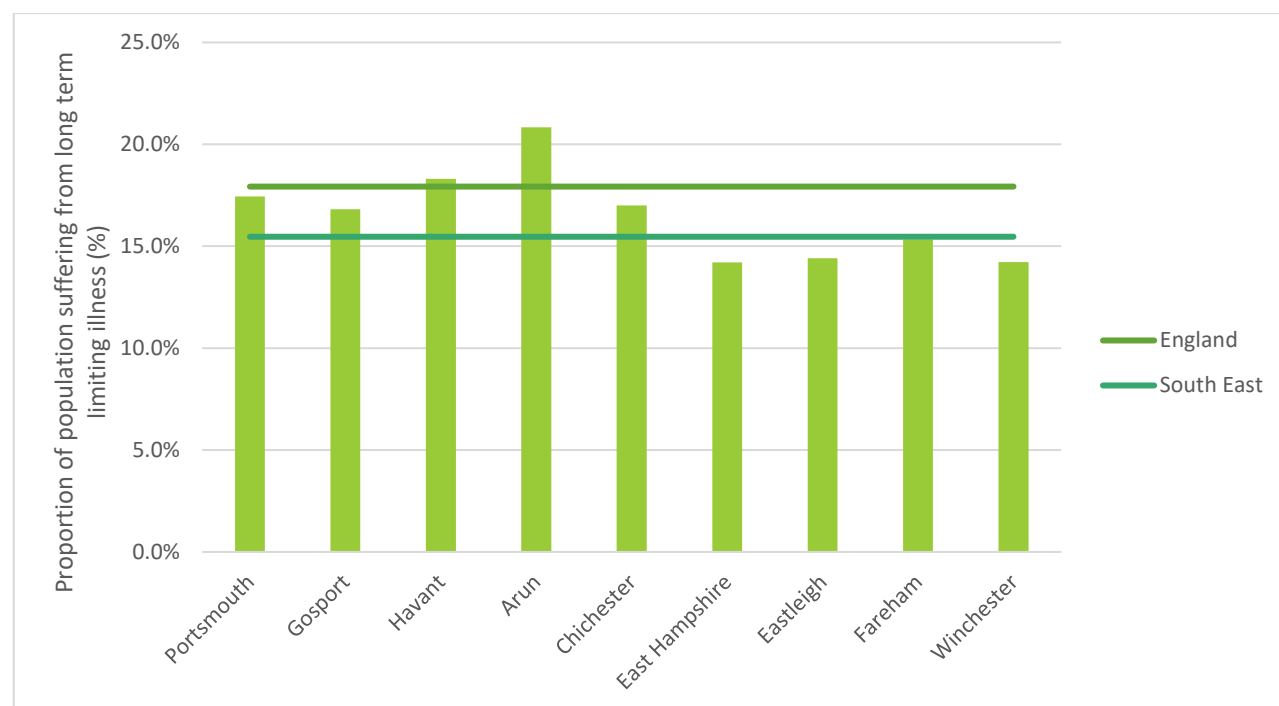


Source: Office for National Statistics (2015) Life Expectancy at Birth and at Age 65, by Local Areas in England and Wales, 1991–93 to 2012–14

<http://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/lifeexpectancies/datasets/lifeexpectancyatbirthanddata/ge65bylocalareasinenglandandwalesreferencetable1> (accessed June 2016).

Figure 3.10 shows that several of the local authorities served by Portsmouth Water have a higher proportion of their population that suffer from a limiting long term illness than the South East mean of 15.5 per cent. Havant and Arun Borough Councils have a higher proportion of their population with a limiting long term illness than the national mean of 17.9 per cent, at 18.3 per cent and 20.8 per cent of their population respectively.

Figure 3.10 Proportion of Population with a Limiting Long Term Illness

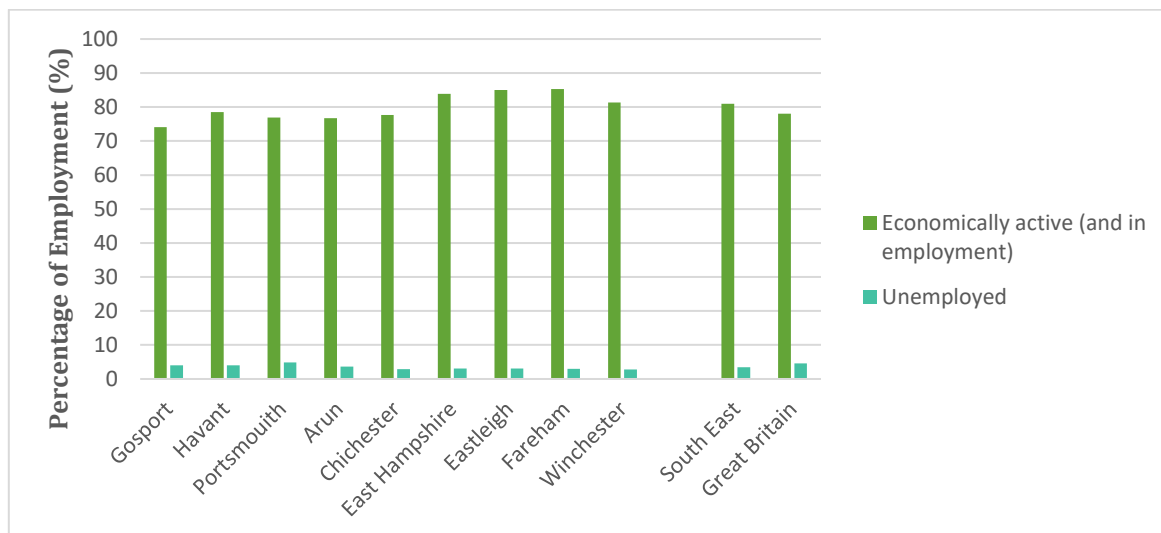


Source: Neighbourhood Statistics Limiting Long-term Illness (UV22) by Local Authority, Region and Country
<https://www.neighbourhood.statistics.gov.uk/> (accessed June 2016)

Local Economy

The percentage of the population that is economically active and in employment is similar within the PWOA to the rest of the South East (**Figure 3.11**). However, some local authorities have lower proportions of the population in employment, especially Gosport (74.1 per cent), Arun (76.7 per cent), and Portsmouth (76.9 per cent) compared to the South East mean of 81 per cent. The local authorities which are wholly within PWOA have the highest levels of unemployment within the PWOA; with Portsmouth at 4.9 per cent, Havant at 4.0 per cent and Gosport at 4.0 per cent and thus above the South East mean of 3.5 per cent.

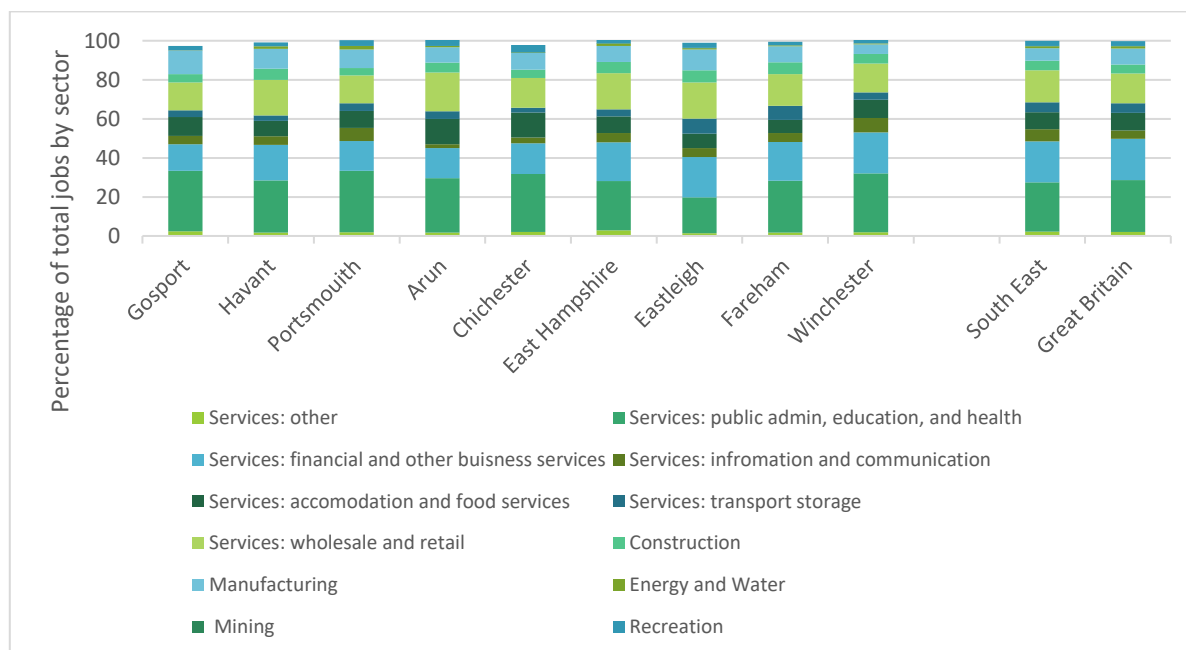
Figure 3.11 Economically Active and Unemployment Levels (July 2016 – June 2017)



Source: NOMIS (2017) Local Authority Profiles <https://www.nomisweb.co.uk/reports/lmp/la/contents.aspx> (accessed November 2017)

Figure 3.12 shows that for some of the local authorities within the PWOA, a larger proportion of employment is related to tourism than the South East and Great Britain mean of 6.8 per cent and 7.5 per cent, respectively, especially within Arun (11.1 per cent), Chichester (8.5 per cent) and Gosport (8.3 per cent). This may place an additional seasonal burden on water resources during the tourist season.

Figure 3.12 Employment across Sectors (2016)



Source: NOMIS (2016) Local Authority Profiles <https://www.nomisweb.co.uk/reports/lmp/la/contents.aspx> (accessed November 2017)

Deprivation

The English Index of Deprivation measures relative levels of deprivation in small areas of England called Lower Layer Super Output Areas (SOA). The Indices of Deprivation is based on seven different domains of deprivation:

- ▶ Income Deprivation;
- ▶ Employment Deprivation;
- ▶ Education, Skills and Training Deprivation;
- ▶ Health Deprivation and Disability;
- ▶ Crime;
- ▶ Barriers to Housing and Services; and
- ▶ Living Environment Deprivation.

In order to determine how deprived a local authority is relatively within the national context, the combined ranks for each of the SOAs within that local authority can be considered. Each of the 354 local authorities has been ranked in terms of overall deprivation, with 1 being the most deprived and 354 being the least deprived.

Table 3.5 indicates the rankings for the local authorities within the PWOA and also what proportion of the local authority SOAs are within the 10 per cent most deprived parts of the country. Local authorities which are wholly within the PWOA (Portsmouth City Council, Gosport City Council, and Havant Borough Council) have the highest levels of deprivation of all the authorities covered by the PWOA (with the exception of Arun District Council).

Figure 3.13 shows the spatial distribution of deprivation across the PWOA.

Table 3.5 Levels of Deprivation by Local Authority

Local Authority	Deprivation Rank (1 = most deprived)	% of SOA within LA which are Considered as England's Most Deprived 10%
Portsmouth City Council	57	13
Gosport Borough Council	131	4
Havant Borough Council	142	8
Arun Borough Council	174	4
Chichester Borough Council	231	0
East Hampshire District Council	308	0
Eastleigh Borough Council	298	0
Fareham Borough Council	312	0
Winchester City Council	307	0

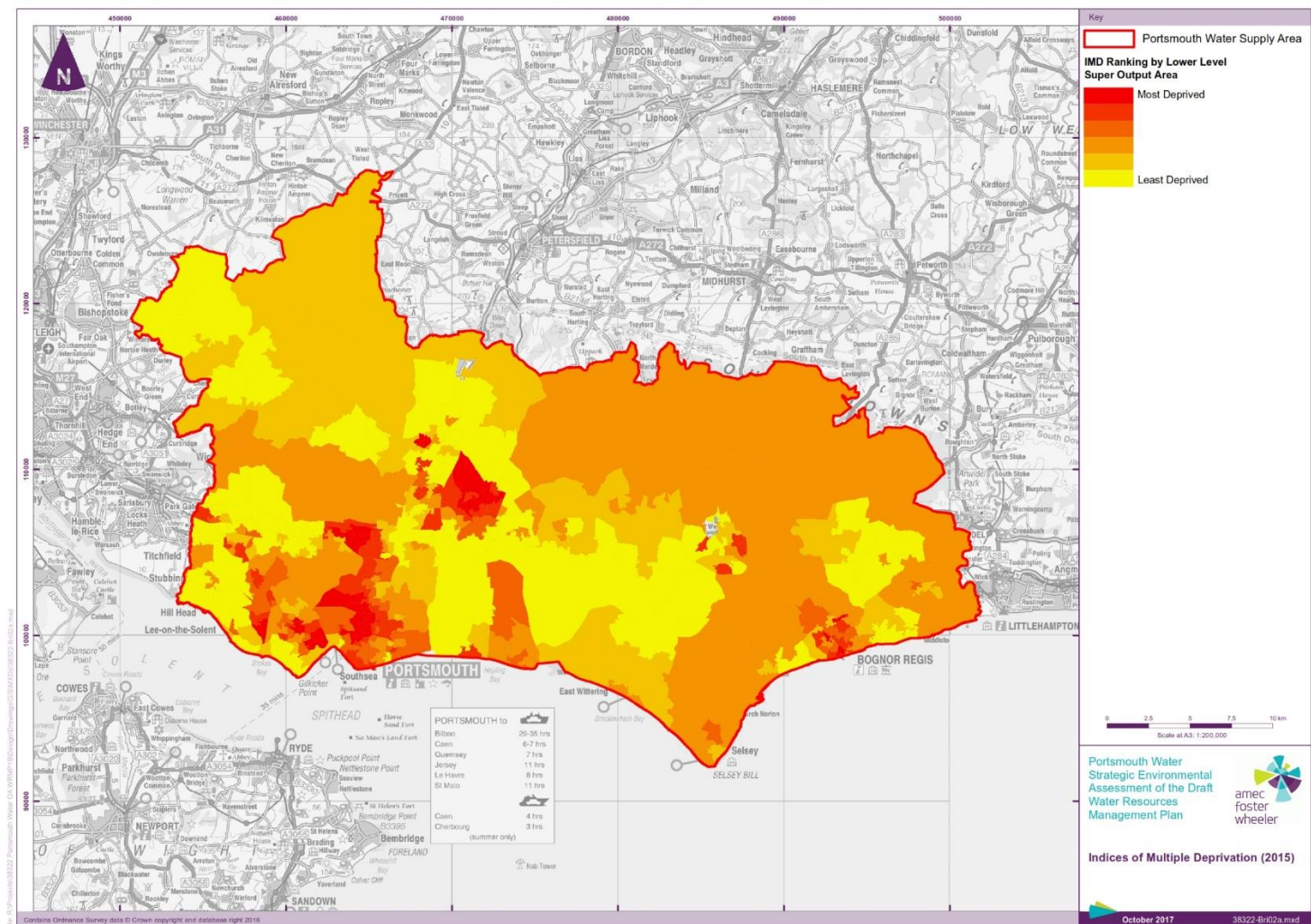
Source: English Indices of Deprivation 2015 <https://www.gov.uk/government/statistics/english-indices-of-deprivation-2015> (accessed June 2016)

Levels of deprivation, particularly income deprivation, affect the ability to pay and may also impact on total water usage. Portsmouth Water charges are the lowest amongst water companies within England & Wales;

the average annual bill for water at £94.50 per household for the period 2015-20 (equivalent to 26p per day). The price of water for Portsmouth Water household customers has increased at a lower rate than average household incomes, making bills more affordable now than they were in the mid-1990's⁶⁰.

⁶⁰ <https://www.portsmouthwater.co.uk/news/publications/planning-for-the-future/> (accessed June 2016).

Figure 3.13 Indices of Multiple Deprivation



Housing

Each local authority within the PWOA has responsibilities under the National Planning Policy Framework to objectively assess their local community's need for housing and employment land and ensure that they have up to date planning policies to reflect these needs.

In September 2017 the Government published a consultation document setting out a standard method for calculating local authorities' housing need and a 'housing need consultation data table' setting out the need for each authority using the proposed method, together with information on how many homes the local authorities are currently planning for. The information for relevant local authorities is provided in **Table 3.6**. Projecting the annual rates of provision for each local authority over the ten year period 2016 to 2026 implies a total provision of 58,600 dwellings.

The Partnership for Urban South Hampshire is proposing the provision of 104,350 dwellings to 2034. There is some uncertainty at present regarding future housing provision predictions, although this will be resolved as more up to date local plans are adopted.⁶¹

Table 3.6 New Housing Provision by Local Authority

Local Authority	Indicative Assessment of housing need based on proposed formula 2016-2026 (dwellings per annum)	Current local assessment of housing need, based on most recent publicly available document (dwellings per annum)
Portsmouth City Council	835	740
Gosport Borough Council	238	335
Havant Borough Council	463	450
Arun Borough Council	1,199	919
Chichester Borough Council	609	505
East Hampshire District Council	617	520-610
Eastleigh Borough Council	715	630
Fareham Borough Council	531	420
Winchester City Council	653	550

Source:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/644783/Housing_Need_Consultation_Data_Table.xlsx

Likely Evolution of the Baseline

- ▶ There will be a continued and substantial growth in the demand for housing, the number of dwellings completed and the number of households formed;
- ▶ Unemployment in the South East and Great Britain increased in the period 2005 to 2009 and has been falling from 2013 onwards. Similar trends have been observed in local authorities within the PWOA, with particular spikes in the less urban borough councils of Arun and Havant. Unemployment rates have fallen between 2014 and 2015 in all areas, with the exception of Eastleigh and Havant. Future growth and job creation is uncertain in the current economic climate;
- ▶ Ofwat has explored the many factors influencing water affordability in two recent reports^{62 63}. Several initiatives are underway to improve the incentives for companies to better meet

⁶¹ PUSH Spatial Position Statement (June 2016) Partnership for Urban South Hampshire

⁶² Ofwat (2011) Water today, water tomorrow: Affordable for all. How can we help those who struggle to pay their water bills?

⁶³ Ofwat (2015) Affordability and debt – 2014-15.

customers' need in the future. Portsmouth Water are currently developing a social tariff for its most vulnerable customers.

Key Sustainability Issues Relevant to the WRMP

The key sustainability issues arising from the baseline assessment for the human environment are:

- ▶ the need to ensure that water resource requirements of people and visitors can be met at all times, in a sustainable way;
- ▶ the need to ensure that water resources remain affordable;
- ▶ the need to ensure that the WRMP measures do not impact on the health and well-being of all members of the community;
- ▶ the need to ensure that the WRMP measures do not adversely affect the economy;
- ▶ the need to ensure that vulnerable people are not affected by implementation of the WRMP measures;
- ▶ the need to avoid disruption through effects on the transport network; and
- ▶ the need to ensure resilience of water supply/treatment infrastructure against climate change effects.

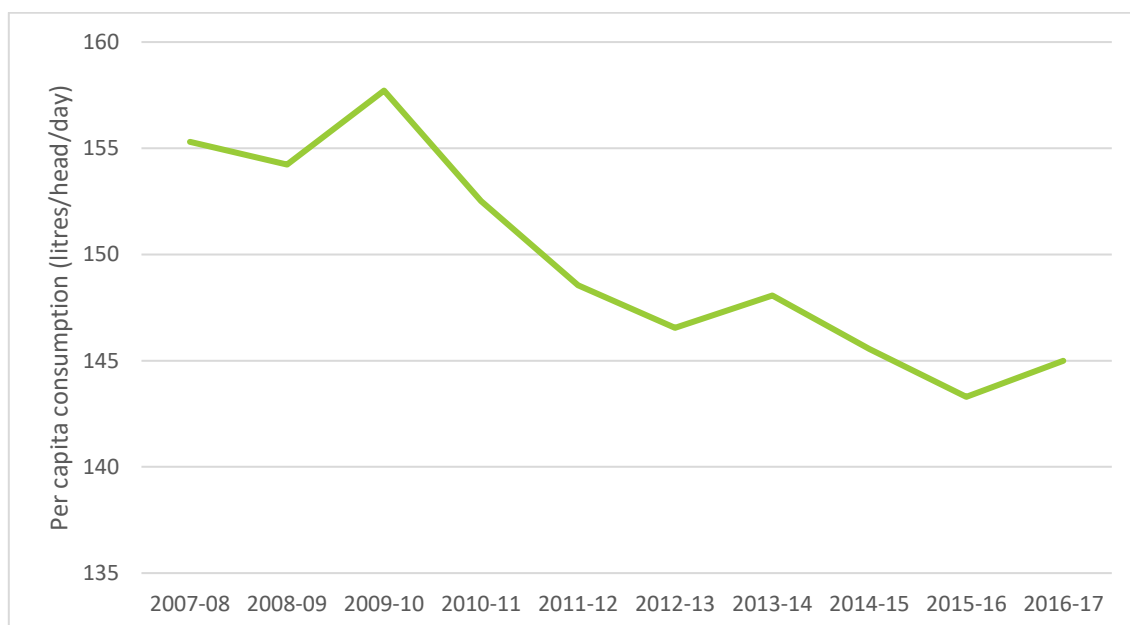
3.8 Material Assets and Resource Use

Baseline Characteristics

Water Demand

In 2016/17, the per capita consumption (PCC) of water for the average household within the PWOA was 145 litres/head/day (l/h/d). **Figure 3.14** shows the per capita water consumption from 2007/08 to 2016/17. A downward trend is shown since PCC peaked in 2011-12; this is likely driven by both increased water efficiency and weather related demand fluctuations.

Figure 3.14 Water Consumption for Households within Portsmouth Water Operational Area



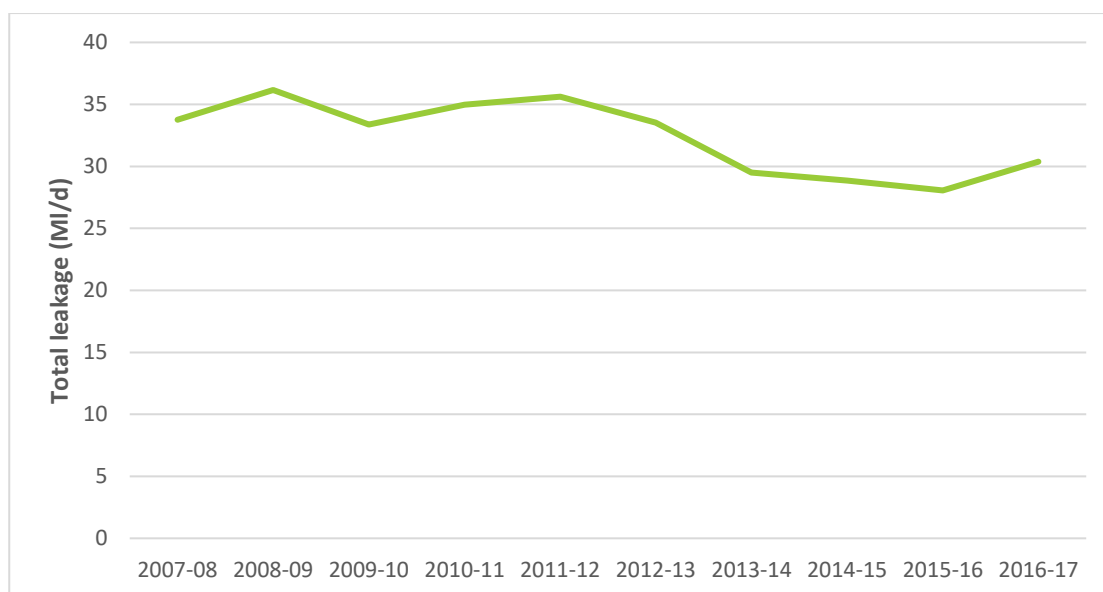
Source: Portsmouth Water Water Resources Management Plan: Annual Review 2017

Leakage

Average leakage from Portsmouth Water for 2016/17 was calculated (using the post Maximum Likelihood Estimate MLE) as 30.37 MI/d⁶⁴. This was a failure against the target of 29.95 MI/d⁶⁵. **Figure 3.15** shows total leakage for the period 2007-08 to 2016/17. The reduction in leakage from the peak of 36.6 MI/d in 2011/12 is a result of additional investment in leakage reduction.

Portsmouth Water identified, as a result of an internal review, an error in their operational leakage calculation that has resulted in leakage being under reported in previous years (29.9 MI/d in 2011/12). The company made the regulators aware of the issue and has put in place a leakage recovery plan which will reduce leakage back to the target level of leakage. The costs of the leakage action plan will be met by shareholders and will not be funded from customer bills³⁰.

Figure 3.15 Leakage within Portsmouth Water Operational Area



Source: Portsmouth Water Supply Annual Review 2016/17

Water Efficiency

Portsmouth Water has an internal Water Efficiency Target of 0.29 MI/d per year based on a saving of 1 litre per property per day. The outturn figure for 2015/16 was 0.27 MI/d which was below the target.⁶⁶ The PCC target for 2019/20 is 144l/h/d⁶⁷.

Energy Use

Energy use has decreased across each of the local authorities, within a range of a decrease of 11 per cent in Eastleigh to a 22 per cent decrease in Gosport. This is similar to decreases across the South East.

⁶⁴ <https://www.portsmouthwater.co.uk/2017/09/05/annual-water-supply-review-201617/>

⁶⁵ The leakage targets were set out in the Company's Business Plan for the last Periodic Review and agreed by Ofwat.

⁶⁶ Portsmouth Water Annual Review 2016

⁶⁷ Portsmouth Water WRMP Annual Review 2017

Table 3.7 Energy Use within Local Authorities – All fuels in GWh

Council	Energy Use in 2005 (GWh)	Energy Use in 2015 (GWh)	% Change in Energy Use (05-15)
Arun	3,076.10	2,486.53	-19
Chichester	3,564.10	3,084.32	-13
East Hampshire	3,183.60	2,821.07	-11
Eastleigh	2,865.60	2,356.04	-18
Fareham	2,495.70	1,998.36	-20
Gosport	1,242.90	971.63	-22
Havant	2,280.30	1,820.50	-20
Portsmouth	4,140.20	3,337.08	-19
Winchester	4,017.60	3,419.76	-15
South East	239,679.80	195,868.61	-18

Source: DECC 2015 Sub-national total final energy consumption statistics.

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/481867/NOVEMBER_2015_-_Sub-national_total_final_energy_consumption_statistics_FINAL.xlsx

In 2016/17, Portsmouth Water gross greenhouse emissions for the year was 11,079 tCO₂e (which compared to 11,606 tCO₂e (restated))⁶⁸. The majority of which came from grid electricity consumption relating to water pumping and treatment activities. The remainder comes from transport, direct burning of fossil fuels on site, process and fugitive emissions, business travel and outsourced activities. Portsmouth Water looks to address carbon emissions in a number of ways, including: operating solar arrays at five water treatment works; and purchasing 100% of energy for treatment and pumping sites from 'Green' energy sources (biomass). Portsmouth Water also participated in National Grid's Demand Side Balancing Reserve (DSBR) where pumps were switched off during times of peak energy demand, to assist the Grid in balancing supply and demand in the UK.

Waste

Recycling/reuse/composting rates for household waste within the predominantly urban local authorities which are wholly within the PWOA (i.e. Gosport, Havant and Portsmouth) are lower when compared to the rest of the local authorities as shown in **Table 3.8**.

Table 3.8 Household Waste for PWOA Councils

Council	Residual Household Waste per Household (kg/household)	Percentage (%) of Household Waste sent for Reuse, Recycling or Composting
Arun	675.7	22.7
Chichester	478.8	35.3
East Hampshire	503.5	29.2
Eastleigh	496.3	23.5
Fareham	473.6	34.4

⁶⁸ Portsmouth Water Limited, Annual Reports and Accounts 2017 <https://www.portsmouthwater.co.uk/wp-content/uploads/2015/05/REPORT-ACCOUNTS-2017.pdf>

Council	Residual Household Waste per Household (kg/household)	Percentage (%) of Household Waste sent for Reuse, Recycling or Composting
Gosport	443.6	40.6
Havant	484.9	32.6
Portsmouth	473.1	38.4
Winchester	459.7	37.5

Source: Local Authority collected waste for England – annual statistics (Defra).

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/481060/LA_and_Regional_spreadsheet_2014-15_publication.ods Accessed June 2016

Portsmouth Water generated a total of 36 tons of waste from office/administration in 2015/16, of which 28% was recycled. Excavated waste from Portsmouth Water infrastructure and non-infrastructure projects, excluding mains renewals, in the same period amounted to 6 tonnes.

Likely Evolution of the Baseline without the WRMP

- ▶ The current business plan for Portsmouth Water sets out a target to reduce average annual personal consumption to 144l/h/d by 2020 and 135 l/h/d by 2040. The current performance is reported as 148 l/h/d.⁶⁹
- ▶ The current business plan sets the leakage target to 29.8 MI/d for the period 2015-20. Achieving this target would result in a savings of 4.3 MI/d through leakage reduction.
- ▶ The current business plan includes the continued promotion of water efficiency measures.
- ▶ The current (2014) WRMP includes options for:
 - ▶ a compulsory metering programme;
 - ▶ the construction of a washwater recovery plant at Works A water treatment works; and
 - ▶ the development of Havant Thicket Winter Storage Reservoir.
- ▶ Water resources in South East England are under pressure from factors including population increase, climate change and the needs of the environment. There are concerns that without action, that there may be insufficient water supply to meet the needs of the South East England during the period of the next WRMPs. Regional solutions are being investigated by the work of the WRSE group.

Key Sustainability Issues Relevant to the WRMP

The key sustainability issues arising from the baseline assessment for material assets and resource use are:

- ▶ the need to promote water efficiency measures (including metering);
- ▶ the need to ensure that leakage is managed at a sustainable economic level in the region;
- ▶ the need to maintain water supplies to a level where water demand is met;
- ▶ the need to reduce energy consumption;
- ▶ the need to ensure efficient use of resources such as construction materials; and
- ▶ the need to minimise waste arisings, promote reuse, recovery and recycling and minimise the impact of wastes on the environment and communities.

⁶⁹ Portsmouth Water Ltd (2015) Business Plan 2015-2020

3.9 Cultural Heritage

Baseline Characteristics

Figure 3.16 highlights key cultural heritage designations within and around the PWOA. Within the PWOA itself, the following heritage assets are designated:

- ▶ 172 scheduled monuments;
- ▶ 3,774 listed buildings; and
- ▶ 12 registered parks and gardens.

There are also four protected wreck sites, including the Mary Rose Wreck Site at Spithead, Solent, just off the coast of Portsmouth. In addition, non-designated heritage features are present throughout the PWOA, examples of which include buildings of local interest, areas of archaeological interest, and unregistered parks and gardens.

Within the PWOA, there are a large number of conservation areas:

- ▶ Portsmouth City Council has 30 Conservation Areas designated⁷⁰;
- ▶ Havant Borough Council has 14 Conservation Areas designated⁷¹;
- ▶ Gosport Borough Council has 16 Conservation Areas designated⁷²;
- ▶ Chichester District Council has 85 Conservation Areas designated, including those within the South Downs National Park⁷³;
- ▶ Eastleigh Borough Council has 8 Conservation Areas designated⁷⁴;
- ▶ East Hampshire has 43 Conservation Areas designated⁷⁵;
- ▶ Fareham Borough Council has 13 Conservation Areas designated⁷⁶;
- ▶ Arun District Council (which is partially covered by the PWOA) has 29 Conservation Areas designated in total, not all are within the PWOA⁷⁷; and
- ▶ Winchester City Council (which is partially covered by the PWOA) has 37 Conservation Areas designated in total, not all are within the PWOA⁷⁸.

⁷⁰ <https://www.portsmouth.gov.uk/ext/development-and-planning/planning/conservation-areas.aspx> (accessed October 2017).

⁷¹ <http://havantstaging.webcurl.co.uk/conservation-areas-and-listed-buildings/detail-conservation-areas-borough-havant> (accessed October 2017).

⁷² <http://www.gosport.gov.uk/sections/your-council/council-services/planning-section/conservation/conservation-areas/area-appraisals/> (accessed October 2017).

⁷³ <http://www.chichester.gov.uk/conservationareas> (accessed October 2017).

⁷⁴ <https://www.eastleigh.gov.uk/conservationareas> (accessed October 2017).

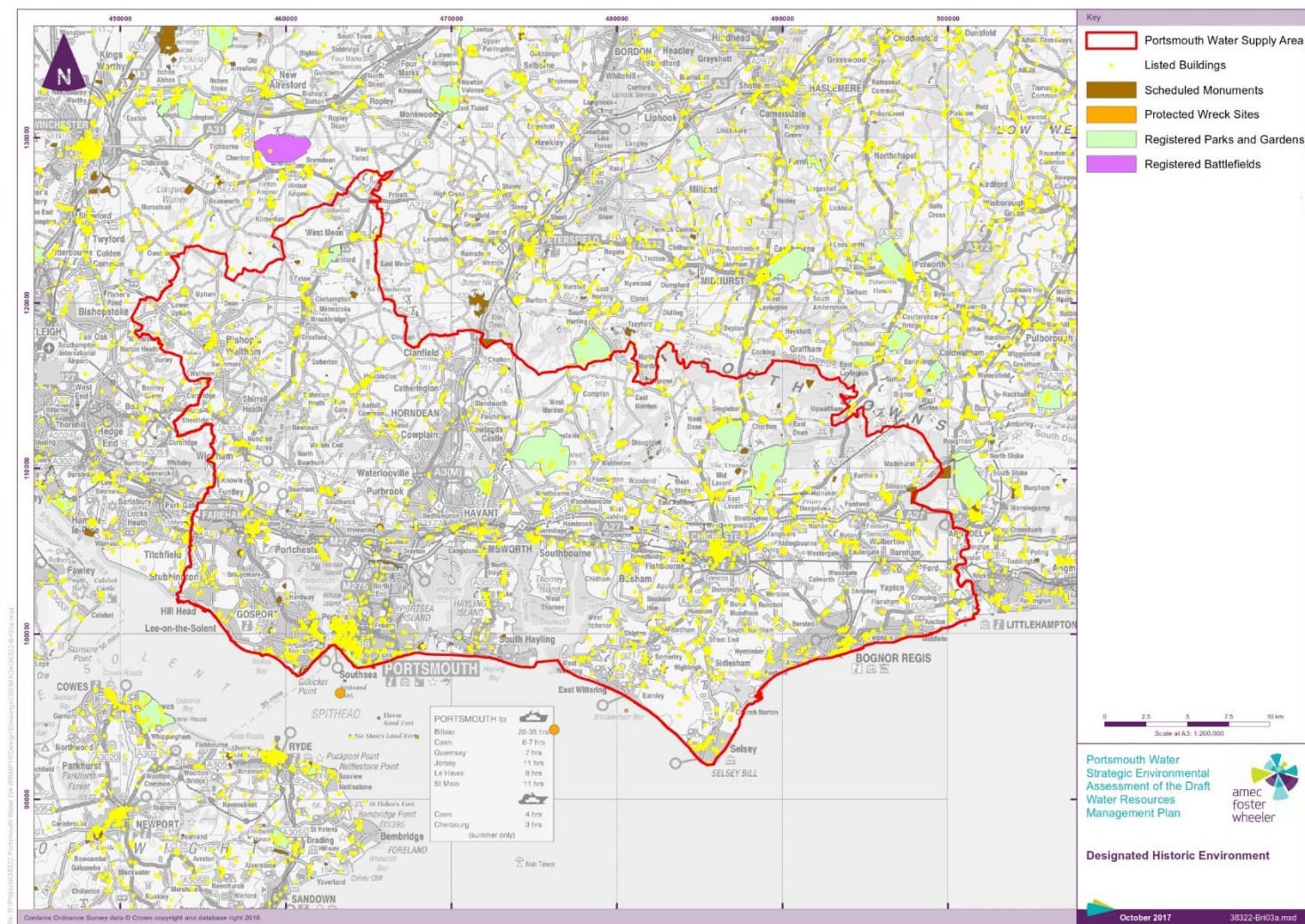
⁷⁵ <https://www.easthants.gov.uk/conservation-areas> (accessed October 2017).

⁷⁶ <http://www.fareham.gov.uk/planning/conservation/intro.aspx> (accessed October 2017).

⁷⁷ <http://www.arun.gov.uk/conservation-areas> (accessed October 2017).

⁷⁸ <http://www.winchester.gov.uk/heritage-conservation/conservation/conservation-winchester/> (accessed October 2017).

Figure 3.16 Designated Historic Environment



Likely Evolution of the Baseline without the WRMP

- ▶ Development pressures, social pressures, natural and environmental threats including climate change, pressures from resource exploitation and infrastructure continue to threaten the condition of cultural heritage sites and monuments⁷⁹. For example, several archaeological sites within Chichester Harbour have been identified as being under threat from sea level rise, natural erosion and human activities⁸⁰. The protection, preservation and setting of these areas must be considered in the siting of any new development.

Key Sustainability Issues Relevant to the WRMP

The key sustainability issue arising from the baseline assessment for cultural heritage is:

- ▶ the need to protect and enhance areas, features, landscapes and sites of archaeological and cultural heritage interest, and their settings.

3.10 Landscape

Baseline Characteristics

Figure 3.17 highlights designated landscape features within and surrounding the PWOA.

Chichester Harbour was designated as an Area of Outstanding Natural Beauty in 1964 in recognition of its unique coastal environment. It covers an area of 74km² making it the smallest AONB within the South East. A population of 8,351 live within its boundaries and it attracts 1.5 million visitors a year.

The East Hampshire and Sussex Downs AONB designations were revoked on the 31 March 2010 when the South Downs National Park Designation Order came into effect. The South Downs National Park covers an area of over 1,624 km². The landscape across the Downs changes dramatically from the vast open spaces in the east, through arable land, park estates and woodland in the centre to the ancient woodlands and wooded valleys in the west.

The Hampshire Historic Landscape Assessment seeks to identify and as far as possible understand the historic development of today's landscape. It places emphasis on the contribution that past historic processes make to the character of the landscape as a whole, not just selected 'special sites' and can contribute to a wider landscape assessment. This will help to guide decisions on its future change and management. It is important to ensure that the landscape evolves in a way that leaves it as rich and diverse in the future. The currently available data was based on a rapid countywide exercise to produce broad patterns of historic landscape character derived from maps and aerial photographs. It was not intended to represent a detailed field by field definition of historic character, but to offer a countywide view.⁸¹

The Chichester Harbour AONB Landscape Character Assessment was undertaken in 2005.⁸² It identifies the factors that make the area special, including the unique blend of land and sea, low lying flat landform, the wilderness quality of the area and its undeveloped character, tranquil nature, importance as a rich habitat.

The South Downs Integrated Landscape Character Assessment (ILCA) was last updated in 2011.⁸³ It is an aid to decision making, helping us to understand the landscape, what is important and special about it, and how it may change in the future. As a document it is intended to guide change and development so that it does not damage the characteristics or value of the landscape. It also helps us to identify ways that we can maintain and improve the character of a place. Development proposals will be expected to conserve and enhance landscape character within the National Park.

⁷⁹ <https://content.historicengland.org.uk/images-books/publications/nhnp-leaflet/nhnp-leaflet.pdf/> (accessed June 2016).

⁸⁰ <http://www.conservancy.co.uk/page/Landscapes-Under-Threat/359/> (accessed June 2016).

⁸¹ http://archaeologydataservice.ac.uk/archives/view/hampshire_hlc_2013/ (accessed October 2017)

⁸² Chichester Harbour Conservancy and the Countryside Agency (2005) Chichester Harbour Landscape Character Assessment

⁸³ <https://www.southdowns.gov.uk/planning/planning-advice/landscape/>

The South Downs LCA defines 18 general landscape types within the National Park as well as 49 more place-specific 'character areas'.

A study of relative tranquillity within the South Downs National Park was undertaken in 2017.⁸⁴ The emerging South Downs Local Plan includes a strategic policy on relative tranquillity. The purpose of draft policy SD8 is to ensure that development does not harm the relative tranquillity of the National Park and to encourage the conservation and enhancement of positive tranquillity factors. Positive tranquillity factors include the quality of the landscape and presence of specific features, including wild open spaces, trees, rivers, streams and lakes. Birdsong, other natural sounds and the absence of sounds associated with human activity or development also contribute to tranquillity.

In terms of Local Landscape and related designations identified in Local Plans these are summarised by Local authority below:

- ▶ The Core Strategy for Portsmouth City (adopted 2012) includes extensive areas designated as Open Space;⁸⁵
- ▶ The Havant Core Strategy (adopted 2011) identifies Local and Strategic Gaps;⁸⁶
- ▶ The Gosport Borough Local Plan (adopted 2015) includes areas of Green Infrastructure and protected Open Space;⁸⁷
- ▶ Saved policies in the Eastleigh Borough Local Plan 2001-2011 (adopted 2006) include Strategic and Local Gaps and Open Space.⁸⁸ The Council is in the process of preparing a Local Plan to 2036;
- ▶ The South Downs National Park is covered by eleven inherited Local Plans and Joint Core Strategies prepared by the local authorities that the Park falls within. It is in the process of preparing its own Local Plan, which is at Pre-submission stage (with consultation running from 26 September 2017 to 21 November 2017. This includes policies that seek to conserve and enhance landscape character and key views and dark sky zones;⁸⁹
- ▶ The Fareham Borough Local Plan includes the Core Strategy (adopted August 2011) and the Development Sites and Policies Plan (adopted June 2015).⁹⁰ They include policies in relation to strategic gaps and Open Space;
- ▶ The Winchester District Local Plan Part 1 – Joint Core Strategy was adopted in March 2013 and includes policies in relation to Strategic Gaps and Open Spaces;⁹¹
- ▶ The Joint Core Strategy for East Hampshire (adopted by the Council in May 2014) includes policies in relation to Gaps between settlements and the protection of landscape character⁹²
- ▶ The Chichester Local Plan (adopted July 2015) includes policies in relation to landscape character;
- ▶ The Arun Local Plan is in the process of being updated and hearing sessions into the examination ended on 28th September 2017, with the Inspector publishing interim conclusions

⁸⁴ South Downs National Park Authority (2017) Tranquillity Study

⁸⁵ <https://www.portsmouth.gov.uk/ext/development-and-planning/planning/the-portsmouth-plan-adopted-2012>

⁸⁶ <https://www.havant.gov.uk/sites/default/files/documents/ADOPTED%20CORE%20STRATEGY%20.pdf>

⁸⁷ <https://www.gosport.gov.uk/sections/your-council/council-services/planning-section/local-development-framework/gosport-borough-local-plan-2029/>

⁸⁸ https://www.eastleigh.gov.uk/media/169203/ppi_Adopted_EBLPR2001-11.pdf

⁸⁹ https://consult.southdowns.gov.uk/consult.ti/Pre_Sub SDLP/viewCompoundDoc?docid=9188884&sessionid=&voteid=&partId=9200852

⁹⁰ <http://www.fareham.gov.uk/planning/localplan.aspx>

⁹¹ <http://www.winchester.gov.uk/planning-policy/local-plan-part-1/>

⁹² <http://www.easthants.gov.uk/sites/default/files/documents/DP01EastHampshireDistrictLocalPlanJointCoreStrategy.pdf>

in October 2017.⁹³ It includes general policies on the protection of landscape character and a specific policy on the protection of the setting of Arundel.⁹⁴

Likely Evolution of the Baseline without the WRMP

- ▶ There are threats to valuable landscapes from natural processes and human activities, e.g. development, agriculture and infrastructure.

Key Sustainability Issues Relevant to the WRMP

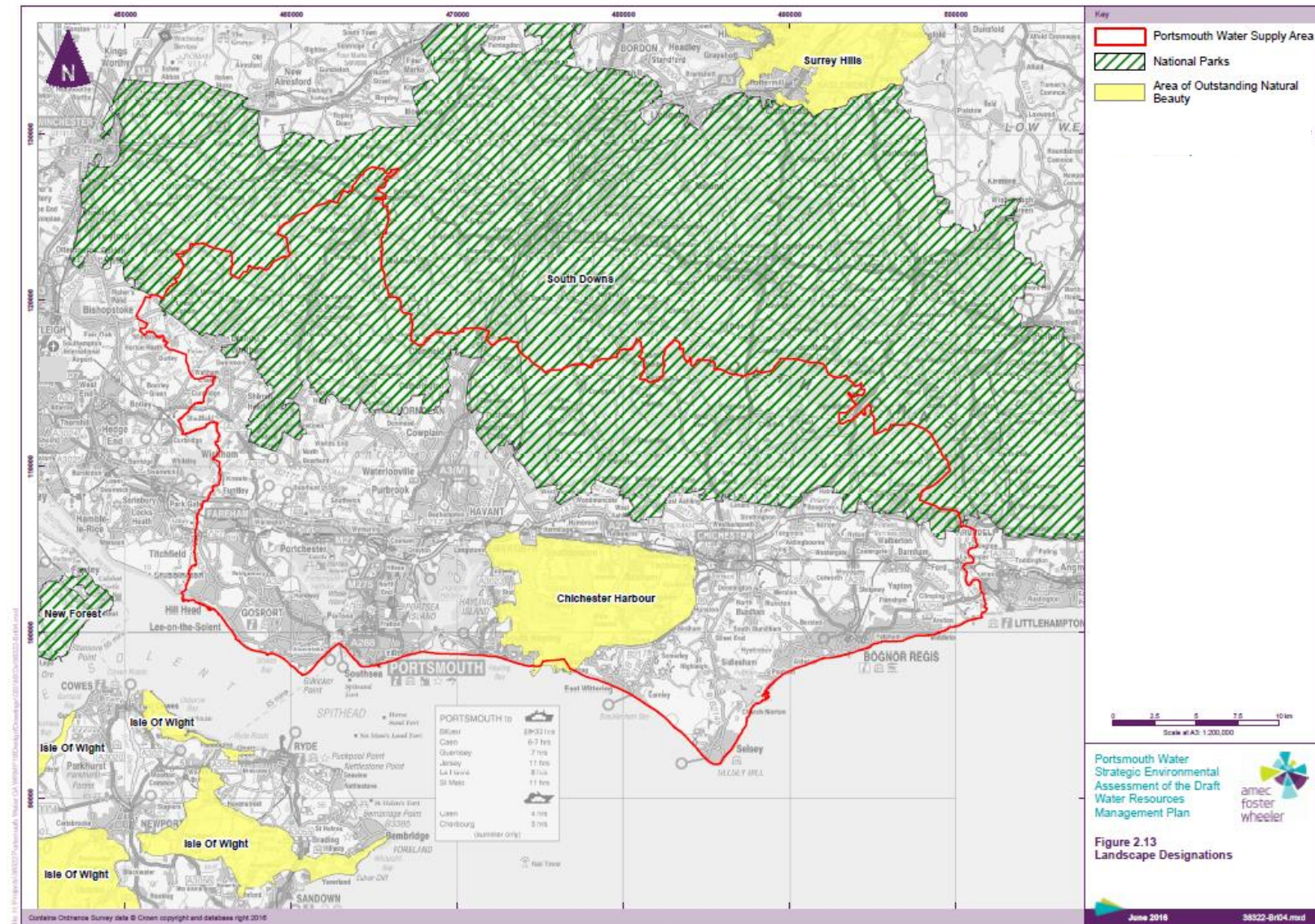
The key sustainability issues arising from the baseline assessment for landscape are:

- ▶ the need to protect the natural beauty of the area, especially within designated sites such as Chichester Harbour AONB and South Downs National Park; and
- ▶ the need to protect and maintain the landscape distinctiveness of the area.

⁹³ <https://www.arun.gov.uk/download.cfm?doc=docm93jjjm4n11343.pdf&ver=11319>

⁹⁴ <https://www.arun.gov.uk/emerging-local-plan>

Figure 3.17 Landscape Designations



3.11 Summary of Key Sustainability Issues

From the analysis of the baseline presented in the preceding sections, a number of key sustainability issues have been identified. These issues are summarised in **Table 3.9**.

Table 3.9 Key Sustainability Issues Relevant to the WRMP

Topic	Key Sustainability Issues
Biodiversity	<ul style="list-style-type: none"> The need to protect and enhance protected sites designated for nature conservation. The need to protect and enhance non-designated sites. The need to continue to improve the condition of priority habitats to support increases in wildlife, biodiversity and important protected species. The need to maintain/enhance ecological connectivity. The need to work within environmental limits and capacities.
Geology and Soils	<ul style="list-style-type: none"> The need to maintain or improve the quality of soils/agricultural land. The need to protect and enhance sites designated for their geological interest. The need to make use of previously developed land and minimise land take. The need to maintain soil function.
Water	<ul style="list-style-type: none"> The need to maintain and improve water quality. The need to maintain seasonal flows in groundwater and surface water. The need to ensure the continued risk of flooding is mitigated effectively. The need to improve the ecological status of water bodies.
Air Quality and Climate	<ul style="list-style-type: none"> The need to minimise emissions of pollutant gases and particulates and enhance air quality. The need to reduce the need to travel and promote sustainable modes of transport. The need to reduce greenhouse gas emissions arising from implementation of the WRMP. The need to take into account and where possible adapt to the potential effects of climate change. The need to increase environmental resilience to the effects of climate change.
Human Environment	<ul style="list-style-type: none"> The need to ensure that water resource requirements of people and visitors can be met at all times, in a sustainable way. The need to ensure that water resources remain affordable. The need to ensure that the WRMP measures do not impact on the health and well-being of all members of the community. The need to ensure that the WRMP measures do not adversely affect the economy. The need to ensure that vulnerable people are not affected by implementation of the WRMP measures. The need to avoid disruption through effects on the transport network. The need to ensure resilience of water supply/treatment infrastructure against climate change effects.
Material Assets and Resource Use	<ul style="list-style-type: none"> The need to promote water efficiency measures (including metering). The need to ensure that leakage is managed at a sustainable economic level in the region. The need to maintain water supplies to a level where water demand is met. The need to reduce energy consumption. The need to ensure efficient use of resources such as construction materials. The need to minimise waste arisings, promote reuse, recovery and recycling and minimise the impact of wastes on the environment and communities.
Cultural Heritage	<ul style="list-style-type: none"> The need to protect and enhance areas, features, landscapes and sites of archaeological and cultural heritage interest, and their settings.
Landscape	<ul style="list-style-type: none"> The need to protect the natural beauty of the area, especially within designated sites such as Chichester Harbour AONB and South Downs National Park. The need to protect and maintain the landscape distinctiveness of the area.

3.12 Limitations of the Data and Assumptions Made

The data collated and presented for the baseline builds upon work undertaken for the previous Environmental Report⁹⁵ for WRMP14 and has been updated where appropriate. However, in some cases no updated information is available and the original datasets have been re-presented.

The information used has been sourced, so far as is possible, from the most recent datasets available utilising a wide range of authoritative and official sources. It is important to acknowledge that there are variable time lags between raw data collection and its publication. Consequently, at the time of this Scoping Report's publication, the baseline or predicted future trends may have varied from those described above.

⁹⁵ Portsmouth Water Ltd (2013) Strategic Environmental Assessment of Draft Water Resources Management Plan, Environmental Report, Amec Foster Wheeler.

4. Approach to the Assessment

4.1 Introduction

This section describes the proposed scope of, and approach to, the SEA of the WRMP. In particular, it draws on the information contained in Sections 2 and 3 to develop the assessment framework and sets out how this framework will be used to support the assessment of water resources management options.

4.2 Scope of the Assessment

The aim of SEA is to identify, describe and evaluate the likely significant effects of implementing the WRMP on the environment. Annex I of the SEA Directive and Schedule 2 of the SEA Regulations require that the assessment includes information on the “*likely significant effects on the environment, including on issues such as: biodiversity; population; human health; fauna; flora; soil; water; air; climatic factors; material assets; cultural heritage, including architectural and archaeological heritage; landscape; and the inter-relationship between the issues referred to*”.

The key policy objectives identified from the review of other plans and programmes relevant to the assessment of the WRMP (**Section 2.3**) and the economic, social and environmental issues arising from the analysis of the baseline (**Section 3.11**), together with the characteristics of the potential water management options, have been used to define the scope of the assessment. In **Table 4.1**, each of the 12 SEA topic areas is considered in turn, with justification provided for scoping out the topic areas where relevant.

Table 4.1 Basis for Scoping Out Topic Areas from the SEA

SEA Topic Area	Included in WRMP SEA?	Justification for Scoping the Topic Out of the SEA
Biodiversity	Yes	Included within SEA framework
Population	Yes	Included within SEA framework
Human Health	Yes	Included within SEA framework
Fauna	Yes	Included within SEA framework
Flora	Yes	Included within SEA framework
Soils	Yes	Included within SEA framework
Water	Yes	Included within SEA framework
Air	No	Some of the feasible options (predominantly the supply side options) will involve the construction of new infrastructure which, during the construction phase, will result in an increase in vehicle movements and on-site construction plant operation and an associated effect on air quality from emissions, and potential effects on air quality from dust. The construction of winter storage reservoirs, for example, are expected to involve significant excavations and therefore in particular these options are likely to have an effect on air quality due to the large number of HGVs required to move soil from/around the site and the likelihood of dust being generated due to the disturbance of the ground. However, these effects will be localised, intermittent and limited to the duration of the

SEA Topic Area	Included in WRMP SEA?	Justification for Scoping the Topic Out of the SEA
		<p>construction phase, as there will be no effects on air quality during the operational phase. There are also standard, best practice mitigation measures that it is assumed will be implemented to minimise any adverse air quality effects during construction.</p> <p>The construction of a desalination plant, meanwhile, will have similar construction related effects on air quality. There may also be very short term, limited effects resulting from the need to run the plant from a backup (assumed diesel) generator should there be a power outage. However, although the operation of a desalination plant is very energy intensive and will have an impact on carbon emissions, it will not result in significant adverse effects on local air quality.</p> <p>The majority of the demand side and leakage measures will not have any impact on air quality, with only limited, short term effects expected from mains replacement to reduce leakage – again due to an increase in vehicle movements and dust from excavation of the network to target specific leaks. At any one location, excavations typically only last 1-2 days.</p> <p>For the reasons presented above, effects on air quality are not considered likely to be significant and therefore are not material to the SEA of the WRMP and it is proposed to scope this topic out of the assessment.</p>
Climatic factors	Yes	Included within SEA framework
Material assets	Yes	Included within SEA framework
Cultural Heritage	Yes	Included within SEA framework
Landscape	Yes	Included within SEA framework

The SEA topic 'Air' was scoped out of the assessment at the Scoping stage. The primary reason for this exclusion is that any air quality effects arising from the feasible options are likely to be as a result of the construction of new infrastructure or the replacement of the existing supply network and therefore will be localised, temporary, limited in duration and can be effectively mitigated by implementing standard best practice measures. This is also consistent with the approach taken to the SEA of the 2014 WRMP.

4.3 Assessment Framework

Establishing appropriate SEA objectives and guide questions is central to assessing the effects of the WRMP on the environment. Each of the water management options that make up the final proposed planning solution in the WRMP have been assessed against the objectives to determine the scale and significance of the effect. By assessing each option against the objectives, it is more apparent where the WRMP will contribute to sustainability, where it might have a negative effect and where enhancements could be made.

The SEA objectives and guide questions developed as part of the SEA of the 2014 WRMP provided the basis for the proposed assessment framework that was presented in the Scoping Report as they had already been subject to extensive consultation with the statutory SEA bodies. These existing SEA objectives and guide questions were, however, reviewed to take into account the key policy objectives and messages derived from the review of plans and programmes (**Section 2.3**) and the key socio-economic and environmental issues derived from the baseline analysis (**Section 3.10**). The framework was also amended in light of comments received on the Scoping Report (see **Appendix C** for summary). The resulting assessment framework is presented in **Table 4.2**.

Table 4.2 Assessment Framework

SEA Objective	Guide Questions
1. To ensure the protection and enhancement of biodiversity, priority habitats and species	Will the option protect and enhance priority species, habitats and sites designated for their nature conservation value?
	Will the option protect and enhance non-designated sites and local biodiversity?
	Will the option provide opportunities for new habitat creation or restoration and link existing habitats as part of the development process?
	Will the option protect and enhance coastal and marine habitats and species?
	Will the option result in a change in the quality of habitats due to changes in groundwater/river water quality or quantity?
	Will the option affect riparian vegetation structure?
2. To ensure the appropriate and efficient use of land and protect soil quality and geodiversity	Will the option minimise the loss of best and most versatile agricultural land?
	Will the option protect and enhance soil health?
	Will the option minimise conflict with existing land use patterns?
	Will the option minimise land contamination?
	Will the option utilise previously developed (brownfield) land?
	Will the option protect and enhance protected sites designated for their geological interest and wider geodiversity?
3. To protect and enhance water quality and surface and groundwater resources and the ecological status of water bodies	Will the option minimise the demand for water resources?
	Will the option protect and improve surface water, groundwater and coastal water quality?
	Will the option result in changes to river flows?
	Will the option result in changes to groundwater levels?
	Will the option prevent the deterioration of Water Framework Directive (WFD) waterbody status (or potential)?
4. To reduce the risk of flooding	Will the option have the potential to cause or exacerbate flooding in the catchment area?
	Will the option have the potential to help alleviate flooding in the catchment area?
	Will the option enhance water infiltration and retention?
	Will the option be at risk of flooding or be affected by flooding, if it occurred?
5. To limit the causes and effects of climate change and increase resilience to the consequences of climate change	Will the option reduce vulnerability to the effects of climate change by appropriate adaptation?
	Will the option increase environmental resilience to the effects of climate change?
	Will the option reduce or minimise greenhouse gas emissions?
	Will the option deliver new infrastructure that is energy efficient or makes use of renewable energy sources?

SEA Objective	Guide Questions
6.To maintain and enhance the economic and social wellbeing of the local community	Will the option ensure sufficient infrastructure is in place for predicted population increases?
	Will the option create local employment opportunities?
	Will the option support the local and regional economy?
	Will the option ensure that an affordable supply of water is maintained and vulnerable customers protected?
	Will the option avoid disruption through effects on the transport network?
7.To ensure the protection and enhancement of human health	Will the option ensure the continuity of a safe and secure drinking water supply?
	Will the option ensure that surface water and bathing water quality are maintained within statutory standards?
	Will the option adversely affect human health by resulting in increased noise and/or adverse effects on air quality?
	Will the option affect opportunities for recreation and physical activity?
8. To promote the wise use of resources	Will the option minimise the demand for raw materials?
	Will the option lead to reduced leakage from the supply network?
	Will the option improve efficiency in water consumption?
	Will the option seek to minimise the demand for raw materials?
	Will the option reduce or minimise energy use?
	Will the option promote the re-use and recycling of waste materials and reduce the proportion of waste sent to landfill?
	Will the option promote the use of sustainable design and materials?
9. To conserve and enhance cultural and historic assets	Will the option conserve or enhance the historic environment, including heritage assets such as historic buildings, conservation areas, features, places and spaces, and their settings?
	Will the option conserve or enhance archaeological sites and/or remains?
	Will the option affect public access to, or enjoyment of, features of cultural heritage?
10.To conserve and enhance landscape character and other protected features	Will the option minimise adverse visual impacts?
	Will the option avoid adverse effects on, and enhance where possible, protected/designated landscapes (including woodlands), townscapes or seascapes such as National Parks-or AONBs be avoided?
	Will the option affect public access to existing landscape features?

4.4 Assessment Methodology

The SEA has used a three stage process to assess the effects of the draft and revised WRMP. The first stage is a high level assessment of all feasible (constrained) water management options (including supply side, demand side and leakage options) against the 12 SEA assessment objectives outlined in Table 4.3 with the findings presented in a summary matrix. The second stage is a more detailed assessment (where information permits) of the preferred options identified in the draft WRMP. For this stage, the potential effects (positive, negative or neutral) and the significance of the effects of each of the preferred options against each of the SEA objectives has been recorded, along with commentary setting out the reasons for the assessment results, any assumptions and uncertainties and, where appropriate, potential mitigation measures. The third stage is an assessment of the revised preferred options that, in combination, form Portsmouth Water's final proposed programme of options using the same assessment matrix as for stage two. Each stage is described in more detail below.

The SEA has used a three stage process to assess the effects of the draft and revised WRMP, complementary to the development of the plan itself. The first stage comprised a high level assessment of all feasible options (including supply, demand side and leakage options) against the 10 SEA assessment objectives outlined in **Table 4.2** with the findings presented in a summary matrix. The second stage is a more detailed assessment (where information permits) of the preferred options identified in the draft WRMP. For this stage, the potential effects (positive, negative or neutral) and the significance of the effects of each of the preferred options against each of the SEA objectives has been recorded, along with commentary setting out the reasons for the assessment results, any assumptions and uncertainties and, where appropriate, potential mitigation measures. The third stage is an assessment of the revised preferred options that, in combination, form Portsmouth Water's final proposed programme of options using the same assessment matrix as for stage two. In undertaking the assessment, regard has been had to relevant guidance, including extant guidance on the SEA of plans and programmes⁹⁶ and guidance on SEA and the historic environment.⁹⁷ Each stage is described in more detail below.

Feasible Options

Both the construction and operational effects of each feasible option were assessed against all of the SEA objectives. This approach recognises that many of the options under consideration within the draft and revised WRMP are likely to be very different in nature in their construction and operational phases. A matrix similar to that shown in **Table 4.3** was used to capture the assessment of each option in a consistent manner and a qualitative scoring system was adopted (see **Table 4.4**).

Table 4.3 Feasible (Constrained) Options Assessment Matrix

Option	Stage	Biodiversity	Geology and Soils	Water	Etc....	Commentary
Option Name	Construction	-	-	0		A description of the likely significant effects of the option on the SEA objectives during construction will be included here.
	Operation	+	0	++		A description of the likely significant effects of the option on the SEA objectives during operation will be included here.

⁹⁶ DCLG (2005) A Practical Guide to the Strategic Environmental Assessment Directive

⁹⁷ Historic England (December 2016) Sustainability Appraisal and SEA: Advice Note 8

Table 4.4 Qualitative Scoring System

Score	Description	Symbol
Significant Positive Effect	Significant positive effect of the Water Resources Management Plan option on this objective	++
Minor Positive Effect	Positive effect of the Water Resources Management Plan option on this objective	+
Neutral	Overall neutral effect of the Water Resources Management Plan option on this objective	0
Minor Negative Effect	Negative effect of the Water Resources Management Plan option on this objective	-
Significant Negative Effect	Significant negative effect of the Water Resources Management Plan option on this objective	--
No Relationship	There is no clear relationship between the Water Resources Management Plan option and the achievement of the objective or the relationship is negligible.	~
Uncertain	The Water Resources Management Plan option has an uncertain relationship to the objective or the relationship is dependent on the way in which the aspect is managed. In addition, insufficient information may be available to enable an assessment to be made.	?

Specific guidance was developed for what constitutes a significant effect, a minor effect or a neutral effect for each of the SEA objectives. These 'definitions of significance' helped to ensure a consistent approach to interpreting the significance of effects and will also help the reader understand the decisions made by the assessor. The proposed definitions of significance are set out in **Appendix D**.

Preferred Options

The feasible (constrained) options assessments, along with a range of other assessments, enabled Portsmouth Water to make an informed choice on which options to take forward as the preferred programme of option(s) that were included in the draft WRMP. The preferred options were then subject to more detailed assessment with the results recorded in a matrix similar to that shown in **Table 4.5**.

Table 4.5 Preferred Option Assessment Matrix

Objective	Guide Questions	Relationship		Commentary
		Construction	Operation	
1. To ensure the protection and enhancement of biodiversity, priority habitats and species	<ul style="list-style-type: none"> Will the option protect, and enhance where appropriate, priority species, habitats and sites designated for their nature conservation value? Will the option protect and enhance non-designated sites and local biodiversity? Will the option provide opportunities for new habitat creation or restoration and link existing habitats as part of the development process? Will the option protect, and enhance where appropriate, coastal and marine habitats and species? Will the option result in a change in the quality of habitats due to changes in groundwater/river water quality or quantity? 	-	0	<p>Effects of Construction A description of the likely significant effects of the option on the SEA objective during construction will be included here.</p> <p>Effects of Operation A description of the likely significant effects of the option on the SEA objective during operation will be included here.</p> <p>Mitigation Mitigation and enhancement measures will be outlined here.</p> <p>Assumptions Any assumptions made in undertaking the assessment will be listed here.</p> <p>Uncertainties Any uncertainties encountered during the assessment will be listed here.</p>

The commentary section of the matrices provides justification for how the assessment was reached (including, where relevant, why the assessment scoring differs from the assessment of the option as a feasible option) and includes consideration of the following:

- ▶ the nature of the potential effect (what is expected to happen);
- ▶ the timing and duration of the potential effect (e.g. short, medium or long term);
- ▶ the geographic scale of the potential effect (e.g. local, regional, national);
- ▶ the location of the potential effect (e.g. whether it affects rural or urban communities, or those in particular parts of the supply area);
- ▶ the potential effect on vulnerable communities or sensitive habitats;
- ▶ the reasons for whether the effect is considered significant;
- ▶ the reasons for any uncertainty, where this is identified; and
- ▶ the potential to avoid, minimise, reduce, mitigate or compensate for the identified effect(s) with evidence (where available).

The commentary section also includes details of any assumptions made during the assessment, uncertainties encountered and further measures that could mitigate adverse effects and enhance positive effects.

The revised preferred options were subject to the same more detailed assessment process with the results recorded in a matrix similar to that shown in **Table 4.5**.

4.5 Secondary, Cumulative and Synergistic Effects

The SEA regulations require that the cumulative effects of a plan or programme are taken into account. This includes the cumulative effects of the revised WRMP in combination with other plans and programmes.

The cumulative assessment considers the in-combination effects of the preferred options, planned to be implemented within the plan period 2020 to 2025. However, there is also the need for a cumulative assessment of the options that are likely to proceed over a longer time frame i.e. from 2025 onwards. This would necessarily be a high level assessment given the uncertainties around which other options would be implemented beyond 2025, and future unforeseen changes in the baseline environmental conditions.

The cumulative assessment considers the impact of the revised preferred option(s) set out in the revised WRMP with those in other relevant plans and programmes identified in **Section 2**. It is anticipated that the greatest potential for cumulative impacts will be from other water company WRMPs, especially where there is the potential for transfers between water company supply areas e.g. Southern Water or South East Water; and from other Portsmouth Water plans, such as the Drought Plan.

4.6 Difficulties Encountered

Quantitative information provided for each option (estimates of land take, yield value, deployable output, capital investment, duration and carbon emissions) have been provided to Amec Foster Wheeler by Portsmouth Water. These estimates have been reviewed as part of the assessment and have been assumed to be current and correct.

In undertaking the detailed assessments of feasible and preferred options it has been necessary to make some assumptions. An example of this is the use of embodied carbon estimates as a proxy for the amount of construction materials used in each option. Any assumptions made have been captured in the detailed options assessments.

Reflecting the strategic nature of the WRMP and SEA, for some supply side options exact site locations and pipeline routes are approximated at this stage whilst the final design of new infrastructure is unknown. However, the assessments of feasible and preferred options have been based on the best available information provided by Portsmouth Water and any assumptions used in the assessment have been highlighted where appropriate.

For some option types (e.g. leakage options), the location of works are not known at this stage and would (if taken forward) be subject to more detailed analysis during the implementation of the WRMP. In consequence, effects on some objectives such as biodiversity are uncertain for these options. Where this is the case, the assessment has reflected this uncertainty.

5. Assessment of Feasible Options

5.1 Introduction

Portsmouth Water has one WRZ for the Company's whole supply area, within which all available resources are shared and all customers experience the same risk from any shortage of water.

At dWRMP stage, Portsmouth Water had identified 21 feasible options. Following completion of the consultation on the draft WRMP, three unconstrained metering options that had not been taken forward on the grounds of lack of public acceptability were reassessed. As result of consultation responses, these three options were screened into the feasible option stage. In consequence, Portsmouth Water has identified a total of 24 feasible options for potential consideration in the revised WRMP. This included six supply options, eleven demand management options, four leakage and three drought options.

All of the options have been assessed using the framework and approach set out in **Section 4** to identify the likely environmental effects. A summary of the results of the assessment, by WRZ, are set out in this section with the full assessments contained in **Appendix E**.

5.2 Description of the Feasible Options

A brief description of each of the feasible options and their estimated yield is shown in **Table 5.1**.

Table 5.1 Descriptions of Feasible Options

Option Number	Option Name	Yield (MI/d)	Description
Supply			
R013	Havant Thicket Winter Storage Reservoir	23.0MI/d	This option would involve the development of a new pumped storage reservoir with a capacity of 8,800 MI on Portsmouth Water's land holding at Havant Thicket (170 ha.). Water would be sourced from the Source B spring source during the winter period and pumped to Havant Thicket Reservoir for use in the summer within the existing annual average licence of 98MI/d; specifically, the new reservoir would deliver 23 MI/d with a peak deployable output of 50 MI/d though this would be subject to the hands-off flows of Lake A and Stream A. Implementation of the scheme would also require a new c.8.4km single raw water main. It should be noted that both pumping stations and WTW at Source B would require minor refurbishments to increase peak output from 40 MI/d to 50 MI/d which would include new pumps, a large external standby generator, and a new DAF plant for the WTW. Treated output would then flow to Works A WTW which would direct water to Reservoir A via a new c.8.4km main and Reservoir B via a new c.4km main. In order to facilitate these secondary transfers to the service reservoirs, Works A WTW would require minor refurbishment/reinforcement to its suction main.
R021a	Source O DO Recovery	1.8MI/d	This option would increase deployable output from three boreholes at Source O which are connected by adits. The existing boreholes are connected with by horizontal adits which are at a relatively high shallow level; as the water level is drawn down in dry conditions the adit is exposed and sediment causes water quality problems. The proposed solution is to extend the casing at the top of Borehole No 2 to block off the adits, and then to deepen the borehole by 24 m so that it matches the depth of Borehole No 1. The borehole pump would then be re-installed at a lower level to give greater drought resilience. The ADO would increase from 3.7 MI/d to the recent actual figure of 5.5 MI/d and would remain within existing licence.
R022a	Source J Group –	12.5MI/d	This option would involve the development of two new boreholes at the existing Source J WTW site. The approximate locations of the two new boreholes would be within a 300m radius of the existing WTW and pumping station. The

Option Number	Option Name	Yield (MI/d)	Description
	Maximising DO		boreholes would be 140 m deep with additional pumps and new raw water mains (300m) connecting the boreholes to the existing raw water network. Implementation of the scheme would also require modifications to the WTW's treatment processes regarding additional chlorine and orthophosphoric acid treatment. Once operational, the new boreholes will abstract a cumulative 12.5 MI/d thus increasing the facility's overall abstraction volume from the existing DO of 10.2 MI/d to 22.7 MI/d which would remain within the peak existing licence (25.20 MI/d).
R023a	Source H DO Recovery	2.0MI/d	This option would increase DO from the Source H source which is currently constrained by water quality problems at higher flows. This option would involve cleaning the boreholes of sediment by air lifting following a maximum flow pumping test. Overall, this option would return the source AOD to the licence figure of 9.1 MI/d resulting in a yield benefit of 2 MI/d.
R024a	Source C DO recovery scheme	5.5MI/d	This option would primarily involve the infrastructural modification of Source C WTW's treatment process through the installation of disposable cartridge filters in order to reduce turbidity at the WTW. Implementation of the new disposable cartridge filters is expected to recover between 4MI/d (ADO) and 5.5MI/d (PDO).
R068	Source S drought permit	8.5MI/d	This option would involve increasing the licenced daily abstraction limit of Source S borehole and WTW from 2.5 MI/d to 11 MI/d under severe drought conditions via a new drought permit in order to provide an additional 8.5 MI/d for public consumption.
Customer Demand and Water Efficiency			
C005	Meter all households where a meter or meter box already exists	0.05MI/d	This option would involve the installation /upgrade of existing metering infrastructure to SMART meters within the premises of previously metered domestic customers over a 3 year implementation period in order to increase consumer awareness regarding water usage, and subsequently, reduce water demand and leakage. Of the 5,000 eligible recipients for this programme, it is assumed that 4,250 customers will avail the SMART metering upgrade.
C006	Metering on change of occupancy - all properties	4.68 MI/d	The option would involve the installation of meters into households that currently do not have a meter, on the change of ownership. It would require Portsmouth Water to be notified by a relevant authority at point of sale and given access to the property to install a new 'dumb' meter that would be read once every six months once installed. The option would start in 2025/26 and is assumed to go through to 2044/45 and an estimated 94,727 meters would be installed over the period. Implementation is assumed to achieve a 15% saving per annum in water use per property. It is anticipated that up to 4.68 MI/d of lost water would be saved following the implementation of this option.
C006a	Metering on change of occupancy – existing meter pits	0.28 MI/d	This option would involve the upgrade of existing metering infrastructure on a change of ownership, although it will still be a 'dumb' meter that would be read once every six months once installed. The option would start in 2020/21 and is assumed to go through to the rest of AMP7. It is estimated that 4,926 meters would be installed. Implementation is assumed to achieve a 15% saving per annum in water use per property. It is anticipated that up to 0.28 MI/d of lost water would be saved following the implementation of this option.
C069	Target occupants of new build housing with Smart meters & water efficiency advice	0.18MI/d	This option would involve the installation of SMART meters within the premises of new build residential dwellings (instead of basic metering units) in conjunction with the provision of water efficiency advice over a 5 year implementation period in order to increase consumer awareness and proactive behaviour regarding water usage which would, subsequently, reduce water demand and leakage. It is assumed that 10,000 new build properties will be targeted for SMART meter installation and water efficiency advice.

Option Number	Option Name	Yield (MI/d)	Description
C075	Smart metering - replacing existing household water meters & provide water efficiency audit and advice	1.40MI/d	This option would involve the upgrading of existing metering infrastructure to SMART meters within the premises of previously metered domestic customers while simultaneously providing water audits (including water efficiency retrofits) and water efficiency advice. It is expected implementation of the option will improve consumer awareness and proactive behaviour regarding smart and sustainable consumption which would, subsequently, reduce water demand and leakage within the Portsmouth Water District Metering Zone (DMZ). Within the 10 year implementation period, it is predicted that 105,725 customers will be targeted for SMART metering installation, auditing, and the provision of water efficiency advice.
Water Efficiency			
C026	Subsidy to customers that purchase water efficient appliances (washing machines and dishwashers, showers and WCs)	0.09MI/d	This option would involve the provision of financial subsidies (10% reduction on measured bills over 3 years) in conjunction with customer awareness programmes and basic water audits in order to incentivise/accelerate the replacement of aging inefficient appliances (washing machines, dishwashers, showers, and WCs) with more water-efficient models. Within the 3 year implementation period, it is predicted that up to 2,300 measured domestic households will avail of this scheme.
C034	Water saving devices – Retrofitting existing toilets (with flush >9l)	0.11MI/d	This option would involve the retrofitting of toilets in household properties to replace existing higher volume flush mechanisms with one free dual flush mechanism, reducing demand for water. The assumption is that this option would reduce the flush per use rate from 9l to 5l. Households would also be offered information on the potential benefits to water bills and on the performance of the retrofit. The device would be installed by Portsmouth Water. Within the 3 year implementation period, it is predicted that up to 951 eligible measured domestic households will avail of this scheme.
C040	Water Saving Devices – Spray Taps	0.07MI/d	This option would involve the provision of one free pair of replacement spray taps in conjunction with an initial information campaign by Portsmouth Water and partners in order to incentivise/accelerate the replacement of inefficient higher flow non-spray taps. Within the 5 year implementation period, it is predicted that up to 3,400 spray taps would be installed per annum (17,000 total) within eligible domestic households.
C043	Water saving devices - Trigger nozzles & water butts	0.06MI/d	This option would involve the provision of hosepipe trigger nozzles and water butts in conjunction with regular annual messages about long-term sustainable garden care for metered customers owning garden space whom do not already own this equipment. It is expected that implementation of this option would reduce the need for customers to connect to water mains in respect of garden care thus decreasing water demand and 'freeing-up' resources for other customers. Within the 3 year implementation period, it is predicted that 4,440 nozzles and 3,330 water butts will be provided to eligible customers.
C046	Household water efficiency programme (Partnering approach, home visit)	1.23MI/d	This option would involve the provision of water audits and the installation of water efficiency equipment for all existing Portsmouth Water customers, metered or unmetered, through a partnership-based implementation programme. Within the 5 year implementation period, it is predicted that 16,500 social housing units will be eligible for auditing and provision of water efficiency equipment whereas 50% of metered private dwellings and 20% of unmetered properties will agree to participate in the scheme.
C084	Void metering	0.28 MI/d	This option involves the installation of external meters (and assumes that there is no access to properties with no occupant). Metering voids enables better assessments of leakage and estimates of illegal use from void properties. The option would start in 2020/21 and runs through to 2044/45 and is estimated that 5,672 meters would be installed. It is anticipated that up to 0.28 MI/d of lost water would be saved following the implementation of this option.

Option Number	Option Name	Yield (MI/d)	Description
Leakage			
D004a	Leak detection - Deploy permanent noise loggers (25% coverage)	4.9MI/d	This option would involve the installation of magnetic acoustic loggers within the water network which would, following a period of calibration, detect and pinpoint any emerging leakages within the network in order to reduce detection costs, leak run times and safety hazards for personnel. This would cover approximately 25% of the network, located in leakage 'hotspot' areas. There would be a fortnightly collection of data from data loggers leading to approximately 10,600km per annum of distance travelled.
D004b	Leak detection - Deploy permanent noise loggers (75% coverage)	9.8MI/d	This option would involve the installation of magnetic acoustic loggers within the water network which would, following a period of calibration, detect and pinpoint any emerging leakages within the network in order to reduce detection costs, leak run times and safety hazards for personnel. This would cover approximately 75% of the network, located across the network. There would be a fortnightly collection of data from data loggers leading to approximately 29,400km per annum of distance travelled.
D005	Leak detection - Partial district metering	5.0MI/d	The option would involve the installation of additional district meters throughout the distribution network leading to partial coverage over a 4 year implementation period. The partial expansion of district metering would enable an increased detection rate of leakage within Portsmouth Water's distribution network via improved flow monitoring. Active leakage control (ALC) operations would subsequently follow the installation of the additional meters in respect of identifying, reducing, and maintaining network leakages.
D011	Leak detection - Full district metering	10.0MI/d	The option would involve the installation of additional district meters throughout the distribution network leading to full coverage over a 10 year implementation period. The full expansion of district metering would enable an increased detection rate of leakage within Portsmouth Water's distribution network via improved flow monitoring. Active leakage control (ALC) operations would subsequently follow the installation of the additional meters in respect of identifying, reducing, and maintaining network leakages.
Drought			
C078	Drought: Voluntary restraint & leakage action	4.3MI/d	This option would involve enhanced public awareness campaigns aimed at domestic and commercial customers during periods of drought concerning the benefits of water use restraint on supply and the natural environment. It is expected that public awareness campaigns would improve proactive behaviour regarding smart and sustainable consumption: reducing the use of water appliances (toilet flushes, shower durations, washing machines, etc.), reducing and/or eliminating non-essential water use (vehicle washing, window washing, garden watering, hot tubs, etc.), and prioritising the identification/repair of leakages within private properties. Simultaneously, Portsmouth Water would expand active leakage control (ALC) operations in order to enhance find and fix rates, accelerate response time, and increase leak volume threshold.
C079	Drought: Mandatory restraint	8.3MI/d	This option would involve the provision of a significant media campaign aimed at non-domestic commercial customers concerning the justification of mandatory restraint actions during periods of drought and how customers can achieve compliance. By permission of Drought Directions 2011, implementation of this option would simultaneously prohibit: garden watering on commercial property, maintenance of commercial swimming pools and ponds, vehicle cleaning, washing of commercial premises, windows, and industrial plant, suppressing dust, and operating unoccupied cisterns.
C80	Imposition of Drought Direction Restrictions (mandatory)	8.1MI/d	This option would involve the implementation of a mandatory restriction of non-critical water uses (as listed in the Drought Direction 2011) aimed at commercial customers during periods of severe drought. In order to facilitate compliance with the water restrictions, telephone hotlines would be organised for customers to report banned usages in conjunction with active site monitoring by operational teams whilst undertaking ongoing business.

Option Number	Option Name	Yield (MI/d)	Description
	commercial restraint)		

5.3 Feasible Options Assessment

Supply feasible options

A table summarising the assessments of the supply feasible options is presented in **Table 5.2**.

Construction Effects

The implementation of Option R013 would exceed £10m in capital investments regarding the construction of Havant Thicket impounding reservoir (IR) which is expected to generate supply chain benefits and a number of employment opportunities as well as increased spend in the local economy by contractors and construction workers. Notwithstanding, HGV movements associated with the development of Havant Thicket IR have the potential to cause traffic disruption within the public road network. Consistent with the definitions of significance (see **Appendix D**), Option R013 has been assessed as having a mixed significant positive and minor negative effect on SEA Objective 6. No further significant or minor positive effects were identified during the assessment of the construction of options.

Given the scale of activity associated with the construction of Havant Thicket IR, Option R013 was assessed as having a significant negative effect on climate change (SEA Objective 5). This reflects the anticipated emissions of greenhouse gases from vehicle movements, construction plant, and the embodied carbon in raw materials which would collectively produce up to 20.4k tCO₂e. Similarly, the magnitude of change resulting from the ongoing construction of Havant Thicket IR is expected to have a significant negative effect on the surrounding landscape (SEA Objective 10) as recreational and residential receptors may perceive the works as adversely impacting the visual amenity associated with the proximate South Down National Park's setting in addition to altering the local greenfield setting and character.

A significant negative effect against flood risk (SEA Objective 4) was identified for Option R023a. The source boreholes and pumping station where works would be undertaken are located in Flood Zone 3 associated with the River Meon. In consequence activities would be at risk of flooding (1 in 100 or greater annual probability of river flooding); however, the risks of this could be reduced through timing of the proposed activities. No other options were assessed as having an effect on the flood risk (SEA Objective 4).

No further significant negative effects were identified during the assessment of the construction of options.

Option R013 was assessed as having a minor negative effect on biodiversity (SEA Objective 1) during the construction phase. The proposed reservoir site, new pipelines, and ancillary infrastructure modifications are not situated within or immediately adjacent to any European designated conservation sites; however, there are several SACs/SPAs/Ramsars within 5km of the scheme: Chichester and Langstone Harbours Ramsar/SPA/SSSIs, Solent Maritime SAC, Solent and Isle of Wight Lagoons SAC, and Portsmouth Harbour Ramsar/SPA/SSSI. It is considered unlikely that excavation or construction of the reservoir would have any significant effects on the priority interest features of these sites due to a lack of clear impact pathways. Furthermore, construction of the reservoir in addition to excavation across Hermitage Stream may indirectly introduce pollution/debris within the stream although site specific mitigation and established best practice should prevent significant effects to both local ecosystems and the harbours. In general, implementation would result in a significant loss of semi-rural greenfield land and woodland. Construction could therefore result direct habitat loss, in addition to temporary localised effects on protected species within the vicinity. Portsmouth Water is, however, making substantial efforts to develop appropriate mitigation measures in partnership with Natural England and guided by an agreed set of mitigation principles.

Construction of the Option R013 would involve a significant loss of semi-rural greenfield land; however, land-take would consist of Grade 4 and non-agricultural land which is considered poor soil quality. The construction/refurbishment of ancillary infrastructure would be situated on previously developed land

whereas the proposed excavation routes would primarily underlie the road network (urban classified land) or non-agricultural land. Disturbed land would, however, be reinstated following the completion of construction. On balance, this option has been assessed as having a negative effect on SEA Objective 2.

Options R21a, R22a and R23a have been assessed as having potentially negative effects against climate change (SEA Objective 5). The development of two new boreholes for Option R022a would involve comparatively limited works (drilling and casing the boreholes) and the estimated associated carbon emissions (156 tCO₂e) are assessed as having a negative effect on climate change. The scale of construction of R021a and R023a is potentially very limited and localised so whilst negative effects have been identified (associated with embodied carbon in construction materials and carbon emissions from vehicle movements), there remains some uncertainty.

The implementation of Options R013, R021a, R022a and R023a would require new infrastructure and energy requirements, however, a majority of material used in the construction of Havant Thicket IR (R013) would be sourced on-site which would help reduce adverse effects resulting from resource use whereas the scale of construction associated with R022a would be minor, and in the case of R021a and R023a potentially so small as to be negligible. Noting the uncertainties for options R021a and R022a, all four options have been assessed as having a minor negative effect on resource use (SEA Objective 8).

Construction of Havant Thicket IR (R013) in addition to associated excavation and infrastructural modification may affect human health due to the potential for emissions from HGV movements and construction plant together with noise/vibration to affect residential and other receptors in close proximity to development sites and along transport routes. However, any impact would be temporary and would likely to be managed through the adoption of good construction practice. Option R013 has therefore been assessed as having a negative effect on SEA Objective 7. Depending on the locations of the two new boreholes for Option R022a, construction may result in temporary disturbance and nuisance to proximate residential receptors although this remains uncertain due to the minor scale of works.

The southern section of the proposed Havant Thicket IR site (R013) is designated as part of the Sir George Staunton Registered Park and Gardens (Grade II listed) which would be directly affected by construction. It is expected that site-specific mitigation and best practice would minimise negative effects on the setting of the historical assets. Additionally, there are approximately 28 Grade II / II* Listed Buildings situated along the proposed excavation routes with 14 assets under 50m. Overall, this option has been assessed as having a negative effect on cultural heritage (SEA Objective 9).

The works required for Option R022a (a drilling rig and other plant/machinery) to construct the borehole headworks and transfer pipelines is considered likely to have short term adverse impacts on local residents who may perceive the increased presence of heavy equipment and materials within the greenfield setting as adversely impacting the local landscape character. Overall, this option has been assessed as having a minor negative effect on Objective 10.

All options were assessed as having a neutral effect in respect of water quantity and quality (SEA Objective 3) during the construction phase. Whilst a number of options would involve works in close proximity to/within watercourses, it is not expected that construction activity would affect water quality or water resources, provided good practices are adhered to and mitigation implemented (such as dust suppression, soil containment and emergency response procedures).

Operational Effects

All of the feasible supply side options were assessed as having a positive effect on health (SEA Objective 7) and wellbeing (SEA Objective 6) as their operation would not adversely affect human health due to increased noise, nuisance or disruption. The yields would also help to ensure the continuity of a safe and secure drinking water supply which may in-turn support economic and population growth. In the case of Options R013, the new reservoir could potentially provide new social and recreational facilities and activities in addition to increasing foot traffic within Portsmouth which could provide a minor economic boost to local businesses. Due to the yields, Options R013 (23 Ml/d) and R022a (12.5 Ml/d) have been assessed as having significant positive effects on these objectives. No further significant positive operational effects were identified during the assessment.

Options R013 and R068 were assessed as having a positive effect on climate change (SEA Objective 5) as they would increase resilience to climatic and environmentally driven supply restrictions in the region due to forecasted hotter/drier summers. Option R024a would also support improved climate change

resilience/adaptation through increased water efficiency; however, new treatment infrastructure would have an operational energy demand of 401,500 kWh/a and produce up to 141 tCO₂e per annum. R024a has therefore been assessed as having a mixed minor positive and negative effect on both climate change and resource use (SEA Objective 8).

The new Havant Thicket IR (R013) would provide flood storage which, in respect of increased uncertainty over future weather patterns, may assist in providing greater management of storm inflows thus having a minor positive effect on flood risk (SEA Objective 4). Additionally, the new reservoir may help contribute to the creation of a new habitat (wetlands) which could benefit birds using Chichester, Langstone, and Portsmouth harbours (e.g. to provide a safe roost for birds displaced by human activity). Similarly, mitigation measures implemented during the construction period are expected to help assimilate the new landscape changes within the local setting while also potentially providing minor benefits such that proximate residential receptors will not perceive operation as adversely altering the wider landscape character of the area. Overall, the operation has been assessed as having minor positive effects on both biodiversity (SEA Objective 1) and landscape (SEA Objective 10) though uncertainty remains regarding the magnitude of benefit. No further positive operational effects were identified during the assessment. No further significant negative effects were identified during the assessment.

The operation of the feasible options would require energy associated with the treatment and pumping of water. Options R013 and R022a would result in increased operational energy demands, 259,500 kWh/year and 657,000 kWh/a, respectively, which have been assessed as having negative effects on resource use (SEA Objective 8). In conjunction with the 657,000 kWh/a energy demand, Option R022a would also produce 230 tCO₂e which, consistent with the definitions of significance contained in **Appendix D**, has been assessed as having a minor negative effect on climate change (SEA Objective 5). For options R021a and R023a, operational energy from pumping the increased volume of water has not been determined at this stage, although it is anticipated to be very low, in consequence resulting in the mixed neutral and uncertain assessments for SEA Objectives 5 and 8.

The operation of R023a would be with the current abstraction licence. However, this option could have a negative effect on the lower reaches of the River Meon during periods of low flow in combination with existing abstractions for spray irrigation, which could affect biodiversity and water quality. On this basis, whilst within licensed amount, the operation of this option is assessed as having an uncertain effect on biodiversity (SEA Objective 1) and on water quality and quantity (SEA Objective 3) until further investigation is conducted.

The operation of Option R068 during times of severe drought may potentially exacerbate the effects of drought on the local water system regarding supply and recovery. Furthermore, the additional abstraction of up to 8.5 Ml/d could also adversely impact Arundel Park SSSI and its range of ecological features due to their shared groundwater supply though the magnitude of effect remains uncertain. Operation of R068 has therefore been assessed as having a negative effect on water quantity and quality (SEA Objective 3) and biodiversity (SEA Objective 1) though uncertainty remains until further investigation is conducted. It should be noted that operational effects of R022a on biodiversity have been assessed as neutral though uncertainty remains regarding whether increased abstraction could affect proximate conservation sites whose interest features depend on groundwater resources.

Once operational, it is not expected that any of the feasible options would have any beneficial or adverse impacts on either geology and soils (SEA Objective 2) or cultural heritage (SEA Objective 9); the one exception to this being Option R068 which was assessed as having a neutral though uncertain effect on cultural heritage due to the potential for 'dewatering' of archaeological deposits during times of severe drought.

Table 5.2 Supply Feasible Options Assessment Summary

Ref	Option	Construction (C) or Operation (O)	1. Biodiversity	2. Geology and Soils	3. Water Quantity and Quality	4. Flood Risk	5. Climate Change	6. Economic and Social Wellbeing	7. Human Health	8. Waste and Resources	9. Cultural Heritage	10. Landscape
R013	Havant Thicket Winter Storage Reservoir'	C	-	-	0	0	--	++/-	-	-	-	--
		O	+/?	0	0	+	+	++	++	-	0	+/?
R021a	Source O DO Recovery	C	0	0	0	0	?/-	0	0	-	0	0
		O	0	0	0	0	0/?	+	+	0/?	0	0
R022a	Source J Group – Maximising DO	C	0	0	0	0	-	0	0/?	-	0	-
		O	0/?	0	0	0	-	++	++	-	0	0
R023a	Source H DO Recovery	C	0	0	0	--	-/0/?	0	0	-	0	0
		O	?	0	?	0	0/?	+	+	0/?	0	0

Ref	Option	Construction (C) or Operation (O)	1. Biodiversity	2. Geology and Soils	3. Water Quantity and Quality	4. Flood Risk	5. Climate Change	6. Economic and Social Wellbeing	7. Human Health	8. Waste and Resources	9. Cultural Heritage	10. Landscape
R024a	Source C DO recovery scheme	C	0	0	0	0	0	0	0	0	0	0
		O	0	0	0	0	+/-	+	+	+/-	0	0
R068	Source S drought permit	C	0	0	0	0	0	0	0	0	0	0
		O	-/?	0	-/?	0	+	+	+	0	0/?	0

Demand and water efficiency feasible options

A table summarising the assessments of the customer demand feasible options is presented in **Table 5.3**.

Construction Effects

Expenditure associated with the enabling works necessary for the demand management options would be relatively small and would therefore be unlikely to have a substantive impact in terms of supply chain benefits. It is also more likely that any additional work would be accommodated in existing employees' or contractors'/partners' workloads such that employment opportunities are likely to be limited. In consequence, the feasible demand management options identified for the Portsmouth Water District Management Zone (DMZ) were assessed as having either neutral or minor positive effects on wellbeing (SEA Objective 6). However, expenditure related to Options C006 and C075 could be of a scale that may generate substantial benefit to local economic and community wellbeing through utilisation of the local road network as transportation corridors regarding vehicle movements may result in minor disruption of mobility thus a mixed significant positive and minor negative effect on this objective has been identified.

Apart from Options C006 and C075, no further significant positive effects were identified during the assessment of the enabling/installation and implementation works associated with the demand management options.

Implementation of the demand management options would require different amounts of raw materials, energy and carbon. As the majority of options would require engineers and/or Portsmouth Water partners/representatives to conduct audits, provide water efficiency advice, and/or retrofit premises with water efficient equipment and metres, there would also be greenhouse gas emissions related to vehicle movements. Additionally, the provision and installation of new SMART meters and water efficiency equipment, e.g. dual flush retrofits, spray taps, trigger nozzles, and water butts, would generate carbon emissions arising from embodied carbon. Emissions associated with D006 and C075 would exceed 1,000 tCO₂e and consistent with the definitions of significance (see **Appendix D**), was assessed as having a significant negative effect on climate change (SEA Objective 5) as well as resource use (SEA Objective 8). Four remaining metering options, C006a, C005, C069 and C084, would produce emissions up to 354 tCO₂e, which were assessed as having a minor negative effect on climate change and resource use. Emissions/resource use associated with the remaining demand management options would be very small and these options were therefore assessed as having a neutral effect on these SEA objectives.

No further effects were identified during the assessment.

Environmental effects associated with the implementation phase of the feasible demand management options on the remaining SEA objectives are likely to be very similar. None of the options identified would involve significant structural development, and where water efficiency devices and SMART metering are installed, this would take place within the curtilages of existing properties. In consequence, none of the options would be expected to have noticeable effects on biodiversity (SEA Objective 1), geology and soils (SEA Objective 2), water quantity and quality (SEA Objective 3), flood risk (SEA Objective 4), health (SEA Objective 7), cultural heritage (SEA Objective 9), and landscape (SEA Objective 10).

Operational Effects

Demand reductions may reduce greenhouse gas emissions and energy use associated with reduced treatment and pumping of water and lower energy use from heating water in the home. Energy savings and emission reductions associated with Option C006 were estimated at 2,516 tCO₂e per annum and significant positive effects against climate change (SEA Objective 5) were assessed. Reflecting the energy saved, a significant positive effect was also recorded against resource use (SEA Objective 8).

All other identified operational effects are assessed as minor.

Demand reductions associated with the operation of water efficient devices and metering as well as increased water efficiency as a result of more engaged behaviour regarding smart and conscientious water consumption in the Portsmouth Water DMZ would generate savings of between 0.005 Ml/d and 4.68 Ml/d. No identified options would generate savings in excess of 5 Ml/d; therefore, consistent with the definitions of

significance (see **Appendix D**), all options (except C006) were assessed as having a minor positive effect on water quantity and quality (SEA Objectives 3) and resource use (SEA Objective 8).

Options C006a, C046, C075 and C084 would lead to reductions of up to 722 tCO₂e per annum associated with reduction in energy use (although for C046 and C075 these savings would gradually decline over time) and for these options, positive effects were identified in respect of climate change (SEA Objective 5). The remaining identified options would not exceed 100 tCO₂e in operational carbon savings, and therefore, were assessed as having a neutral effect on this objective.

Savings associated with the reduction water demand, and subsequently, network leakage, through increased water efficiency would help ensure a continual supply of clean drinking water and may additionally support local economic/population growth. Options C006, C046 and C075 would generate savings up to 4.68MI/d, 1.23 MI/d and 1.40 MI/d, respectively, which has been assessed as having minor positive effects on health (SEA Objective 7) and wellbeing (SEA Objective 6). Savings associated with the remaining options would be relatively small (0.005 MI/d and 0.18 M/d) and were therefore assessed as having a neutral effect on SEA Objectives 7 and 6.

No further effects, including significant or minor negative, were identified during the assessment.

Once installed, the feasible demand management options are considered unlikely to have any beneficial or adverse environmental effects; consequently, all options were assessed as having a neutral effect on biodiversity (SEA Objective 1), geology and soils (SEA Objective 2), flood risk (SEA Objective 4), cultural heritage (SEA Objective 9), and landscape (SEA Objective 10).

Table 5.3 Customer Demand and Water Efficiency Feasible Options Assessment Summary

Ref	Option	Construction (C) or Operation (O)	1. Biodiversity	2. Geology and Soils	3. Water Quantity and Quality	4. Flood Risk	5. Climate Change	6. Economic and Social Wellbeing	7. Human Health	8. Waste and Resources	9. Cultural Heritage	10. Landscape
C005	Meter all households where a meter or meter box already exists	C	0	0	0	0	-	0	0	-	0	0
		O	0	0	+	0	0	0	0	+	0	0
C006	Metering on change of occupancy – existing meter pits	C	0	0	0	0	--	++/-	0	--	0	0
		O	0	0	+	0	++	+	+	++	0	0
C006a	Metering on change of occupancy – existing meter pits	C	0	0	0	0	-	0	0	-	0	0
		O	0	0	+	0	+	0	0	+	0	0
C026	Subsidy to customers that purchase water efficient appliances (washing machines and dishwashers, showers and WCs)	C	0	0	0	0	0	0	0	0	0	0
		O	0	0	+	0	0	0	0	+	0	0
C034	Water saving devices - Retrofitting existing toilets (with flush >9l)	C	0	0	0	0	0	0	0	0	0	0

Ref	Option	Construction (C) or Operation (O)	1. Biodiversity	2. Geology and Soils	3. Water Quantity and Quality	4. Flood Risk	5. Climate Change	6. Economic and Social Wellbeing	7. Human Health	8. Waste and Resources	9. Cultural Heritage	10. Landscape
	Target metered customers	O	0	0	+	0	0	0	0	+	0	0
C040	Water saving devices – Spray Taps	C	0	0	0	0	0	0	0	0	0	0
		O	0	0	+	0	0	0	0	+	0	0
C043	Water saving devices - Trigger nozzles & water butts	C	0	0	0	0	0	0	0	0	0	0
		O	0	0	+	0	0	0	0	+	0	0
C046	Household water efficiency programme (Partnering approach, home visit)	C	0	0	0	0	0	0	0	0	0	0
		O	0	0	+	0	+	+	+	+	0	0
C069	Target occupants of new build housing with Smart meters & water efficiency advice	C	0	0	0	0	-	0	0	-	0	0
		O	0	0	+	0	0	0	0	+	0	0

Ref	Option	Construction (C) or Operation (O)	1. Biodiversity	2. Geology and Soils	3. Water Quantity and Quality	4. Flood Risk	5. Climate Change	6. Economic and Social Wellbeing	7. Human Health	8. Waste and Resources	9. Cultural Heritage	10. Landscape
C075	Smart metering - replacing existing household water meters & provide water efficiency audit and advice	C	0	0	0	0	--	++/-	0	--	0	0
		O	0	0	+	0	+	+	+	+	0	0
C084	Void metering	C	0	0	0	0	-	0	0	-	0	0
		O	0	0	+	0	+	0	0	+	0	0

Leakage feasible options

A table summarising the assessments of the leakage feasible options is presented in **Table 5.4**.

Construction Effects

Significant negative effects are associated with the construction phase of one option (D011: the installation of district meters and subsequent ALC operations) against climate change (SEA objective 5) and resource use (SEA Objective 8).

Overall, it is expected that implementation of option D011 would result in a large quantity of carbon emissions (depending on the volume of meters/valves installed and/or replaced, length of pipeline targeted for leakage repair, and the intensity of movement throughout the DMZ) which has been assessed as having a significant negative effect on climate change (SEA Objective 5).

Option D011 comprises several infrastructural components including new meters, ancillary valves, and piping which would require a substantial volume of raw materials and energy to implement. Material use and energy requirements are considered to be large, and the option has therefore been assessed as having a significant effect on sustainable resource use (SEA Objective 8). Furthermore, this option would generate construction wastes which may include excavation waste and infrastructural waste (original piping and meters) in addition to fuel usage for vehicles and plant.

Minor negative effects (with some uncertainty) are assessed against health (SEA Objective 7) for options D004b, D005 and D011. This reflects the identification and repair of network leakages which may result in minor localised adverse effects on human health regarding noise disturbance and adverse air quality impacts (dust) depending on the scale, duration, and proximity of the works to sensitive receptors.

Options D004b and D011 involve substantial capital investment which could generate a number of employment opportunities and supply chain benefits (e.g. associated with the supply of raw materials and appointment of contractors to undertake the works) which have been assessed as having a positive effect on local economic and social wellbeing (SEA Objective 6) though uncertainty remains regarding residual effects on mobility and road access.

Operational Effects

Once installed and in operation, all the options were assessed as having positive effects.

Two of the options (D004a and D011) would generate savings in excess of 5 Ml/d; therefore, consistent with the definitions of significance, both were assessed as having a significant positive effect on resource use (SEA Objective 8).

All options were assessed as having a minor positive effect on water quantity and quality (SEA Objectives 3).

Leakage reductions would be anticipated to reduce greenhouse gas emissions and energy use associated with reduced treatment and pumping of water and lower energy use from heating water in the home. Energy savings and emission reductions ranged from 26 tCO₂e/a to 765 tCO₂e/a, and for all these options, positive effects have been identified in respect of climate change (SEA Objective 5). In addition, it was noted that by reducing leakage and increasing water supply, the options were positively contributing to climate change resilience.

Savings associated with the network leakage arising from all the options would help ensure a continual supply of clean drinking water and may additionally support local economic/population growth. In consequence all the options were assessed as having minor positive effects on wellbeing (SEA Objective 6) and health (SEA Objective 7).

No further effects, including significant or minor negative, were identified during the assessment.

Once installed, the feasible demand management options are considered unlikely to have any other beneficial or adverse environmental effects; consequently, all options were assessed as having a neutral effect on biodiversity (SEA Objective 1), geology and soils (SEA Objective 2), flood risk (SEA Objective 4), cultural heritage (SEA Objective 9), and landscape (SEA Objective 10).

Table 5.4 Leakage Feasible Options Assessment Summary

Ref	Option	Construction (C) or Operation (O)	1. Biodiversity	2. Geology and Soils	3. Water Quantity and Quality	4. Flood Risk	5. Climate Change	6. Economic and Social Wellbeing	7. Human Health	8. Waste and Resources	9. Cultural Heritage	10. Landscape
D004a	Leak detection - Deploy permanent noise loggers (25% coverage)	C	0/?	0	0	0	0/?	0	0/?	0	0	0
		O	0	0	+	0	+	+	+	+	0	0
D004b	Leak detection - Deploy permanent noise loggers (75% coverage)	C	0/?	0	0	0	0/?	+	-/?	0	0	0
		O	0	0	+	0	+	+	+	++	0	0
D005	Leak detection - Partial district metering	C	0/?	0	0	0	-	0	-/?	-	0	0/?
		O	0	0	+	0	+	+	+	+	0	0
D011	Leak detection - Full district metering	C	0/?	0	0	0	--	+/?	-/?	--	0	0/?
		O	0	0	+	0	+	+	+	++	0	0

Drought feasible options

A table summarising the assessments of the drought feasible options is presented in **Table 5.5**.

Construction Effects

There were no significant or minor positive effects identified during the assessment of the implementation works associated with the drought management options which reflects the options' dependency on knowledge transference to encourage sustainable behaviour in addition to the activation of the statutory Drought Directions 2011 to facilitate the cessation of non-critical water consumption by domestic and commercial customers.

The ALC operation, leakage investigation and reduction activity, included within the scope of C078 is expected to be minor and within short duration. Notwithstanding, the cumulative impacts of noise/vibration disturbance and air quality impacts (dust) resulting from excavation and the transportation of equipment/material may adversely affect human health depending on the scale, duration, and proximity of the works to sensitive receptors. Consequently, implementation of C078 has been assessed as having an uncertain though potentially minor negative effect on health (SEA Objective 7).

No further effects were identified during the assessment.

Environmental effects associated with the implementation phase of the feasible drought management options on the remaining SEA objectives are likely to be very similar. It should be noted, however, that implementation of C078, regarding ALC operation, does have a degree of uncertainty regarding potential effects on biodiversity (SEA Objective 1) and landscape (SEA Objective 10). Specifically, leakage investigation and reduction activity may encompass a wide combination of urban, semi-rural, and rural settings which could have a range of effects on biodiversity (localised noise disturbance, and adverse air quality impacts) and protected/designated landscapes regarding visual amenity and local character. Pipeline repair/replacement works would likely, however, focus on areas where the distribution network is most dense (under roads, tracks, and/or footpaths) which should limit impact pathways to sensitive focal features. Furthermore, targeted sites would have been previously disturbed during the initial installation of the pipelines such that it is assumed site-specific mitigation procedures have already been established.

Overall, none of the options would be expected to have noticeable effects on geology and soils (SEA Objective 2), water quantity and quality (SEA Objective 3), flood risk (SEA Objective 4), climate change (SEA Objective 5), economic and social wellbeing (SEA Objective 6), waste and resources (SEA Objective 8), and cultural heritage (SEA Objective 9).

Operational Effects

The operation of C079 and C80 would lead to a reduction of water demand by domestic and commercial customers through the restriction of non-critical water uses should facilitate a water saving of up to 8.1 Ml/d to 8.3 Ml/d which could subsequently provide capacity elsewhere during times of drought. In addition, there would be operational carbon savings associated with reduced treatment and pumping of water. These options have therefore been assessed as having significant positive effects on the sustainable use of resources (SEA Objective 8). No further significant positive effects were identified during the assessment.

Consistent with the definitions of significance (see **Appendix D**), all options were assessed as having a minor positive effect on water quantity and quality (SEA Objectives 3) whereas C078 was also assessed as having a minor positive effect on sustainable resource use (SEA Objective 8).

Demand reductions may reduce greenhouse gas emissions and energy use associated with reduced treatment and pumping of water. Energy savings and emission reductions associated with the feasible drought management options would range from 10.7 tCO₂e to 38.4 tCO₂e per annum (on average over the first ten years of operation, although savings would gradually decline over time) which were identified as having a minor benefit. The options would, however, generate benefits in respect of climate change adaptation (drought resilience). On balance, all options were identified as having minor positive effects on climate change (SEA Objective 5).

Savings associated with the reduction water demand, and subsequently, network leakage, through increased water efficiency would help ensure a continual supply of clean drinking water and may additionally support

local economic/population growth during times of drought. The operation of all feasible drought management options would generate savings in between 1 Ml/d and 10 Ml/d which have been assessed as having (minor) positive effects on health (SEA Objective 7) and wellbeing (SEA Objective 6).

No further effects, including significant or minor negative, were identified during the assessment.

Once installed, the feasible drought management options are considered unlikely to have any beneficial or adverse environmental effects; consequently, all options were assessed as having a neutral effect on biodiversity (SEA Objective 1), geology and soils (SEA Objective 2), flood risk (SEA Objective 4), cultural heritage (SEA Objective 9), and landscape (SEA Objective 10).

Table 5.5 Drought Feasible Options Assessment Summary

Ref	Option	Construction (C) or Operation (O)	1. Biodiversity	2. Geology and Soils	3. Water Quantity and Quality	4. Flood Risk	5. Climate Change	6. Economic and Social Wellbeing	7. Human Health	8. Waste and Resources	9. Cultural Heritage	10. Landscape
C078	Drought: Voluntary restraint & leakage action	C	0/?	0	0	0	0	0	-/?	0	0	0/?
		O	0	0	+	0	+	+	+	+	0	0
C079	Drought: Mandatory restraint	C	0	0	0	0	0	0	0	0	0	0
		O	0	0	+	0	+	+	+	++	0	0
C80	Imposition of Drought Direction Restrictions (mandatory commercial restraint)	C	0	0	0	0	0	0	0	0	0	0
		O	0	0	+	0	+	+	+	++	0	0

6. Assessment of the Revised Preferred Options

6.1 Introduction

The process for developing a WRMP includes a clear series of steps to balance the need to develop solutions that are technically feasible, cost-effective, and take into account the impacts on the community and environment.

Informed by the environmental, social and economic assessments and ongoing discussion with stakeholders, the list of feasible options was refined to identify the preferred options included in the draft WRMP. Following consultation on the draft WRMP and the responses from the regulators and consultees, further changes were made to the WRMP, which led to revisions of the preferred options.

In selecting the final planning solution, Portsmouth Water has sought to balance the expectations of customers, the needs of the environment and Government policy priorities. Whilst option evaluation and selection is an essential part of developing the WRMP, for Portsmouth Water, the revised preferred WRMP options represents the Company's best value solution in response to the results of WRSE and the need to provide bulk supplies to neighbouring companies. To address the baseline supply/demand balance deficit created by the bulk supply requirements, and taking into account the earliest completion dates of the options, means that 20 of the 24 feasible options are selected as soon as possible in the planning period.

The 20 revised preferred options proposed in the revised WRMP are detailed in **Table 6.1**.

This chapter sets out a summary of the assessments of the revised preferred options. It includes, where relevant, the effects of mitigation that will be incorporated into the design of each option by Portsmouth Water and more detailed analyses where further information could be ascertained regarding the option. The inclusion of these factors in the assessment of the preferred options may result in differences in the scoring against some SEA objectives between the assessments of the same option during the feasible and preferred option assessments. This chapter also outlines further mitigation measures that could be incorporated, where relevant into the preferred option to reduce negative effects. The full assessments and potential mitigation measures for each of the revised preferred options are included in **Appendix F**.

After the summaries of the revised preferred option assessments, an assessment of the cumulative effects of the revised preferred options is set out, including consideration of in-combination effects of proposals with other plans and projects.

Finally, this section concludes by identifying the reasons for selection of the revised preferred programme of options.

6.2 Assessment of the Revised Preferred Options

Twenty one revised preferred options have been selected. The revised preferred options together with the scale of implementation and yield are shown in **Table 6.1**. Please note that some of the option descriptions have changed when compared to the feasible option list (**Table 5.1**).

Table 6.1 Revised Preferred Combination of Options

Option Number	Option Name	Yield (MI/d)	Description
Supply			
R013	Havant Thicket Winter Storage Reservoir	23.0MI/d	This option would involve the development of a new pumped storage reservoir with a capacity of 8,800 MI on Portsmouth Water's land holding at Havant Thicket (170 ha.). Water would be sourced from the Source B spring source during the winter period and pumped to Havant Thicket Reservoir for use in the

Option Number	Option Name	Yield (MI/d)	Description
			summer within the existing annual average licence of 98MI/d; specifically, the new reservoir would deliver 23 MI/d with a peak deployable output of 50 MI/d though this would be subject to the hands-off flows of Lake A and Stream A. Implementation of the scheme would also require a new c.8.4km single raw water main consisting of two parts: an oversized 1600mm main to Hermitage Stream to allow rapid gravity drawdown and an 800mm main to Source B Pumping Stations and WTW. It should be noted that both pumping stations and WTW at Source B would require minor refurbishments to increase peak output from 40 MI/d to 50 MI/d which would include new pumps, a large external standby generator, and a new DAF plant for the WTW. Treated output would then flow to Works A WTW which would direct water to Reservoir A via a new c.8.4km main and Reservoir B via a new c.4km main. In order to facilitate these secondary transfers to the service reservoirs, Works A WTW would require minor refurbishment/reinforcement to its suction main.
R021a	Source O DO Recovery	1.8MI/d	This option would increase deployable output from three boreholes at Source O which are connected by adits. The existing boreholes are connected with by horizontal adits which are at a relatively high shallow level; as the water level is drawn down in dry conditions the adit is exposed and sediment causes water quality problems. The proposed solution is to extend the casing at the top of Borehole No 2 to block off the adits, and then to deepen the borehole by 24 m so that it matches the depth of Borehole No 1. The borehole pump would then be re-installed at a lower level to give greater drought resilience. The ADO would increase from 3.7 MI/d to the recent actual figure of 5.5 MI/d and would remain within existing licence.
R022a	Source J Group – Maximising DO	12.5MI/d	This option would involve the development of two new boreholes at the existing Source J WTW site. The approximate locations of the two new boreholes would be within a 300m radius of the existing WTW and pumping station. The boreholes would be 140 m deep with additional pumps and new raw water mains (300m) connecting the boreholes to the existing raw water network. Implementation of the scheme would also require modifications to the WTW's treatment processes regarding additional chlorine and orthophosphoric acid treatment. Once operational, the new boreholes will abstract a cumulative 12.5 MI/d thus increasing the facility's overall abstraction volume from the existing DO of 10.2 MI/d to 22.7 MI/d which would remain within the peak existing licence (25.20 MI/d).
R023a	Source H DO Recovery	2.0MI/d	This option would increase DO from the Source H source which is currently constrained by water quality problems at higher flows. This option would involve cleaning the boreholes of sediment by air lifting following a maximum flow pumping test. Overall, this option would return the source AOD to the licence figure of 9.1 MI/d resulting in a yield benefit of 2 MI/d.
R024a	Source C DO recovery scheme	5.5MI/d	This option would primarily involve the air scouring of the source boreholes, to remove a build-up of sediment, followed by a maximum rate pumping test in order to reduce turbidity at the WTW. Implementation is expected to recover between 4MI/d (ADO) and 5.5MI/d (PDO).
R068	Source S drought permit	8.5MI/d	This option would involve increasing the licenced daily abstraction limit of Source S borehole and WTW from 2.5 MI/d to 11 MI/d under severe drought conditions via a new drought permit in order to provide an additional 8.5 MI/d for public consumption.
Customer Demand and Water Efficiency			
C005	Meters – Not for Revenue (MNFR) Switchers	0.08MI/d	This option is a refinement of the feasible option. It would involve the installation of SMART meters in properties where previously no meter had been installed. It would operate over the period 2020/21 - 2044/45 and it is assumed that some 13,000 meters would be installed.
C006a	Metering on change of	0.28 MI/d	This option would involve the upgrade of existing metering infrastructure on a change of ownership, although it will still be a 'dumb' meter that would be read once every six months once installed. The option would start in 2020/21 and is

Option Number	Option Name	Yield (MI/d)	Description
	occupancy – existing meter pits		assumed to go through to the rest of AMP7. It is estimated that 4,926 meters would be installed. Implementation is assumed to achieve a 15% saving per annum in water use per property. It is anticipated that up to 0.28 MI/d of lost water would be saved following the implementation of this option.
C006b	Metering on change of occupier - all properties	4.68 MI/d	The option would involve the installation of meters into households that currently do not have a meter, on the change of ownership. It would require Portsmouth Water to be notified by a relevant authority at point of sale and given access to the property to install a new 'dumb' meter that would be read once every six months once installed. The option would start in 2025/26 and is assumed to go through to 2044/45 and an estimated 94,727 meters would be installed over the period. Implementation is assumed to achieve a 15% saving per annum in water use per property. It is anticipated that up to 4.68 MI/d of lost water would be saved following the implementation of this option.
Water Efficiency			
C026a	Subsidy to customers that purchase water efficient appliances (washing machines and dishwashers, showers and WCs)	0.31MI/d	This option would involve the provision of financial subsidies (10% reduction on measured bills over 3 years) in conjunction with customer awareness programmes and basic water audits in order to incentivise/accelerate the replacement of aging inefficient appliances (washing machines, dishwashers, showers, and WCs) with more water-efficient models. Within the 3 year implementation period, it is predicted that up to 2,300 measured domestic households will avail of this scheme.
C034	Water saving devices – Retrofitting existing toilets (with flush >9l)	0.11MI/d	This option would involve the retrofitting of toilets in household properties to replace existing higher volume flush mechanisms with one free dual flush mechanism, reducing demand for water. The assumption is that this option would reduce the flush per use rate from 9l to 5l. Households would also be offered information on the potential benefits to water bills and on the performance of the retrofit. The device would be installed by Portsmouth Water. Within the 3 year implementation period, it is predicted that up to 951 eligible measured domestic households will avail of this scheme.
C040	Water Saving Devices – Spray Taps	0.07MI/d	This option would involve the provision of one free pair of replacement spray taps in conjunction with an initial information campaign by Portsmouth Water and partners in order to incentivise/accelerate the replacement of inefficient higher flow non-spray taps. Within the 5 year implementation period, it is predicted that up to 3,400 spray taps would be installed per annum (17,000 total) within eligible domestic households.
C043	Water saving devices - Trigger nozzles & water butts	0.06MI/d	This option would involve the provision of hosepipe trigger nozzles and water butts in conjunction with regular annual messages about long-term sustainable garden care for metered customers owning garden space whom do not already own this equipment. It is expected that implementation of this option would reduce the need for customers to connect to water mains in respect of garden care thus decreasing water demand and 'freeing-up' resources for other customers. Within the 3 year implementation period, it is predicted that 4,440 nozzles and 3,330 water butts will be provided to eligible customers.
C046	Household water efficiency programme (Partnering approach, home visit)	1.27MI/d	This option would involve the provision of water audits and the installation of water efficiency equipment for all existing Portsmouth Water customers, metered or unmetered, through a partnership-based implementation programme. Within the 5 year implementation period, it is predicted that 16,500 social housing units will be eligible for auditing and provision of water efficiency equipment whereas 50% of metered private dwellings and 20% of unmetered properties will agree to participate in the scheme.
C084	Void metering	0.28 MI/d	This option involves the installation of external meters (and assumes that there is no access to properties with no occupant). Metering voids enables better assessments of leakage and estimates of illegal use from void properties. The

Option Number	Option Name	Yield (Ml/d)	Description
option would start in 2020/21 and runs through to 2044/45 and is estimated that 5,672 meters would be installed.			
Leakage			
D004a	Permanent Noise Loggers (Phase 1)	5.4Ml/d	This option would involve the installation of telemetered noise loggers within the water network which would, following a period of calibration, detect and pinpoint any emerging leakages within the network in order to reduce detection costs, leak run times and safety hazards for personnel. It is assumed that 3,975 telemetered noise loggers will be all installed in 2020/21 with resulting leaks identified and fixed in the remainder of AMP7. Assumes that 450 repairs will have been carried out by 2024/25 with an average of 2,160 km travelled per year.
D004b	Permanent Noise Loggers (Phase 2)	5.4Ml/d	This option would involve the installation of telemetered noise loggers within the water network which would, following a period of calibration, detect and pinpoint any emerging leakages within the network in order to reduce detection costs, leak run times and safety hazards for personnel. It is assumed that 5,080 telemetered noise loggers will be all installed in 2025/26 with resulting leaks identified and fixed in the period to 2044/45. Assumes that 1,350 repairs will have been carried out by 2024/25 with an average of 1,620 km travelled per year.
Drought			
C078	Drought: Voluntary restraint & leakage action	4.3Ml/d	This option would involve enhanced public awareness campaigns aimed at domestic and commercial customers during periods of drought concerning the benefits of water use restraint on supply and the natural environment. It is expected that public awareness campaigns would improve proactive behaviour regarding smart and sustainable consumption: reducing the use of water appliances (toilet flushes, shower durations, washing machines, etc.), reducing and/or eliminating non-essential water use (vehicle washing, window washing, garden watering, hot tubs, etc.), and prioritising the identification/repair of leakages within private properties. Simultaneously, Portsmouth Water would expand active leakage control (ALC) operations in order to enhance find and fix rates, accelerate response time, and increase leak volume threshold.
C079	Drought: Mandatory restraint	8.3Ml/d	This option would involve the provision of a significant media campaign aimed at non-domestic commercial customers concerning the justification of mandatory restraint actions during periods of drought and how customers can achieve compliance. By permission of Drought Directions 2011, implementation of this option would simultaneously prohibit: garden watering on commercial property, maintenance of commercial swimming pools and ponds, vehicle cleaning, washing of commercial premises, windows, and industrial plant, suppressing dust, and operating unoccupied cisterns.
C80	Imposition of Drought Direction Restrictions (mandatory commercial restraint)	8.1Ml/d	This option would involve the implementation of a mandatory restriction of non-critical water uses (as listed in the Drought Direction 2011) aimed at domestic and commercial customers during periods of severe drought. In order to facilitate compliance with the water restrictions, telephone hotlines would be organised for customers to report banned usages in conjunction with active site monitoring by operational teams whilst undertaking ongoing business.

Construction

The findings of the detailed assessments of the preferred options during construction are presented in **Table 6.2** and are summarised below.

The implementation of Option R013 would exceed £10m in capital investments regarding the construction of Havant Thicket impound reservoir (IR) which is expected to generate supply chain benefits and a number of employment opportunities as well as increased spend in the local economy by contractors and construction workers. Similarly, the implementation of Option C006b would represent a significant capital investment (£21.5m, albeit over 20 years) which is expected to generate a number of long term jobs and which could have effects on the local economy. Notwithstanding, HGV movements associated with the development of Havant Thicket IR and the implementation of Option C006b have the potential to cause traffic disruption within the public road network. Consistent with the definitions of significance (see **Appendix D**), Options R013 and C006b have been assessed as having a mixed significant positive effect on SEA Objective 6. No further significant positive effects were identified during the assessment of the construction of the options.

Given the scale of construction activity associated with the construction of Havant Thicket IR (Option R013) and the number of meters implemented in Option C006b, both options were assessed as having a significant negative effect on climate change (SEA Objective 5). This reflects the anticipated emissions of greenhouse gases from vehicle movements, construction plant, and the embodied carbon in raw materials which would collectively produce up to 20.4k tCO₂e for Option R013 and 2.3ktCO₂e for Option C006b. Option C006b was also assessed as having a significant negative effect against waste and resources (SEA Objective 8).

Furthermore, the magnitude of change resulting from the ongoing construction of Havant Thicket IR is expected to have a significant negative effect on the surrounding landscape (SEA Objective 10) as recreational and residential receptors may perceive the works as adversely impacting the visual amenity associated with the proximate South Down National Park's setting in addition to altering the local greenfield setting and character.

A significant negative effect against flood risk (SEA Objective 4) was identified for Option R023a. The source boreholes and pumping station where proposed works would be undertaken are located in Flood Zone 3 associated with the River Meon. In consequence, construction activities would be at risk of flooding (1 in 100 or greater annual probability of river flooding); however, the risks of this could be reduced through timing of any proposed activities.

Minor negative effects were assessed against climate change and resource use for options R021a, R022a, R023a, R024a, C026, and C046 (with some uncertainty noted for options R021a, R023a and R024a). R013 was also classified as having a minor negative effect on resource use. This reflects the resources required to construct Havant Thicket IR (R013), the additional boreholes (R022a), the refurbishment of boreholes (R021a, R023a and R024a) together with the estimated carbon emissions associated with infrastructural construction and the provision of site visits/water efficiency equipment (C026/C046). Further minor negative effects were assessed against health (SEA Objective 7) for options R013, and C078 (with some uncertainty). This primarily reflects the identification and repair of network leakages (C078) which may result in minor localised adverse effects on human health regarding noise disturbance and adverse air quality impacts (dust) depending on the scale, duration, and proximity of the works to sensitive receptors. Similarly, implementation of R013 may generate adverse health impacts from emissions and noise/vibration; however, any impact would be temporary and would likely to be managed through the adoption of good construction practice.

Option R013 was assessed as having minor negative effects on biodiversity (SEA Objective 1), geology and soils (SEA Objective 2), and cultural heritage (SEA Objective 9) due to scale and intensity of anticipated construction which would result in the direct loss of semi-rural greenfield land and supported habitats in addition to directly affecting Sir George Staunton Registered Park and Gardens (Grade II listed). Portsmouth Water is, however, making substantial efforts to develop appropriate mitigation measures in partnership with statutory bodies, and guided by an agreed set of mitigation principles.

Table 6.2 Revised Preferred Combination of Options – Construction Effects

Ref	Option	Construction (C) or Operation (O)	1. Biodiversity	2. Geology and Soils	3. Water Quantity and Quality	4. Flood Risk	5. Climate Change	6. Economic and Social Wellbeing	7. Human Health	8. Waste and Resources	9. Cultural Heritage	10. Landscape
R013	Havant Thicket Winter Storage Reservoir	C	-	-	0	0	--	++/-	-	-	-	--
R021a	Source O DO Recovery	C	0	0	0	0	?/-	0	0	-	0	0
R022a	Source J Group – Maximising DO	C	0	0	0	0	-	0	0/?	-	0	-
R023a	Source H DO Recovery	C	0	0	0	--	-/0/?	0	0	-	0	0
R024a	Source C DO recovery scheme	C	0	0	0	0	-/0/?	0	0	-	0	0
R068	Source S drought permit	C	0	0	0	0	0	0	0	0	0	0
C005	Smart Metering Trial (NFR)	C	0	0	0	0	-	+	0	-	0	0
C006a	Metering on change of occupancy – existing meter pits	C	0	0	0	0	-	0	0	-	0	0
C006b	Metering on change of occupier - all properties	C	0	0	0	0	--	++/-	0	--	0	0

Ref	Option	Construction (C) or Operation (O)	1. Biodiversity	2. Geology and Soils	3. Water Quantity and Quality	4. Flood Risk	5. Climate Change	6. Economic and Social Wellbeing	7. Human Health	8. Waste and Resources	9. Cultural Heritage	10. Landscape
C026	Subsidy to customers that purchase water efficient appliances (washing machines and dishwashers, showers and WCs)	C	0	0	0	0	-	0	0	-	0	0
C034	Water saving devices - Retrofitting existing toilets (with flush >9l) Target metered customers	C	0	0	0	0	0	0	0	0	0	0
C040	Water saving devices – Spray Taps	C	0	0	0	0	0	0	0	0	0	0
C043	Water saving devices - Trigger nozzles & water butts	C	0	0	0	0	0	0	0	0	0	0
C046	Household water efficiency programme (Partnering approach, home visit)	C	0	0	0	0	-	0	0	-	0	0
C078	Drought: Voluntary restraint & leakage action	C	0/?	0	0	0	0	0	-/?	0	0	0/?
C079	Drought: Mandatory restraint	C	0	0	0	0	0	0	0	0	0	0
C80	Imposition of Drought Direction Restrictions (mandatory commercial restraint)	C	0	0	0	0	0	0	0	0	0	0

Ref	Option	Construction (C) or Operation (O)	1. Biodiversity	2. Geology and Soils	3. Water Quantity and Quality	4. Flood Risk	5. Climate Change	6. Economic and Social Wellbeing	7. Human Health	8. Waste and Resources	9. Cultural Heritage	10. Landscape
C084	Void metering	C	0	0	0	0	-	0	0	-	0	0
D004a	Permanent Noise Loggers (Phase 1)	C	0/?	0	0	0	0/?	+	0	0	0	0
D004b	Permanent Noise Loggers (Phase 2)	C	0/?	0	0	0	0/?	+	0	0	0	0

Operation

The findings of the detailed assessments of the preferred options during operation are presented in **Table 6.3** and are discussed below:

The design capacity of Options R013 and R022a, 23 MI/d and 12.5 MI/d respectively, would help to ensure the continuity of a safe and secure drinking water supply which may in-turn support economic and population growth. In the case of Option R013, the new reservoir could potentially provide new social and recreational facilities and activities in addition to increasing foot traffic within Portsmouth which could provide a minor economic boost to local businesses. The remaining options, excluding the water efficiency options of C026, C034, C040, and C043, would have capacities of 1.8 MI/d to 8.5 MI/d which would also help to ensure the continuity of a safe and secure drinking water supply thus having (minor) positive effects on these objectives.

The operation of C079 and C80 would generate reductions of water demand by domestic and commercial customers through the restriction of non-critical water uses should facilitate a water saving of up to 8.1 MI/d to 8.3 MI/d which could subsequently be utilised elsewhere during times of drought. Similarly, D004a and D004b would generate notable water savings through leakage reduction. As all four options would generate savings in excess of 5 MI/d; therefore, consistent with the definitions of significance, they were assessed as having a significant positive effect on resource use (SEA Objective 8). The remaining water efficiency and drought options would also facilitate operational water savings (<5 MI/d) thus having a minor positive effect on the objective.

No further significant positive operational effects were identified during the assessment.

All options, excluding R021a, R022a, R023a, C005, C034, C040, and C043, were assessed as having positive effects on climate change (SEA Objective 5) as they would increase resilience to climatic and environmentally driven supply restrictions in the region due to forecasted hotter/drier summers and/or generate operational energy savings and emission reductions. Minor positive effects were also identified for water quantity and quality (SEA Objective 3) by all leakage, drought, and water efficiency options in respect to water savings generated through demand management; e.g. leakage reduction, increased water efficiency through positive behavioural changes, and voluntary/mandatory restrictions of non-critical water use during times of drought.

The new Havant Thicket IR (R013) would provide flood storage which, in respect of increased uncertainty over future weather patterns, may assist in providing greater management of storm inflows thus having a minor positive effect on flood risk (SEA Objective 4). Additionally, the new reservoir may help contribute to the creation of a new habitat (wetlands). Similarly, mitigation measures implemented may provide minor benefits in which proximate residential receptors will not perceive operation as adversely altering the wider landscape character of the area. Overall, the operation has been assessed as having minor positive effects on both biodiversity (SEA Objective 1) and landscape (SEA Objective 10) though uncertainty remains regarding the magnitude of benefit.

No further positive operational effects were identified during the assessment.

No significant negative effects were identified during the assessment. Options R013 and R022a would result in increased operational energy demands, 259,500 kWh/year and 657,000 kWh/a, respectively, which have been assessed as having negative effects on resource use (SEA Objective 8). In conjunction with the 657,000 kWh/a energy demand, Option R022a would also produce 230 tCO₂e/a thus having a minor negative effect on climate change (SEA Objective 5). For options R021a and R023a, operational energy from pumping the increased volume of water has not been determined at this stage, although it is anticipated to be very low, in consequence resulting in the mixed neutral and uncertain assessments for SEA Objectives 5 and 8.

The operation of Option R068 during times of severe drought may potentially exacerbate the effects of drought on the local water system regarding supply and recovery. Consequently, R068 has therefore been assessed as having a negative effect on water quantity and quality (SEA Objective 3) and biodiversity (SEA Objective 1) though uncertainty remains until further investigation is conducted. The operation of R023a could also have effects during periods of low flow, in conjunction with water users down river; however, as any increase in abstraction is within licensed amounts, the effects on biodiversity (SEA Objective 1) and water quality and quantity (SEA Objective 3) are assessed as uncertain.

Table 6.3 Revised Preferred Combination of Options – Operation Effects

Ref	Option	Construction (C) or Operation (O)	1. Biodiversity	2. Geology and Soils	3. Water Quantity and Quality	4. Flood Risk	5. Climate Change	6. Economic and Social Wellbeing	7. Human Health	8. Waste and Resources	9. Cultural Heritage	10. Landscape
R013	Havant Thicket Winter Storage Reservoir	O	+/?	0	0	+	+	++	++	-	0	+/?
R021a	Source O DO Recovery	O	0	0	0	0	0	+	+	0	0	0
R022a	Source J Group – Maximising DO	O	0/?	0	0	0	-	++	++	+/-	0	0
R023a	Source H DO Recovery	O	?	0	?	0	0	+	+	0	0	0
R024a	Source C DO recovery scheme	O	0	0	0	0	+/-	+	+	+/-	0	0
R068	Source S drought permit	O	-/?	0	-/?	0	+	+	+	0	0/?	0
C005	Smart Metering Trial (NFR)	O	0	0	+	0	0	0	0	0	0	0
C006a	Metering on change of occupancy – existing meter pits	O	0	0	+	0	+	0	0	+	0	0
C006b	Metering on change of occupier - all properties	O	0	0	+	0	++	+	+	++	0	0

Ref	Option	Construction (C) or Operation (O)	1. Biodiversity	2. Geology and Soils	3. Water Quantity and Quality	4. Flood Risk	5. Climate Change	6. Economic and Social Wellbeing	7. Human Health	8. Waste and Resources	9. Cultural Heritage	10. Landscape
C026	Subsidy to customers that purchase water efficient appliances (washing machines and dishwashers, showers and WCs)	O	0	0	+	0	+	0	0	+	0	0
C034	Water saving devices - Retrofitting existing toilets (with flush >9l) Target metered customers	O	0	0	+	0	0	0	0	+	0	0
C040	Water saving devices – Spray Taps	O	0	0	+	0	0	0	0	+	0	0
C043	Water saving devices - Trigger nozzles & water butts	O	0	0	+	0	0	0	0	+	0	0
C046	Household water efficiency programme (Partnering approach, home visit)	O	0	0	+	0	+	+	+	+	0	0
C078	Drought: Voluntary restraint & leakage action	O	0	0	+	0	+	+	+	+	0	0
C079	Drought: Mandatory restraint	O	0	0	+	0	+	+	+	++	0	0
C80	Imposition of Drought Direction Restrictions (mandatory commercial restraint)	O	0	0	+	0	+	+	+	++	0	0

Ref	Option	Construction (C) or Operation (O)	1. Biodiversity	2. Geology and Soils	3. Water Quantity and Quality	4. Flood Risk	5. Climate Change	6. Economic and Social Wellbeing	7. Human Health	8. Waste and Resources	9. Cultural Heritage	10. Landscape
C084	Void metering	O	0	0	+	0	+	0	0	+	0	0
D004a	Permanent Noise Loggers (Phase 1)	O	0	0	+	0	+	+	+	++	0	0
D004b	Permanent Noise Loggers (Phase 2)	O	0	0	+	0	+	+	+	++	0	0

6.3 Secondary, Cumulative and Synergistic Effects

The SEA Regulations require that the cumulative effects of the revised WRMP are assessed. This includes the cumulative effects of the individual preferred options that comprise the Preferred Plan and the effects of the revised WRMP in combination with other plans and programmes.

Section 6.2 summarises the effects of the revised preferred combination of options.

The following sections consider the potential for cumulative effects of the WRMP and the following:

- ▶ population change in the Portsmouth Water area;
- ▶ Nationally Significant Infrastructure Projects (NSIPs);
- ▶ Portsmouth Water's Statutory draft Drought Plan; and
- ▶ other water company WRMPs.

The cumulative effects of the revised WRMP are difficult to accurately assess given the inherent uncertainties concerning (inter alia): future changes to baseline environmental conditions; future population and economic growth; the deliverability of some NSIPs (and the potential for new NSIPs to be developed); and the proposals of emerging water company WRMPs. As such, it will be necessary to keep under review the information and assumptions used, particularly regarding implementation of proposals, to ensure the assessment of cumulative effects remain valid and applicable.

Population Change

Population change in the Portsmouth Water operational area has already been considered in the WRMP along with the potential for further changes in demographics throughout the plan period. These forecasts have been based upon population projections published by the ONS and engagement with local and unitary authorities to determine how many household properties are likely to be built in the region over the planning horizon. The population within the Portsmouth Water operational area is projected to rise from total population is expected to increase by nearly 16% from 714,452 in 2015/16 to 832,739 by 2044/45.

In consequence, the 'in combination' water-resource effects of growth promoted by other plans (such as local planning authority local plans or local economic partnership strategic growth plans) are considered and accounted for during the WRMP development process. Conversely, in respect of water resources, the WRMP is unlikely to have significant effects on the other plans as the 'source' of any potential effects arises from the 'other' plan, with the WRMP having to respond to the changes.

Nationally Significant Infrastructure Projects (NSIPs)

Depending on the type of development proposed there is potential for NSIPs to act cumulatively with the WRMP if the NSIP requires significant amounts of water resource. National planning policy guidance (for developers and inspectors) is set out in National Policy Statements (NPSs). A number of these NPSs have been published and set out the definition, and in some cases the location, of NSIPs. The current status of the NPSs is set out in **Table 6.4**.

Table 6.4 Current National Policy Statement Status

National Policy Statement (NPS)	Status of NPS	Are Potential Locations of NSIPs included in the NPS?
Overarching energy EN-1	Designated June 2011	No
Fossil Fuels EN-2	Designated June 2011	No

National Policy Statement (NPS)	Status of NPS	Are Potential Locations of NSIPs included in the NPS?
Renewable energy EN-3	Designated June 2011	No
Oil and Gas Supply and Pipelines EN-4	Designated June 2011	No
Electricity Networks EN-5	Designated June 2011	No
Nuclear Power EN-6	Designated July 2011	Yes
Ports	Designated January 2012	No
National Networks (including rail and roads)	Designated December 2014	No
New Runway Capacity and Infrastructure at Airports in the South East of England (Aviation NPS)	Designated April 2018	Yes
Hazardous Waste (England only)	Designated June 2013	No
Waste Water Treatment (England only)	Designated July 2013	Yes
Water Supply	Draft not yet published	n/a
Geological Disposal Infrastructure	Draft published January 2018	n/a

The Nuclear Power NPS (EN-6) sets out eight potentially suitable sites for the deployment of new nuclear power stations in England and Wales before the end of 2025. None of these sites are located within 15km of the Portsmouth Water operational area and so are considered too distant from the Portsmouth Water supply area for in-combination effects to occur.

Reference has been made to the Planning Inspectorates National Infrastructure Projects database⁹⁸ which includes major projects, subject to the requirements of the Planning Act 2008. It includes project:

- ▶ Where the developer has advised the Planning Inspectorate in writing that they intend to submit an application to us in the future
- ▶ Where an application has already been made to the Planning Inspectorate and is undergoing the development consent process
- ▶ Where a proposal has been decided.

Currently there are no Nationally Significant Infrastructure Project proposed in or within 15km of the PWOA and therefore no cumulative effects are anticipated. Nonetheless, Portsmouth Water should consider the potential implications of water demands associated with the construction and operation of the identified (and any new) NSIPs as part of monitoring and through the five year review of the WRMP when more details of the schemes should be available.

Drought Plan 2017

Water companies in England and Wales are required to prepare and maintain Statutory Drought Plans under Sections 39B and 39C of the Water Industry Act 1991, as amended by the Water Act 2003 and subsequently

⁹⁸ <https://infrastructure.planninginspectorate.gov.uk/projects/>

Water Act 2014, which set out the sort of operational steps a company will take before, during and after a drought. The Water Industry Act 1991 defines a Drought Plan as ‘*a plan for how the water undertaker will continue, during a period of drought, to discharge its duties to supply adequate quantities of wholesome water, with as little recourse as reasonably possible to drought orders or drought permits*’.

Portsmouth Water published its last Drought Plan in October 2012. In accordance with the Drought Direction (England) 2016, Portsmouth Water was required to submit an updated draft Drought Plan to the Secretary of State’s review and approval.

In addition to demand management measures that would be implemented in a drought (including appeals to customers for voluntary restraint in their use of water, enhanced leakage control, the imposition of temporary bans on certain activities and the application of further restrictions under a Drought Order, a range of supply side options have been identified.

- ▶ Lowering pumps in existing sources;
- ▶ Re-commissioning unused Portsmouth Water sources;
- ▶ Commissioning unused boreholes at existing Portsmouth Water sources;
- ▶ Commissioning unused licence from Private and Commercial Boreholes;
- ▶ Internal transfers – enhancing connectivity or reversing flow in mains to make better use of existing resources;
- ▶ Drought Permits or Drought Orders:
- ▶ Source H (suspension of flow constraint);
- ▶ Source N (suspension of flow constraint);
- ▶ Source B (suspension of Minimum Residual Flow constraint);
- ▶ QRST Group (Source S) (application to exceed abstraction licence limit);
- ▶ Source A (River Itchen) (application to exceed abstraction licence limit);
- ▶ LMNOP Group (Source P) (application to exceed abstraction licence limit).

The potential for cumulative effects centre on Havant Thicket (due to its scale and significance). The Havant Thicket option sources water from Source B Springs, one of the sources potentially identified for Drought Permits or Drought Orders. No cumulative effects are envisaged as a result of this option because the reservoir would be operated in conjunction with any drought permit or order at Source B Springs. In dry periods, water stored in the reservoir would be drawn for treatment at Works A, along with water sourced directly from the springs, thus providing a strategic benefit to Portsmouth Water customers at times of drought.

Other Water Company WRMPs

There is potential for Portsmouth Water’s WRMP to have cumulative effects with the WRMPs of other water companies. A review of the existing WRMP proposals in neighbouring water company areas including Southern Water and South East Water is included in **Appendix B** of this report.

Southern Water’s WRMP includes the renewal of the existing bulk supply from Portsmouth Water and by the end of 2017/18, Portsmouth Water will provide Southern Water with two bulk supplies, both for 15 MI/d to their Sussex and Hampshire zones (from Point A to their SRN Source D site and River Itchen into supply in Hampshire respectively).

Southern Water has requested two additional supplies, of 9 MI/d and 21 MI/d into their Hampshire zone in 2022/23 and 2028/29 respectively; the water will come from the Source A source on the River Itchen and effectively take all available water from that source for Southern Water’s needs. This was included in the draft WRMP, issued by Southern Water for consultation (ending 25th May 2018).

The total bulk supply to Southern Water will therefore be up to a total of 60 MI/d by 2030.

Portsmouth Water will continue to work with Southern Water and other stakeholders to progress this issue. However, it has been assumed, in the final WRMP plan that the requirements are confirmed and both supply and demand options will need to be undertaken to meet this requirement.

The requests for the bulk supplies have driven the supply/demand balance and the need for resource options, whose environmental implications have been assessed through this SEA.

As part of the work for WRSE, a report⁹⁹ was completed of the potential for cumulative effects between previous WRMPs. This report identified the potential effects on high value receptors (the South Downs National Park, the North Wessex Downs AONB, the High Weald AONB and the Holborough to Burham Marshes SSS), surface water catchments and groundwater bodies. It identified the Portsmouth Water option B5290 Clanfield to Tilmore Bulk Transfer (between Portsmouth Water and Southern Water) as potentially having an effect on the South Downs National Park. With regard to potential effects on landscape, the previous SEA¹⁰⁰ noted:

“Minor negative effects have been determined against objective 10 (landscape) due to the routing of much of the 5.5km pipeline in option B5290 through the South Downs National Park, although much of the route will follow roads to help minimise the impact. There will be impacts on landscape during the construction, although these are expected to be short term in nature. Following completion the ground would be made good, and it is expected that the landscape would be restored to its pre-construction condition following one to two growing seasons.”

The SEA of the previous WRMP for Portsmouth Water assessed the effects of this option within the PWOA whilst Southern Water assessed the effects within its own supply area within the SEA that accompanied its WRMP.

6.4 Mitigation and Enhancement

The potential effects of the preferred options are set out in the sections above. In some cases, there is an opportunity to reduce some of the potential negative effects. The detail of this mitigation needs to be considered during the planning phases of each of the individual component schemes within the preferred options. Where relevant, potential mitigation measures are included within each of the preferred option assessment matrices in **Appendix F** although these should be considered as a starting point for more detailed consideration as options are planned and developed.

There is a substantial body of general construction good-practice which is applicable to all of the proposed options where ground works are required and can be relied on (at this level) to prevent significant or adverse effects on a European or national designated site occurring as a result of construction site-derived pollutants. The following guidance documents detail the current industry best-practices in construction that are relevant to the preferred options:

- NRW, SEPA & NIEA, Guidance for Pollution Prevention (GPPs) (which are replacing the previous Pollution Prevention Guidelines (PPGs) when published) [online]. Available at: <http://www.netregs.org.uk/environmental-topics/pollution-prevention-guidelines-ppgs-and-replacement-series/guidance-for-pollution-prevention-gpps-full-list/>
- PPG1: Understanding Your Environmental Responsibilities - Good Environmental Practices (July 2013; under review);
- GPP5: Works and maintenance in or near water (January 2017);
- PPG6: Working at construction and demolition sites (March 2012; under review);
- GPP21: Pollution incident response planning (July 2017); and
- PPG22: Incident response - dealing with spills (April 2011; under review).

⁹⁹ Ricardo (2017), Environmental Information to inform Water Company SEAs: Identification of potential for cumulative effects between water companies for WRMP19 SEAs, A report for WRSE, ED 10803, Issue Number 1, October 2017

¹⁰⁰ Amec (2013), Portsmouth Water Strategic Environmental Assessment of Draft Water Resources Management Plan: Environmental Report, May 2013

- ▶ Venables R. et al. (2000) Environmental Handbook for Building and Civil Engineering Projects. 2nd Edition. Construction Industry Research and Information Association (CIRIA), London.

The best-practice procedures and measures detailed in these documents should be followed for all construction works derived from the WRMP as a minimum standard, unless scheme-specific investigations identify additional measures and / or more appropriate non-standard approaches for dealing with potential site-derived pollutants.

Construction activities should be undertaken so as to minimise short term adverse effects on recreational areas, such as footpaths, and on landscape and biodiversity. Noise, traffic disruption and visual impacts should also be considered. Care should also be taken during construction regarding the potential for contaminants such as silt, concrete or fuel oil to pollute water courses via surface run off. This can be mitigated by undertaking all construction activities in accordance with relevant best practice pollution prevention guidance.

To maximise economic benefits in the Portsmouth Water operational area, it is recommended that, where possible, work is carried out by local firms and contractors or by those with a policy for training and skills development that could help contribute to the local economy and meet employment needs.

Where significant raw materials are required for options, this can be mitigated by utilising recycled and locally sourced materials. Construction and operational wastes should also be reused/recycled where appropriate.

The potential for adverse impacts of the settings of cultural heritage assets should be considered early in the design process.

Effects on landscape character and visual amenity should also be considered at an early stage in the design process.

6.5 Conclusions and Reasons for the Selection of the Revised Preferred Options and Rejection of Alternatives

Portsmouth Water chose the revised preferred WRMP options using a standard industry method that includes consideration of technical feasibility, financial costs and benefits, and quantified impacts on the environment and community, taking into account the findings of the SEA and HRA as well as input from key stakeholders.

The revised preferred WRMP options represents Portsmouth Water's preferred, or best value solution, rather than the least cost solution. It takes account of resilience, environmental protection and customer preferences. Sensitivity analysis checks that the Final Planning Solution is robust to possible changes in forecasts or availability of resources.

In developing the revised preferred WRMP options, the Company has given due consideration to the issues raised by stakeholders throughout the pre-consultation process.

In selecting the final planning solution, the Company has sought to balance the expectations of customers, the needs of the environment and Government policy priorities. The baseline supply/demand balance shows a deficit at average and peak week. This means that the existing supply network can't cope with future demands and all of the assumed uncertainties and risks.

The results of WRSE identify further bulk supplies from Portsmouth Water to neighbouring companies. Portsmouth Water has included bulk supplies that other companies have agreed to in principle. These bulk supplies drive the supply/demand balance and the need for resource options.

The timing of the new bulk supplies, and the earliest completion dates of the options, means that all of the feasible options are selected as soon as possible in the planning period.

Table 6.5 Timing of Selected Supply Options

Option	Description	Commissioning Date
C026-46	Water Efficiency	2018-2019
C078-80	Drought Measures	2018-2045
R013	Havant Thicket Winter Storage Reservoir	2029
R021a	Source O DO Recovery	2019
R022a	Source J DO Recovery	2024
R023a	Source H DO Recovery	2019
R024	Source C DO Recovery	2019
R068	Source S Drought Permit	2018-2045
D004a	Permanent Noise Loggers (Phase 1)	2020 – 2040
D004b	Permanent Noise Loggers (Phase 2)	2020 - 2040

In addition to these options Portsmouth Water will enhance its optional metering programme with 'Change of Occupier Metering' which will be implemented in two phases to ensure that per capita consumption falls with time.

7. Next Steps and Proposals for Monitoring

7.1 Next Steps

This revised Environmental Report has been completed to assess the changes to the WRMP. It also includes changes made in response to comments received from the consultation.

The revised WRMP has been submitted to the Secretary of State for Environment, Food and Rural Affairs. A statement of response will also be submitted containing all the consultation submissions received and Portsmouth Water's response. The statement of response and revised WRMP will be set to the Environment Agency for review. A decision will then be taken as to whether the revised WRMP can be published or whether further work is required before it can be published.

As soon as is reasonable practicable after the publication of the final WRMP, Portsmouth Water will also publish a Post Adoption Statement which is the final output of the SEA process. This will summarise

- ▶ how environmental considerations have been integrated into the plan or programme;
- ▶ how the Environmental Report has been taken into account;
- ▶ how opinions expressed in response to consultation have been taken into account;
- ▶ how the results of any transboundary consultations entered into have been taken into account;
- ▶ the reasons for choosing the plan or programme as adopted, in the light of the other reasonable alternatives dealt with; and
- ▶ the measures that are to be taken to monitor the significant environmental effects of the implementation of the plan or programme.

As the WRMP is implemented, Portsmouth Water will monitor its effects on the environment through their existing processes, helping to ensure that the potential impacts identified in the SEA are considered in practice.

7.2 How Environmental Effects will be Considered Going Forward

Once the WRMP has been adopted, the preferred options for managing water supply and demand contained in it will need to be implemented through specific projects. As part of this process, each project may be subject to further assessment to understand and manage its potential environmental and social impacts. These assessments will take account of the issues discussed in this report but will also be informed by the greater detail available as the work progresses about construction techniques, building materials, and agreed locations and routes.

One form of assessment that may be required for some of the works undertaken could be a Habitats Regulations Assessment, required by the Conservation of Habitats and Species Regulations 2017. Habitats Regulations Assessment must be undertaken to assess whether a plan or project could have a significant effect on an internationally important nature conservation site (a SAC, SPA or Ramsar site) and adversely affect the achievement of the conservation objectives for the site. In many cases, a Habitats Regulation Assessment is undertaken alongside an Environmental Impact Assessment, which is the requirement of separate legislation. Environmental Impact Assessment assesses the potential positive and negative effects of development projects, and identifies the opportunities to enhance the positive and mitigate the negative effects.

7.3 Monitoring the Effects of the WRMP

Portsmouth Water will continue to develop its Final WRMP in consultation with EA, Natural England (NE) and other stakeholders.

Once the WRMP is implemented, with its component projects in place, its effects on the environment and people will need to be taken into account. Portsmouth Water expect to monitor the effects of the WRMP alongside the other impacts of their operations, and as such, are likely to rely on existing sources of information that are collected either by Portsmouth Water or by other relevant organisations such as the EA. For example, Portsmouth Water already collects information for a robust annual review process (the Water Resources Management Plan Annual Performance Review) that is submitted to the regulators. This includes information such as the quality of water supplied, the volumes lost through leakage and per capita consumption of water.

Portsmouth Water updates the WRMP and Drought Plan at regular intervals, and there are a number of statutory controls which must be monitored.

As shown in Section 3, a substantial amount of relevant information is collated by central and local government. These collated data are reported through government department (primarily Defra and BEIS), government agencies (ONS, the EA, and Natural England) and Local Authority websites.

Monitoring Requirements

Monitoring the sustainability effects of the WRMP can help to answer questions such as:

- ▶ Were the SEA predictions of effects accurate?
- ▶ Is the WRMP contributing to the achievement of the SEA objectives?
- ▶ Are mitigation measures performing as well as expected?
- ▶ Are there any adverse effects? Are these within acceptable limits, or is remedial action desirable?

It is not necessary to monitor everything or monitor an effect indefinitely. Instead monitoring should be focussed on:

- ▶ Significant effects that may give rise to irreversible damage, with a view to identifying trends before such damage is caused; and
- ▶ Significant effects where there was uncertainty in the SEA and where monitoring would enable preventative or mitigation measures to be undertaken.

Portsmouth Water will need to take a broad view of the findings of their ongoing monitoring processes to identify whether the WRMP has any significant unforeseen effects. Where these are identified, the company may be required to put in place specific monitoring arrangements and will consider how best to mitigate or avoid the adverse consequences. **Table 7.1** provides a provisional and indicative list of indicators based on a range of existing measures (including those identified in the previous SEA); monitoring proposals will then be considered further and a final monitoring framework that satisfies the requirements of the SEA Directive will be presented in the Post Adoption Statement.

Table 7.1 Potential Indicators for Monitoring Effects

Objective	Indicator	Source of Information	Commentary
1. To ensure the protection and enhancement of biodiversity,	Condition of specific protected sites (e.g. SACs and SPAs)	Natural England	Open communication between Natural England and Portsmouth Water results in up-to-date information and identification of any potential issues.

Objective	Indicator	Source of Information	Commentary
priority habitats and species.	Condition of SSSIs on water industry land holdings	Natural England, Portsmouth Water	Condition assessment of designated land on Portsmouth Water's landholdings, both area and condition may change.
	Biological monitoring (macroinvertebrates, macrophytes, fisheries, Bird surveys)	Environmental Agency, Portsmouth Water, Angling clubs, British Trust for Ornithology	Using these data sets and comparing them against other monitored information such as levels and flows will assist in identifying whether there are any adverse effects and if mitigation measures are performing as well as expected.
	Number and area of new or restored habitats	Portsmouth Water	Portsmouth Water could consider recording the number of locations and area of habitats created or restored, e.g. Havant Thicket IR.
2. To ensure the appropriate and efficient use of land and protect soil quality and geodiversity.	Number/ floorspace of water infrastructure built on previously developed land	Portsmouth Water	Portsmouth Water could record the number and floorspace of new buildings that are built on previously developed land.
	Condition of sites designated for geological interest (e.g. geological SSSIs) on water industry land holdings	Portsmouth Water	Condition assessment of designated land on Portsmouth Water's landholdings, both area and condition may change.
3. To protect and enhance water quality and surface and groundwater resources and the ecological status of water bodies.	River flows, river levels, lake and reservoir levels. Water quality of surface waters	Portsmouth Water, Environmental Agency	At sensitive sites previous studies should be used to inform monitoring and assessment. For example, RoC documentation, WFD Post Implementation Monitoring data, and any Drought Permit (DP) Environmental Assessments and associated environmental monitoring plans.
	River flow and level characteristics	Portsmouth Water, Environmental Agency	Monitoring can be compared to historic records.
	Groundwater levels, recharge characteristics and abstracted groundwater quality	Portsmouth Water, Environmental Agency	At sensitive sites previous studies should be used to inform monitoring and assessment. For example, RoC, WFD Post Implementation Monitoring data, documentation and any Drought Permit (DP) Environmental Assessments and associated environmental monitoring plans.
	Leakage	Portsmouth Water Annual Performance Report	Portsmouth Water report these data to Ofwat and the EA as part of the annual returns process.
4. To reduce the risk of flooding.	Number of properties that experience flooding as a result of burst in the water supply distribution network.	Portsmouth Water	Portsmouth Water could record the number of properties that experience flooding as a result of bursts on the water supply distribution network.
	Number of properties that experience internal flooding from public sewers.	Portsmouth Water, Environmental Agency	Portsmouth Water report these data to Ofwat as part of the statutory returns process.

Objective	Indicator	Source of Information	Commentary
5. To limit the causes and effects of climate change and increase resilience to the consequences of climate change.	Quantity of greenhouse gas emissions per megalitre of water supplied	Portsmouth Water	Portsmouth Water's energy managers can use company data taken from the Annual Report, and guidance from the UKWIR greenhouse gas workbook and BEIS (Department for Business, Energy & Industrial Strategy) conversion factors to derive this information.
	Energy use used in the operational phase of water treatment and supply.	Portsmouth Water Annual Performance Report	Portsmouth Water should hold and record energy consumption data e.g. via accounts / invoices to enable quantification of the proposed indicator.
	Renewable energy generated; renewable energy purchased.	Portsmouth Water Annual Performance Report	Portsmouth Water should record renewable energy generation data, in addition to data on renewable energy purchased e.g. via accounts / invoices.
6. To maintain and enhance the economic and social wellbeing of the local community.	Population and projected population change over time	Portsmouth Water, Office for National Statistics	Portsmouth Water report these data to the Environmental Agency as part of the annual return process and to Ofwat as part of the Strategic Business Plan.
	Proportion of customers who pay more than 3% of their income on water and sewerage	Portsmouth Water	Portsmouth Water could identify the proportion of customers who pay more than 3% of their income on water and sewerage.
7. To ensure the protection and enhancement of human health.	Compliance with drinking water standards at customers' taps (%).	Portsmouth Water – drinking water quality report	Portsmouth Water reports these data to Ofwat as part of the statutory returns process (Annual Performance Report) and to the Drinking Water Inspectorate.
	Compliance with water quality standards under the EC Bathing Waters Directive.	Environment Agency	The Environment Agency monitors the compliance of bathing waters and reports this annually.
	Number of Portsmouth Water sites with public access which provide sporting, recreational and leisure resources and number of visits per year.	Portsmouth Water	Portsmouth Water hold information on the number of annual visitors to sites where specific visitor facilities are provided (e.g. Staunton Country Park)
	Number of nuisance-related complaints e.g. noise, dust	Portsmouth Water	Portsmouth Water could record the number of nuisance-related complaints made in relation to implementation of the WRMP.
8. To promote the wise use of resources.	Chemicals Use in Water Supply	Portsmouth Water (services data)	Information on chemical use should be held in accounts.
	Amount of primary and recycled aggregates used.	Portsmouth Water (contractors/consultants)	Information on aggregate use and recycling should be held by Construction managers and accounts (contractors / consultants accounts, waste or procurement records)
	Proportion of waste sent to landfill	Portsmouth Water	Information on quantities, classification and proportion of waste disposed to landfill should be held by Portsmouth Water.

Objective	Indicator	Source of Information	Commentary
	Levels of leakage	Portsmouth Water Annual Performance Report	These indicators will help identify whether the WRMP does contribute to the achievement of this SEA objective.
	Trends in overall per capita consumption.	Portsmouth Water Annual Performance Report	Portsmouth Water should hold and record capita consumption data.
9. To conserve and enhance cultural and historic assets.	Loss / damage or discovery / protection of cultural, historic and industrial heritage features. Including loss of landscapes of Historic Interest and natural heritage features (including for example field systems, field boundaries) that contribute to the cultural and historic distinctiveness of the area.	Portsmouth Water, Historic England	Historic England's regional field monument wardens monitor the condition of all statutorily protected monuments.
10. To conserve and enhance landscape character and other protected features.	Loss or damage to landscape character and features of designated sites.	Portsmouth Water	Portsmouth Water could consider recording the number and floorspace of new buildings above ground infrastructure that are built within designated landscape sites.

Appendix A

Quality Assurance Checklist

The Government's Guidance on SEA¹⁰¹ contains a quality assurance checklist to help ensure that the requirements of the SEA Directive are met. Those requirements relevant to the scoping stage of the SEA of Portsmouth Waters' WRMP have been highlighted below.

Quality Assurance Checklist	
Objectives and Context	
The plan's or programme's purpose and objectives are made clear.	<p>The purpose of the revised WRMP is set out in Section 1 of this report.</p> <p>The objectives of the revised WRMP are set out in Section 1.</p>
Environmental issues and constraints, including international and EC environmental protection objectives, are considered in developing objectives and targets.	Key environmental, social and economic issues (including protection objectives) identified through a review of relevant plans and programmes (see Section 2 of this report) and analysis of baseline conditions (see Section 3) have informed the development of the assessment framework presented in Section 4 .
Scoping	
Consultation Bodies are consulted in appropriate ways and at appropriate times on the content and scope of the Environmental Report.	The SEA Scoping Report was consulted upon in July/August 2016 and responses are summarised in this Environmental Report (see Appendix C).
The assessment focuses on significant issues.	Sustainability issues have been identified in the baseline analysis contained in Section 3 on a topic-by-topic basis. Section 3.11 summarises the key sustainability issues identified.
Technical, procedural and other difficulties encountered are discussed; assumptions and uncertainties are made explicit.	Section 4.6 describes the key difficulties encountered during the preparation of this Environmental Report.
Reasons are given for eliminating issues from further consideration.	N/a.
Alternatives	
Realistic alternatives are considered for key issues, and the reasons for choosing them are documented.	All feasible and preferred options have been assessed, as set out in Section 5 and Section 6 and Appendix E and Appendix F of this report. For the purposes of the WRMP, the reasonable alternatives are the feasible options considered. The reasons for selection of the revised WRMP as proposed and for the rejection of alternatives is set out in Section 6 .
Alternatives include 'do minimum' and/or 'business as usual' scenarios wherever relevant.	The Feasible Options included 'business as usual' options for production and resource options; customer demand options; and distribution options where relevant. This is assessed in Section 6 .
The environmental effects (both adverse and beneficial) of each alternative are identified and compared.	This is included in Section 5 , Section 6 , Appendix E and Appendix F of this report.
Inconsistencies between the alternatives and other relevant plans, programmes or policies are identified and explained.	No inconsistencies were identified.
Reasons are given for selection or elimination of alternatives.	The reasons for selection of the revised WRMP as proposed and for the rejection of alternatives is set out in Section 6 .

¹⁰¹ Office of the Deputy Prime Minister (2005) *A Practical Guide to the Strategic Environmental Assessment Directive*.

Quality Assurance Checklist	
Baseline Information	
Relevant aspects of the current state of the environment and their likely evolution without the plan or programme are described.	Section 3 of this report characterises the current environmental baseline conditions, along with how these are likely to change in the future.
Environmental characteristics of areas likely to be significantly affected are described, including areas wider than the physical boundary of the plan area where it is likely to be affected by the plan.	Throughout Section 3 of this report, reference is made to areas which may be affected by the WRMP.
Difficulties such as deficiencies in information or methods are explained.	Section 3.12 details limitations of the data used in the report and assumptions made.
Prediction and Evaluation of Likely Significant Environmental Effects	
Effects identified include the types listed in the Directive (biodiversity, population, human health, fauna, flora, soil, water, air, climate factors, material assets, cultural heritage and landscape), as relevant; other likely environmental effects are also covered, as appropriate.	This is set out in Sections 5, 6, Appendix E Error! Reference source not found. and Appendix F and of this report.
Both positive and negative effects are considered, and the duration of effects (short, medium or long-term) is addressed.	This is set out in Sections 5, 6, Appendix E Error! Reference source not found. and Appendix F and of this report.
Likely secondary, cumulative and synergistic effects are identified where practicable.	Likely secondary, cumulative and synergistic effects are considered in Section 6 of this report.
Inter-relationships between effects are considered where practicable.	This is set out in Sections 5, 6, Appendix E Error! Reference source not found. and Appendix F and of this report.
The prediction and evaluation of effects makes use of relevant accepted standards, regulations, and thresholds.	Relevant standards have been used where appropriate in undertaking the assessment.
Methods used to evaluate the effects are described.	Information on the methods used for evaluation of potential effects is included in Section 4 and Appendix D .
Mitigation Measures	
Measures envisaged to prevent, reduce and offset any significant adverse effects of implementing the plan or programme are indicated.	Mitigation measures are set out in Section 6 and Appendix E and F and of this report.
Issues to be taken into account in project consents are identified.	This is set out in Sections 5, 6, Appendix E Error! Reference source not found. and Appendix F and of this report.
The Environmental Report	
Is clear and concise in its layout and presentation.	We believe the report is clear and concise.
Uses simple, clear language and avoids or explains technical terms.	The report uses accessible language wherever possible.
Uses maps and other illustrations where appropriate.	Maps and illustrations have been utilised in the report.
Explains the methodology used.	The method used is set out in the report in Section 4 .
Explains who was consulted and what methods of consultation were used.	Appendix C of this report outlines the consultation that has been carried out to-date.
Identifies sources of information, including expert judgement and matters of opinion.	Sources of information are included throughout the report.
Contains a non-technical summary covering the overall approach to the SEA, the objectives of the plan, the main options considered, and any changes to the plan resulting from the SEA.	A Non-Technical Summary has been included as part of the report.

Quality Assurance Checklist

Consultation

The SEA is consulted on as an integral part of the plan-making process.	The previously issued SEA Scoping Report was consulted upon and responses to these are included in this Environmental Report (see Appendix C). The Environmental Report issued to accompany the draft WRMP was also subject to consultation (with responses summarised in Appendix C).
Consultation Bodies and the public likely to be affected by, or having an interest in, the plan or programme are consulted in ways and at times which give them an early and effective opportunity within appropriate time frames to express their opinions on the draft plan and Environmental Report.	Consultation on the draft WRMP and this Environmental Report was undertaken by Portsmouth Water for a 12 week period from 5 th March to 25 th May 2018. Consultation responses to the Environmental Report are summarised in Appendix C .

Decision-making and Information on the Decision

The environmental report and the opinions of those consulted are taken into account in finalising and adopting the plan or programme.	This will be incorporated in the revised WRMP following consultation on the draft WRMP and Environmental Report. These will be summarised in the Post Adoption Statement.
An explanation is given of how they have been taken into account.	This will be incorporated in the revised WRMP following consultation on the draft WRMP and Environmental Report. These will be summarised in the Post Adoption Statement.
Reasons are given for choosing the plan or programme as adopted, in the light of other reasonable alternatives considered.	This will be incorporated in the revised WRMP following consultation on the draft WRMP and Environmental Report. These will be summarised in the Post Adoption Statement.

Monitoring Measures

Measures proposed for monitoring are clear, practicable and linked to the indicators and objectives used in the SEA.	The report sets out potential indicators that Portsmouth Water could use in Section 7 .
Monitoring is used, where appropriate, during implementation of the plan or programme to make good deficiencies in baseline information in the SEA.	The suggestions for monitoring are included in Section 7 of the report. Monitoring will take place following implementation WRMP.
Monitoring enables unforeseen adverse effects to be identified at an early stage. (These effects may include predictions which prove to be incorrect.)	The suggestions for monitoring made in Section 7 are for Portsmouth Water to act on, with monitoring taking place following implementation of the WRMP.
Proposals are made for action in response to significant adverse effects.	Mitigation is outlined in Section 6 and Appendix E and F of this report.

Appendix B

Review of Plans and Programmes

International / European Plans and Programmes	
Purpose of the Document, including Objectives and Targets relevant to the Water Resources Management Plan and SEA	Relationships and Influences on the WRMP and the SEA
The Bonn Convention (or CMS) 1975 <i>The Convention on the Conservation of Migratory Species of Wild Animals</i>	
<p>The Convention on the Conservation of Migratory Species of Wild Animals (also known as the Bonn Convention or CMS) is an intergovernmental treaty under the United Nations Environment Programme. The convention was signed in 1979 ratified in the UK in 1985.</p> <p>The convention aims to ensure contracting parties work together to conserve terrestrial, marine and avian migratory species and their habitats (on a global scale) by providing strict protection for endangered migratory species.</p> <p>Overarching objectives set for the Parties are:</p> <ul style="list-style-type: none"> - Should promote, co-operate in and support research relating to migratory species; - Shall endeavour to provide immediate protection for migratory species; - Shall endeavour to conclude Agreements covering the conservation and management of migratory species included in Appendix II. <p>Setting targets is the responsibility of member states.</p>	<p>The WRMP should take into account the habitats and species that have been identified under this directive, and should include provision for their protection, preservation and improvement.</p> <p>The SEA assessment framework should include biodiversity, incorporating the importance of conserving migratory species.</p>
The Bern Convention 1979	
<p>The Convention on the Conservation of European Wildlife and Natural Habitats (the Bern Convention) was adopted in Bern, Switzerland in 1979, and came into force in 1982.</p> <p>The principal objectives are:</p> <ul style="list-style-type: none"> - To conserve wild flora and fauna and their natural habitats, especially those species and habitats whose conservation requires the co-operation of several States; - To promote such co-operation. Particular emphasis is given to endangered and vulnerable species, including endangered and vulnerable migratory species; - In order to achieve this the Convention imposes legal obligations on contracting parties, protecting over 500 wild plant species and more than 1000 wild animal species. <p>Targets for Contracting Parties are:</p> <ul style="list-style-type: none"> - Promoting national policies for the conservation of wild flora, wild fauna and natural habitats, with particular attention to endangered and vulnerable species, especially endemic ones, and endangered habitats, in accordance with the provisions of this Convention; - Undertaking in its planning and development policies, and in its measures against pollution, to have regard to the conservation of wild flora and fauna; - Promoting education and disseminating general information on the need to conserve species of wild flora and fauna and their habitats. 	<p>The WRMP should take into account the habitats and species that have been identified under the Convention, and should include provision for the preservation, protection and improvement of the quality of the environment as appropriate.</p> <p>The SEA assessment framework should incorporate the conservation provisions of the Convention particularly the protection of wild flora, fauna and natural habitats.</p>

International / European Plans and Programmes	
Purpose of the Document, including Objectives and Targets relevant to the Water Resources Management Plan and SEA	Relationships and Influences on the WRMP and the SEA
UNESCO (1971) <i>The Ramsar Convention on Wetlands</i>	
<p>The Convention on Wetlands of International Importance was signed in Ramsar, Iran in 1971. It is an intergovernmental treaty which provides the framework for national action and international co-operation for the conservation and wise use of wetlands and their resources, as a means to achieving sustainable development throughout the world.</p> <p>The original emphasis was on the conservation and wise use of wetlands primarily to provide habitat for water birds, however over the years the Convention has broadened its scope to incorporate all aspects of wetland conservation and wise use, recognising wetlands as ecosystems that are extremely important for biodiversity conservation and for the well-being of human communities.</p> <p><i>‘The Convention’s mission is the conservation and wise use of all wetlands through local, regional and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world’ (Ramsar COP8, 2002).</i></p> <p>A Strategic Plan 2009-2015 has been adopted to provide guidance on how efforts for implementing the Convention on Wetlands should be focussed. The strategy has 5 goals:</p> <ul style="list-style-type: none"> - Wise use: The wise use of all wetlands being achieved in all Parties, including more participative management of wetlands, and conservation decisions being made with an awareness of the importance of the ecosystem services provided by wetlands; - Wetlands of International Importance: Parties designating and managing Ramsar sites within their territories with a view to supporting an international network of Wetlands of International Importance, fully implementing their reporting commitments under Articles 3 and 8.2, and using the Montreux Record as part of the Convention’s governance process, as appropriate; - International cooperation: Parties developing their coherent national approaches to the implementation of the Ramsar Convention in such a way as to benefit from developing effective partnerships with related conventions and international agencies and with other Parties to the Convention on Wetlands; - Institutional capacity and effectiveness: Increasing success of the Convention in achieving the conservation and wise use of wetlands, as measured by agreed effectiveness indicators, and increased recognition of the Convention’s achievements by other sectors of governments and civil society; - Membership: All countries eligible for accession to have joined the Ramsar Convention by 2015. <p>A number of strategic key results are set out in the strategy against each of the 5 goals, e.g. by 2015 global wetland distribution and status data and information should be available through Web portal mechanisms, Ramsar guidance on the maintenance of ecological character to be have been applied with a priority upon recognized internationally important wetlands not yet designated as Ramsar sites.</p>	<p>The WRMP should ensure the protection and wise use of wetlands.</p> <p>The SEA assessment framework should incorporate the protection of wetland sites listed under the Ramsar convention.</p>
UNESCO World Heritage Convention (1972)	
<p>The Convention defines the kind of natural or cultural sites which can be considered for inscription on the World Heritage List. In addition to this, countries are required to:</p> <ul style="list-style-type: none"> • Ensure that measures are taken for the protection, conservation and presentation of cultural and natural heritage 	<p>The assessment framework should include an objective on heritage and archaeological issues.</p>

International / European Plans and Programmes	
Purpose of the Document, including Objectives and Targets relevant to the Water Resources Management Plan and SEA	Relationships and Influences on the WRMP and the SEA
<ul style="list-style-type: none"> Adopt a general policy that gives cultural and natural heritage a function in the life of the community Integrate the protection of heritage into comprehensive planning programmes. 	
The Kyoto Protocol 1997	
<p>The Kyoto Protocol was adopted in Kyoto, Japan, on 11 December 1997 and entered into force on 16 February 2005. It is an international agreement linked to the United Nations Framework Convention on Climate Change. The major feature of the Kyoto Protocol is that it sets binding targets for industrialized countries for reducing greenhouse gas (GHG) emissions. These amounted to an average of five per cent against 1990 levels in the first commitment period (2008 to 2012). The Protocol is planned to be extended to 2020 (the Kyoto second commitment period), pending ratification of the Doha Agreement.</p>	<p>The WRMP should aim to reduce greenhouse gas emissions.</p> <p>The SEA assessment framework should include objectives/guide questions related to reducing greenhouse gas emissions.</p>
The Aarhus Convention 1998	
<p>To contribute to the protection of present and future generations to live in an environment adequate to his or her health and well-being. This will be achieved through each Party subject to the convention guaranteeing the rights of access to information, public participation in decision-making, and access to justice in environmental matters in accordance with the provisions of this Convention.</p> <p>To establish and maintain a clear, transparent and consistent framework to implement the provisions of this Convention. This will be achieved through each Party taking the necessary legislative, regulatory and other measures, including measures to achieve compatibility between the provisions implementing the information, public participation and access-to-justice provisions in this Convention, as well as proper enforcement measures.</p> <p>Responsibility for implementation is deferred to the member states.</p>	<p>The development of the WRMP needs to be a transparent process.</p> <p>SEA should show a strong sense of safeguarding the lives of future generations and ensure that enough time is provided for consultation on the SEA documents in line with the Aarhus convention of establishing and maintaining a transparent clear framework.</p>
The Convention for the Protection of the Architectural Heritage of Europe (Granada Convention, 1987)	
<p>The main purpose of the convention is to reinforce and promote policies for the conservation and enhancement of Europe's heritage and to foster closer European co-operation in defence of heritage. Recognition that conservation of heritage is a cultural purpose and integrated conservation of heritage is an important factor in the improvement of quality of life.</p>	<p>The SEA assessment framework should include an objective on the conservation and enhancement of heritage and decision making criteria on architectural heritage.</p>
The European Convention on the Protection of Archaeological Heritage (Valetta Convention)	
<p>Agreement that the conservation and enhancement of an archaeological heritage is one of the goals of urban and regional planning policy. It is concerned in particular with the need for co-operation between archaeologists and planners to ensure optimum conservation of archaeological heritage.</p>	<p>The SA Framework should include an objective on the conservation and enhancement of heritage and decision making criteria on archaeological heritage.</p>
World Commission on Environment and Development (1987) <i>Our Common Future</i> (The Brundtland Report)	
<p>The Brundtland Report is concerned with the world's economy and its environment. The objective is to provide an expanding and sustainable economy while protecting a sustainable environment. The Report was a call by the United Nations:</p>	<p>The SEA and WRMP should seek to contribute to sustainable development.</p>

International / European Plans and Programmes	
Purpose of the Document, including Objectives and Targets relevant to the Water Resources Management Plan and SEA	Relationships and Influences on the WRMP and the SEA
<ul style="list-style-type: none"> to propose long-term environmental strategies for achieving sustainable development by the year 2000 and beyond; to strengthen co-operation among developing countries and between countries at different stages of economic and social development to achieve common and mutually supportive objectives which take account of the interrelationships between people, resources, environment and development; to consider ways and means by which the international community can deal more effectively with environment concerns; and to help define shared perceptions of long-term environmental issues and the appropriate efforts needed to deal successfully with the problems of protecting and enhancing the environment, a long term agenda for action during the coming decades, and aspirational goals for the world community. 	
The World Summit on Sustainable Development, Johannesburg (September 2002)	
<p>The World Summit resulted in the Johannesburg Declaration on Sustainable Development and a Plan of Implementation. The declaration reaffirms principles already agreed upon at the Rio Earth Summit UNCED in 1992 and the UN Millennium Summit in 1999. It recognises that poverty eradication is a key condition for sustainable development and addresses issues such as cultural diversity, patterns of production and consumption, health issues, armed conflicts, the new dimension created by globalisation, gender issues and financing for development.</p> <p>The implementation plan sets out actions to achieve sustainable development such as poverty eradication, changing unsustainable patterns of consumption and production, protecting and managing the natural resource base of economic and social development, sustainable development in a globalizing world and health and sustainable development.</p> <p>Sustainable development in England is delivered through the sustainable development strategy, Securing the Future, and in Wales through One Wales: One Planet, The Sustainable Development Scheme of the Welsh Government.</p>	<p>The WRMP should promote sustainable development.</p> <p>The SEA should help to deliver sustainable development through the balanced assessment of the WRMP.</p>
United Nations Convention on Biodiversity (the Rio Convention, 1992)	
<p>The Convention on Biodiversity called for the development and enforcement of national strategies and associated action plans to identify, conserve and protect existing biological diversity, and to enhance it wherever possible. In the UK, the UK Biodiversity Action Plan was then established to conserve and enhance biodiversity in the UK through the use of Habitats and Species Action Plans to help the most threatened species and habitats to recover and to contribute to the conservation of global biodiversity.</p>	<p>The assessment framework should include protection and enhancement of biodiversity.</p>
European Landscape Convention 2000 (became binding March 2007)	
<p>The European Landscape Convention was adopted on 20 October 2000 in Florence and came into force on 1 March 2004 (Council of Europe Treaty Series no. 176). It is open for signature by member states of the Council of Europe and for accession by the European Community and European non-member states. The UK Government signed the European Landscape Convention in 2006 and it became binding from March 2007.</p> <p>The aims of the Convention are to promote landscape protection, management and planning, and to organise European co-operation on landscape issues.</p> <p>Responsibility for implementation has been deferred to the signatories. Articles 5 (general measures) and 6 (specific measures) set out measures that the signatories will undertake, e.g.</p>	<p>The WRMP should take landscape into account.</p> <p>The SEA assessment framework should include landscape.</p>

International / European Plans and Programmes	
Purpose of the Document, including Objectives and Targets relevant to the Water Resources Management Plan and SEA	Relationships and Influences on the WRMP and the SEA
integrating landscape into policies with possible direct or indirect impact on landscape and to introduce instruments aimed at protecting, managing and/or planning the landscape.	
The Paris Agreement 2016	
The Paris Agreement was adopted at the 2015 Climate Change Conference, which aims to limit global temperature rises to 2 degrees. It was adopted by 195 countries at the Conference but will not come into force in 2020 unless ratified by at least 55 countries. The Agreement opened for signature in April 2016.	<p>The WRMP should aim to reduce greenhouse gas emissions.</p> <p>The SEA assessment framework should include greenhouse gas emissions.</p>
European Commission (2006) <i>Thematic Strategy for Soil Protection</i>	
<p>The <i>Thematic Strategy for Soil Protection</i> consists of a Communication from the Commission to the other European Institutions, a proposal for a framework Directive (a European law), and an Impact Assessment.</p> <p>It sets out an EU strategy for soil protection with an overall objective of the protection and sustainable use of soil, based on the following guiding principles:</p> <p>(1) Preventing further soil degradation and preserving its functions:</p> <ul style="list-style-type: none"> - when soil is used and its functions are exploited, action has to be taken on soil use and management patterns; and - when soil acts as a sink/receptor of the effects of human activities or environmental phenomena, action has to be taken at source. <p>(2) Restoring degraded soils to a level of functionality consistent at least with current and intended use, thus also considering the cost implications of the restoration of soil.</p> <p>The strategy proposes introducing a framework Directive setting out common principles for protecting soils across the EU, with Member States deciding how best to protect soil and how use it in a sustainable way on their own territory.</p>	<p>The WRMP should take potential effects on soil into account.</p> <p>The SEA assessment framework should include soils.</p>
European Commission (EC) (2011) <i>A Resource- Efficient Europe- Flagship Initiative Under the Europe 2020 Strategy, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions (COM 2011/21)</i>	
<p>This flagship initiative aims to create a framework for policies to support the shift towards a resource-efficient and low-carbon economy which will help to:</p> <ul style="list-style-type: none"> • Boost economic performance while reducing resource use; • Identify and create new opportunities for economic growth and greater innovation and boost the EU's competitiveness; • Ensure security of supply of essential resources; and • Fight against climate change and limit the environmental impacts of resource use. 	<p>The WRMP provides an opportunity to ensure reductions in resource use and to ensure security of supply of water.</p> <p>The SEA framework should include objectives relating to resource use.</p>
European Commission (2011) <i>A Roadmap for Moving to a Competitive Low Carbon Economy in 2050</i>	
The EU already has short term targets in place to reduce its emissions to 20% below 1990 levels by 2020; to increase the share of renewable energy to 20%; and to make a 20% improvement in energy efficiency. The 2050 roadmap looks beyond 2020 at longer term objectives.	The assessment framework should recognise that certain development proposals require an EIA to be undertaken,

International / European Plans and Programmes	
Purpose of the Document, including Objectives and Targets relevant to the Water Resources Management Plan and SEA	Relationships and Influences on the WRMP and the SEA
<p>The roadmap suggests that by 2050, the EU should cut its emissions to 80% below 1990 levels through domestic reductions alone. It sets out milestones which form a cost-effective pathway to this goal - reductions of 40% by 2030 and 60% by 2040. It also shows how the main sectors responsible for Europe's emissions - power generation, industry, transport, buildings and construction, as well as agriculture - can make the transition to a low-carbon economy most cost-effectively.</p>	<p>resulting in the identification of any likely significant environmental effects and associated mitigation measures.</p>
European Commission (2013) <i>Strategy on Adaptation to Climate Change</i>	
<p>The EU strategy aims to make Europe more climate-resilient by adapting to the changing climate. It aims to provide a coherent approach to enhance preparedness and capacity to respond to the impacts of climate change. The three key objectives of the strategy are:</p> <ul style="list-style-type: none"> Promoting action by Member States – encouraging Member States to adopt adaptation strategies and provide funding to boost capacity; 'Climate-proofing' action at EU level – promoting adaptation in vulnerable sectors such as agriculture and fisheries; and Better informed decision-making – addressing gaps in knowledge and improving the European information sharing platform, Climate-ADAPT. 	<p>The assessment framework should include criteria relating to climate resilience.</p>
European Commission (2014) <i>A Policy Framework for Climate and Energy in the Period from 2020 to 2030</i>	
<p>The 2030 climate and energy framework was adopted in 2014 and builds on the 2020 targets. It sets three key targets for 2030:</p> <ul style="list-style-type: none"> at least 40% cuts in greenhouse gas emissions (from 1990 levels); at least 27% share for renewable energy; and at least 27% improvement in energy efficiency. <p>The greenhouse gas emissions and renewable energy targets are binding, while the energy efficiency target will be reviewed in 2020.</p>	<p>The WRMP should support longer term targets for reducing greenhouse gas emissions, increasing renewable energy and energy efficiency.</p> <p>The SEA assessment framework should include the consideration of energy and greenhouse gas emissions.</p>
European Commission (2015) '<i>Closing the loop - An EU Action Plan for the Circular Economy</i>' policy package	
<p>This document sets out actions to implement the European Commission's long term vision of significantly reducing waste landfilling and increasing recycling.</p>	<p>The SEA should consider opportunities for the WRMP to contribute/enable the circular economy.</p>
European Union (1991) <i>The Nitrates Directive (91/676/EEC)</i>	
<p>The Nitrates Directive is designed to reduce water pollution caused by nitrate from agriculture. The directive requires Defra and the Welsh Government to identify surface or groundwaters that are, or could be high in nitrate from agricultural sources.</p> <p>Once a water body is identified as being high in nitrate all land draining to that water is designated a Nitrate Vulnerable Zone. Within these zones, farmers must observe an action programme of measures which include restricting the timing and application of fertilisers and manure, and keeping accurate records.</p>	<p>The WRMP should be consistent with the aim to reduce water pollution caused by nitrate from agriculture.</p> <p>The SEA assessment framework should include water quality.</p>
European Union (1991) <i>91/271/EEC for Urban Waste-water Treatment</i>	

International / European Plans and Programmes	
Purpose of the Document, including Objectives and Targets relevant to the Water Resources Management Plan and SEA	Relationships and Influences on the WRMP and the SEA
<p>The aim of the Urban Waste Water Directive is to protect the environment from the adverse effects of waste water discharges. It sets out guidelines and legislation for the collection, treatment and discharge of urban waste water. The Directive was adopted by member states in May 1991 and is transposed into law in England and Wales by The Urban Waste Water Treatment (England & Wales) Regulations 1994 (as amended*). The Regulations require that all significant discharges are treated to at least secondary treatment. They also set standards and deadlines for the provision of sewage systems, the treatment of sewage according to the size of the community served by the sewage treatment works and the sensitivity of receiving waters to their discharges.</p> <p>* The Regulations were amended in 2003 by The Urban Waste Water Treatment (England & Wales) (Amendment) Regulations 2003.</p> <p>Responsibility for Implementation is deferred to member states.</p>	<p>The WRMP needs to consider the implication of the Directive.</p> <p>The SEA assessment framework should include water quality.</p>
European Union (1992) <i>The Habitats Directive 92/43/EEC</i>	
<p>The Habitats Directive seeks to conserve natural habitats. Conservation of natural habitats requires member states to identify special areas of conservation and to maintain where necessary landscape features of importance to wildlife and flora.</p> <p>It is required that each Member State propose a list of sites indicating which natural habitat types and which species the sites host. The information would include a map of the site, its name, location and its extent. The Commission will then establish, in agreement with each Member State, a draft list of sites of Community importance drawn from the Member States' lists identifying those which host one or more priority natural habitat types or priority species.</p>	<p>The WRMP should take into account the habitats and species that have been identified under this Directive, and include provision for the preservation, protection and improvement of the quality of the environment as appropriate.</p> <p>The SEA assessment framework should incorporate sites protected for their nature conservation importance.</p>
European Union (1998) <i>Drinking Water Directive (98/83/EC)</i>	
<p>The Drinking Water Directive (DWD) concerns the quality of water intended for human consumption. The objective of the DWD is to protect the health of the consumers in the EU and to make sure the water is wholesome and clean. To do this, the DWD sets standards for 48 (microbiological and chemical) parameters that can be found in drinking water. The parameters must be monitored and tested regularly. In principle WHO guidelines for drinking water are used as a basis for the standards in the DWD. While translating the DWD into their own national legislation (transposition of the DWD), the Member States of the European Union can include additional requirements e.g. regulate additional substances that are relevant within their territory or set higher standards. However, Member States are not allowed to set lower standards as the level of protection of human health should be the same within the whole EU. Member States have to monitor the quality of the drinking water supplied to their citizens and of the water used in the food production industry. Member States report at three yearly intervals the monitoring results to the European Commission.</p> <p>Standards constitute legal limits. Sets limits for microbiological and chemical parameters in drinking water. Also gives indicator parameters.</p>	<p>The WRMP should contain objectives for drinking water quality to ensure that limits are not exceeded.</p> <p>The SEA assessment framework should include drinking water quality.</p>
European Union (1999) <i>Directive on the Landfill of Waste (99/31/EC)</i>	
<p>The Directive aims at reducing the amount of waste landfilled; promoting recycling and recovery; establishing high standards of landfill practice across the EU, and preventing the shipping of waste from one Country to another.</p>	<p>The WRMP should take the effects on waste to landfill into account.</p>

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<p>The objective of the Directive is to prevent or reduce as far as possible negative effects on the environment (in particular on surface water, groundwater, soil, air and human health) from the land-filling of waste, by introducing stringent technical requirements for waste and landfills.</p> <p>The Directive requires the reduction of the amount of biodegradable municipal waste sent to landfill to 75% of the total generated in 1995 by 2006, 50% by 2009 and 35% by 2016.</p>	<p>The SEA assessment should consider the effects on water, soil, air, human health and waste</p>
European Union (2000) <i>EU Water Framework Directive (2000/60/EC)</i>	
<p>The purpose of this Directive is to establish a framework for the protection of inland surface waters, transitional waters, coastal waters and groundwater. The framework aims to:</p> <ul style="list-style-type: none"> - Protect any further deterioration and enhance the status of aquatic ecosystems and, with regard to their water needs, terrestrial ecosystems and wetlands directly depending on the aquatic ecosystems; - Promote sustainable water use based on a long-term protection of available water resources; - Enhance protection and improvement of the aquatic environment, inter alias, through specific measures for the progressive reduction of discharges, emissions and losses of priority substances and the cessation or phasing-out of discharges, emissions and losses of the priority hazardous substances; - Ensure the progressive reduction of pollution of groundwater and prevent its further pollution; - Contribute to mitigating the effects of floods and droughts. <p>Key targets and indicators relevant to the WRMP and SEA are:</p> <ul style="list-style-type: none"> - Achievement of good ecological status and good surface water chemical status by 2015; - Achievement of good ecological potential and good surface water chemical status for heavily modified water bodies and artificial water bodies; - Prevention of deterioration from one status class to another; - Achievement of water-related objectives and standards for protected areas; - Achievement of good groundwater quantitative and chemical status by 2015; - Prevention of deterioration from one status class to another; - Reversal of any significant and sustained upward trends in pollutant concentrations and prevent or limit input of pollutants to groundwater; - Achievement of water related objectives and standards for protected areas. 	<p>The WRMP needs to consider the implication of the Directive in terms of sustainable water use, protection and improvement of the aquatic environment, reducing and preventing pollution and mitigating the effects of droughts.</p> <p>The SEA assessment framework should include water quality, water resources, sustainable water use, and biodiversity.</p>
European Union (2001) <i>Directive on the Assessment of the Effects of Certain Plans and Programmes on the Environment (SEA Directive) (2001/42/EC)</i>	
<p>The objective of the SEA Directive is “to provide for a high level of protection of the environment and to contribute to the integration of environmental considerations into the preparation and adoption of plans and programmes with a view of contributing towards sustainable development”.</p> <p>Throughout the course of the development of the plan, policy or programme, the aim of SEA is to identify the potential impact of options proposed in the plan in terms of their environmental,</p>	<p>Driver for SEA. Need to ensure all topics identified in the SEA Directive are considered within the scope of the assessment.</p> <p>Need to ensure that the subsequent Environmental</p>

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economic and social effects. If any adverse effects are identified, these options can then be avoided or proposals modified to manage or mitigate adverse effects.	Report meets the requirements of Annex I of the SEA Directive.
European Union (2001) National Emissions Ceiling Directive 2001/81/EC	
<p>The Directive sets upper limits for each Member State for the total emissions in 2010 of the four pollutants responsible for acidification, eutrophication and ground-level ozone pollution (sulphur dioxide, nitrogen oxides, volatile organic compounds and ammonia). The UK 2010 ceilings for each of these pollutants were 585 kilotonnes, 1,167 kilotonnes, 1,200 kilotonnes and 297 kilotonnes, respectively.</p> <p>This is being revised through the Thematic Strategy on Air Pollution and emissions ceilings for the four compounds and particulate matter (PM_{2.5}) up to 2020 are anticipated.</p>	Consider the need for air quality to be included in the SEA framework.
European Union (2002) The Environment Noise Directive (Directive 2002/49/EC)	
<p>The END aims to “define a common approach intended to avoid, prevent or reduce on a prioritised basis the harmful effects, including annoyance, due to the exposure to environmental noise”. For that purpose several actions are to be progressively implemented. It furthermore aims at providing a basis the harmful effects, including annoyance, due to the exposure to environmental noise”. For that purpose several actions are to be progressively implemented. It furthermore aims at providing a basis for developing EU measures to reduce noise emitted by major sources, in particular road and rail vehicles and infrastructure, aircraft, outdoor and industrial equipment and mobile machinery.</p> <p>The underlying principles of the Directive are similar to those underpinning other overarching environment policies (such as air or waste), i.e.:</p> <ul style="list-style-type: none"> - Monitoring the environmental problem; by requiring competent authorities in Member States to draw up "strategic noise maps" for major roads, railways, airports and agglomerations, using harmonised noise indicators Lden (day-evening-night equivalent level) and Lnight (night equivalent level). These maps will be used to assess the number of people annoyed and sleep-disturbed respectively throughout Europe. - Informing and consulting the public about noise exposure, its effects, and the measures considered to address noise, in line with the principles of the Aarhus Convention. - Addressing local noise issues by requiring competent authorities to draw up action plans to reduce noise where necessary and maintain environmental noise quality where it is good. The directive does not set any limit value, nor does it prescribe the measures to be used in the action plans, which remain at the discretion of the competent authorities. - Developing a long-term EU strategy, which includes objectives to reduce the number of people affected by noise in the longer term, and provides a framework for developing existing Community policy on noise reduction from source. With this respect, the Commission has made a declaration concerning the provisions laid down in article 1.2 with regard to the preparation of legislation relating to sources of noise. <p>It is important to note, however, that the present Directive does not set binding limit values, nor does it prescribe the measures to be included in the action plans thus leaving those issues at the discretion of the competent authorities.</p> <p>The long-term exposure indicators supersede those in the 1999 World Health Organisation (WHO) Guidelines for Community Noise, which are now in the process of being updated in line with the Directive.</p>	<p>The WRMP will need to have regard to the requirements of the END.</p> <p>The SEA assessment framework should include for the protection against excessive noise.</p>

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European Union (2002) Directive 2002/91/EC on the Energy Performance of Buildings	
<p>The European Union Energy Performance of Buildings Directive was published in the Official Journal on the 4th January 2003. The overall objective of the Directive is to <i>promote the improvement of energy performance of buildings within the Community taking into account outdoor climate and local conditions as well as indoor climate requirements and cost effectiveness</i>.</p> <p>The Directive highlights how the residential and tertiary sectors, the majority of which are based in buildings, accounts for 40% of EU energy consumption.</p>	<p>The SEA should highlight any opportunities for new buildings associated with the WRMP to contribute to improved energy performance.</p>
European Commission (2004), Environmental Liability Directive (2004/35/EC)	
<p>The Directive establishes a framework for environmental liability based on the "polluter pays" principle, with a view to preventing and remedying environmental damage.</p>	<p>The SEA should take account of the need to ensure that proposals in the WRMP avoids causing direct or indirect damage to the aquatic environment or contamination of land that creates a significant risk to human health.</p>
European Union (2005) Thematic Strategy on Air Pollution	
<p>This strategy supplements current legislation. It sets out objectives for air pollution and proposes measures for achieving them by 2020.</p>	<p>The SEA undertaken for the last iteration of the WRMP scoped out air quality and consideration should be given to this approach.</p>
European Union (2006), Animal health requirements for aquaculture animals and products thereof, and on the prevention and control of certain diseases in aquatic animals (2006/88/EC)	
<p>The Directive establishes:</p> <ul style="list-style-type: none"> Animal health requirements for the placing on the market, importation and transit of aquaculture animals and their products; Minimum measures to prevent diseases in aquaculture animals; Minimum measures to be taken in response to suspected or established cases of certain diseases in aquatic animals. 	<p>The SEA should take account of the need to maintain or enhance the quality of habitats and biodiversity.</p>
European Union (2006) Directive 2006/118EC on the protection of groundwater against pollution and deterioration	
<p>This Directive establishes specific measures as provided for in Article 17(1) and (2) of Directive 2000/60/EC (Water Framework Directive) in order to prevent and control groundwater pollution. This Directive is designed to prevent and combat groundwater pollution.</p>	<p>The SEA should take account of the need to maintain, protect and improve water quality across the WRMP area.</p>
European Union (2006) The Bathing Waters Directives 2006 2006/7/EC	
<p>The Bathing Waters Directive set standards for the quality of bathing waters (with the exception of water intended for therapeutic bathing purposes and water used in swimming pools).</p> <p>It lays down the minimum quality criteria to be met by bathing water:</p> <ul style="list-style-type: none"> the physical, chemical and microbiological parameters; the mandatory limit values and indicative values for such parameters; the minimum sampling frequency and method of analysis or inspection of such water. 	<p>The WRMP will need to comply with set limits.</p> <p>The SEA assessment should include a guide question relating to the effects of options on the water quality at designated bathing waters.</p>

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<p>Member States fix the values that they apply to bathing water in accordance with the guidelines of Directive 76/160/EEC. Member States may fix more stringent values than those laid down in the Directive. Where it does not give any values for certain parameters, Member States are not obliged to fix any.</p> <p>The Directive is transposed into law in England and Wales through the Bathing Water (Classifications) Regulations 2003.</p> <p>In March 2006, a revised Bathing Water Directive was adopted and become law in the UK in March 2008. As well as stricter water quality standards, it contains a requirement to provide more detailed and standardised information about bathing waters across Europe. Directive 2006/7/EC will repeal the Directive 76/160/EEC in 2014.</p> <p>Bathing waters are protected areas under the Water Framework Directive.</p> <p>Mandatory standards are given for 10 parameters: total coliforms, faecal coliforms, salmonella, enteroviruses, pH, colour, mineral oils, surface active substances (detergents), phenols and transparency.</p> <p>The Directive also sets the minimum frequency at which bathing waters should be sampled.</p>	
European Union (2006) Sustainable Development Strategy	
<p>This document sets out a single coherent strategy outlining how the EU will meet long-standing commitments to sustainable development. This document presents a renewed version of the 2001 EU Sustainable Development Strategy (SDS). The aim of the SDS is to identify and develop actions to enable the EU to achieve continuous improvement of quality of life both for current and for future generations, through the creation of sustainable communities able to manage and use resources efficiently, and to tap the ecological and social innovation potential of the economy, ensuring prosperity, environmental protection and social cohesion.</p> <p>The key objectives of the strategy are:</p> <ul style="list-style-type: none"> - Environmental protection; - Social equity and cohesion; - Economic prosperity; and - Meeting our international responsibilities. <p>The following key challenge areas include a number of targets in achieving their respective objectives:</p> <ul style="list-style-type: none"> - Climate Change and clean energy; - Sustainable Transport; - Sustainable consumption and production; - Conservation and management of natural resources; - Public Health; - Social inclusion, demography and migration; - Global poverty and sustainable development challenges. 	<p>The WRMP should reflect all of the aims and targets set out in the Sustainable Development Strategy.</p> <p>The SEA assessment framework should reflect the core and supporting principles of the strategy including climate change, sustainable transport, public health, social inclusion and poverty.</p>

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<p>The strategy was reviewed by the European Commission in 2009 (<i>Mainstreaming sustainable development into EU policies: 2009 Review of the European Union Strategy for Sustainable Development</i>), which underlined that the EU has mainstreamed sustainable development into a broad range of its policies in recent years, but that efforts still need to be intensified to address unsustainable trends such as energy consumption.</p>	
European Union (2006) Mining Waste Directive (2006/21/EC)	
<p>The Directive aims to prevent or reduce as far as possible any adverse effects on the environment, and any resultant risks to human health, brought about as a result of the management of waste from the extractive industries. The Directive covers the management of waste resulting directly from prospecting, extraction, treatment and storage of mineral resources and from quarrying. Operators are required to use Best Available Techniques in the management of waste facilities and the prevention of major accidents.</p>	<p>The WRMP should have regard to the aim to avoid adverse effects from extractive waste.</p> <p>The SEA assessment framework should include consideration of waste.</p>
European Union (2007) Floods Directive 2007/60/EC	
<p>The Floods Directive requires Member States to assess if all water courses and coast lines are at risk from flooding, to map the flood extent and assets and humans at risk in these areas and to take adequate and coordinated measures to reduce this flood risk.</p> <p>Member States are required to carry out a preliminary assessment by 2011 to identify the river basins and associated coastal areas at risk of flooding.</p>	<p>The WRMP should take account of the flood risk management plans as they become available through the life of the plan.</p> <p>The SEA assessment framework should include flood risk.</p>
European Union (2007) The Eel Directive 2007/1100/EC	
<p>The Eel Directive establishes measures for the recovery of the stock of European eel and requires member states to produce Eel management plans for each catchment.</p>	<p>The WRMP should ensure that there are no adverse impacts on eel as a result of water resource management measures.</p>
European Union (2008) Environmental Quality Standards Directive 2008/105/EC	
<p>The Directive aims to control the concentration of certain substances which pose a risk to the aquatic environment. The 33 'priority substances' addressed by the Directive are defined by the Water Framework Directive (2000/60/EC), including cadmium, lead, mercury, nickel, benzene and polyaromatic hydrocarbons.</p> <p>The Directive sets thresholds of concentration that must not be exceeded, with limits to average values over a year to ensure long-term water quality and maximum allowable concentrations to limit short term pollution peaks. Member States must comply with the water quality standards and record an inventory of emissions and discharges of all substances in the Directive.</p>	<p>The assessment framework should include assessment criteria relating to water quality.</p>
European Union (2008) Marine Strategy Framework Directive 2008/56/EC	
<p>The Directive sets out a framework for an ecosystem-based approach to the management of human activities which supports the sustainable use of marine goods and services. The overarching goal of the Directive is to achieve 'Good Environmental Status' (GES) by 2020 across Europe's marine environment. The Directive establishes four European Marine Regions, based on geographical and environmental criteria. The North East Atlantic Marine Region is divided into four subregions, with UK waters lying in two of these (the Greater North Sea and the Celtic Seas).</p> <p>Each Member State is required to develop a marine strategy for their waters, in coordination with other countries within the same marine region or subregion. Marine strategies must be</p>	<p>The assessment framework should incorporate assessment criteria relating to the quality of the marine environment.</p>

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<p>implemented to protect and conserve the marine environment, prevent its deterioration, and, where practicable, restore marine ecosystems in areas where they have been adversely affected. The marine strategies must contain:</p> <ul style="list-style-type: none"> • An initial assessment of the current environmental status of that Member State's marine waters; • A determination of what Good Environmental Status means for those waters; • Targets and indicators designed to show whether a Member State is achieving GES; • A monitoring programme to measure progress towards GES; • A programme of measures designed to achieve or maintain GES. <p>The Directive also requires Marine Protected Areas (MPAs) to be established to support the achievement of GES.</p>	
European Union (2008) <i>EU Air Quality Directive (2008/50/EC) and previous directives (96/62/EC; 99/30/EC; 2000/69/EC & 2002/3/EC)</i>	
<p>The Directive:</p> <ul style="list-style-type: none"> - defines and establishes objectives for ambient air quality to avoid, prevent or reduce harmful effects on human health and the environment as a whole; - assesses the ambient air quality in Member States using common methods and criteria; - obtains information on ambient air quality in order to help combat air pollution and nuisance and to monitor long-term trends and improvements resulting from national and Community measures; - ensures that such information on ambient air quality is made available to the public; - seeks to maintain air quality where it is good and improving it in other cases; and - promotes increased cooperation between the Member States in reducing air pollution. 	<p>The WRMP should contribute towards achieving air quality standards set out in the Directive.</p> <p>Consider the need for air quality to be included in the SEA framework.</p>
European Union (2008) <i>Directive on Waste (Directive 75/442/EEC, 2006/12/EC 2008/98/EC as amended)</i>	
<p>The essential objective of all provisions relating to waste management should be the protection of human health and the environment against harmful effects caused by the collection, transport, treatment, storage and tipping of waste. Some key objectives include:</p> <ul style="list-style-type: none"> - The recovery of waste and the use of recovered materials as raw materials should be encouraged; - Member States should, in addition to taking responsible action to ensure the disposal and recovery of waste, take measures to restrict the production of waste; - It is important for the Community as a whole to become self-sufficient in waste disposal and desirable for Member States individually to aim at such self-sufficiency; - Waste management plans should be drawn up in the Member States; - Movements of waste should be reduced; - Ensure a high level of protection and effective control; 	<p>The WRMP should seek to ensure the protection of human health and the environment in relation to waste management.</p> <p>The SEA assessment should include objectives on the protection of human health and the environment.</p>

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<ul style="list-style-type: none"> - Subject to certain conditions, and provided that they comply with environmental protection requirements, some establishments which process their waste themselves or carry out waste recovery may be exempted from permit requirements; - That proportion of the costs not covered by the proceeds of treating the waste must be defrayed in accordance with the 'polluter pays' principle. 	
European Union (2009) <i>EU Directive on the Conservation of Wild Birds (09/147/EC)</i> (codified version of Council Directive 79/409/EEC as amended)	
<p>The Directive provides a framework for the conservation and management of, and human interactions with, wild birds in Europe. The main provisions of the Directive include:</p> <ul style="list-style-type: none"> • The maintenance of the populations of all wild bird species across their natural range (Article 2) with the encouragement of various activities to that end (Article 3). • The identification and classification of Special Protection Areas (SPAs) for rare or vulnerable species listed in Annex I of the Directive, as well as for all regularly occurring migratory species, paying particular attention to the protection of wetlands of international importance (Article 4). (Together with Special Areas of Conservation designated under the Habitats Directive, SPAs form a network of European protected areas known as Natura 2000). • The establishment of a general scheme of protection for all wild birds (Article 5). • Restrictions on the sale and keeping of wild birds (Article 6). • Specification of the conditions under which hunting and falconry can be undertaken (Article 7). (Huntable species are listed on Annex II of the Directive). • Prohibition of large-scale non-selective means of bird killing (Article 8). • Procedures under which Member States may derogate from the provisions of Articles 5-8 (Article 9) — that is, the conditions under which permission may be given for otherwise prohibited activities. • Encouragement of certain forms of relevant research (Article 10 and Annex V). • Requirements to ensure that introduction of non-native birds do not threatened other biodiversity (Article 11). 	<p>The WRMP should seek to protect and enhance biodiversity, particularly designated sites.</p> <p>The SEA assessment framework should include objectives, indicators and targets that cover biodiversity.</p>
European Union (2010) <i>Industrial Emissions Directive (integrated pollution prevention and control) 2010/75/EU</i>	
<p>This Directive brings together the IPPC Directive (2008/1/EC) and six other Directives on titanium dioxide, VOCs and waste incineration, with the aim of reducing pollutant emissions. It covers industries with high polluting potential such as energy, production and processing of metals, minerals, chemicals, waste management and rearing of animals.</p> <p>It defines the obligations to be met by industrial activities with a major pollution potential. This includes establishing a permit procedure, requirements for Best Available Techniques (BAT) and setting out requirements for discharges.</p>	<p>The assessment framework should include criteria that ensure the protection of the environment through the prevention of pollution.</p>
European Union (2010) <i>Energy 2020 - A Strategy for Competitive, Sustainable and Secure Energy</i>	
<p>EU energy and climate goals have been incorporated into the Europe 2020 Strategy for smart, sustainable and inclusive growth. The energy strategy includes five priorities for Europe:</p>	<p>The assessment framework should include criteria relating to energy where appropriate</p>

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<ol style="list-style-type: none"> 1. Achieving an energy-efficient Europe; 2. Building a truly pan-European integrated energy market; 3. Empowering consumers and achieving the highest level of safety and security; 4. Extending Europe's leadership in energy technology and innovation; 5. Strengthening the external dimension of the EU energy market. <p>Energy 2020 is part of Resource-Efficient Europe, one of the seven key initiatives of Europe 2020.</p>	
European Union (2010) <i>Europe 2020 : A strategy for smart, sustainable and inclusive growth</i>	
<p>Europe 2020 is the EU's ten-year growth strategy. It aims to change the EU's growth model and create the conditions for growth that is smarter, more sustainable and more inclusive. It contains seven 'flagship initiatives' to provide a framework for innovation, the digital economy, employment, youth, industrial policy, poverty, and resource efficiency.</p> <p>There are also five key target areas for the EU to achieve by 2020:</p> <ol style="list-style-type: none"> 1. Employment: 75% of the 20-64 year-olds to be employed. 2. R&D: 3% of the EU's GDP to be invested in R&D. 3. Climate change and energy sustainability: greenhouse gas emissions 20% (or even 30%, if the conditions are right) lower than 1990; 20% of energy from renewable; 20% increase in energy efficiency. 4. Education: reducing the rates of early school leaving below 10%; at least 40% of 30-34-year-olds completing third level education. 5. Fighting poverty and social exclusion: at least 20 million fewer people in or at risk of poverty and social exclusion. 	<p>The assessment framework should include criteria relating to employment, R&D, climate change and poverty where relevant.</p>
European Union (2011) <i>EU Biodiversity Strategy to 2020 – towards implementation</i>	
<p>The European Commission has adopted an ambitious new strategy to halt the loss of biodiversity and ecosystem services in the EU by 2020.</p> <p>The strategy provides a framework for action over the next decade and covers the following key areas:</p> <ul style="list-style-type: none"> • Conserving and restoring nature; • Maintaining and enhancing ecosystems and their services; • Ensuring the sustainability of agriculture, forestry and fisheries; • Combating invasive alien species; • Addressing the global biodiversity crisis. 	<p>The WRMP should seek to protect and enhance biodiversity, particularly designated sites.</p> <p>The SEA assessment framework should include objectives, indicators and targets that cover biodiversity.</p>
European Union (2009) <i>Renewable Energy Directive (2009/28/EC)</i>	

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<p>This Directive establishes a common framework for the use of energy from renewable sources in order to limit greenhouse gas emissions and to promote cleaner transport. It encourages energy efficiency, energy consumption from renewable sources and the improvement of energy supply.</p> <p>The Member States are to establish national action plans which set the share of energy from renewable sources consumed in transport, as well as in the production of electricity and heating, for 2020. These action plans must take into account the effects of other energy efficiency measures on final energy consumption (the higher the reduction in energy consumption, the less energy from renewable sources will be required to meet the target). These plans will also establish procedures for the reform of planning and pricing schemes and access to electricity networks, promoting energy from renewable sources.</p> <p>Each Member State has a target calculated according to the share of energy from renewable sources in its gross final consumption for 2020. The UK is required to source 15 per cent of energy needs from renewable sources, including biomass, hydro, wind and solar power by 2020. From 1 January 2017, biofuels and bioliquids share in emissions savings should be increased to 50%.</p>	<p>The WRMP should seek to contribute towards increasing the proportion of energy from renewable energy sources.</p> <p>The SEA assessment framework should include consideration of use of energy from renewable energy sources.</p>
EU Directives on <i>Environmental Impact Assessment (Codified Directive 2011/92/EU and Revised Directive 2014/52/EU)</i>	
<p>The Directive, as enacted in 1985, amended, codified in 2011 and revised in 2014, sets out procedural requirements for certain development proposals to undergo an Environmental Impact Assessment (EIA) before being granted consent through the town and country planning or other consenting regimes. The UK Government is obliged to transpose the Revised EIA Directive by May 2017.</p>	<p>The SEA should recognise that certain development proposals require an EIA to be undertaken, resulting in the identification of any likely significant environmental effects and associated mitigation measures.</p>
European Union 2012 <i>Energy Efficiency Directive (2012/27/EU)</i>	
<p>The Directive establishes a set of binding measures to help the EU reach its 20% energy efficiency target by 2020. Under the Directive, all EU countries are required to use energy more efficiently at all stages of the energy chain from its production to final consumption.</p> <p>Specific measures relate to:</p> <ul style="list-style-type: none"> energy distributors achieving 1.5% energy savings per year through energy efficiency measures; improving the efficiency of heating systems, installing double glazed windows or insulating roofs; purchasing energy efficient buildings, products and services, and performing energy efficient renovations; access to data on consumption; large companies to audit energy consumption (implemented in the UK through the Energy Savings Opportunity Scheme Regulations 2014); national incentives for SMEs to undergo energy audits; and monitoring efficiency levels in new energy generation capacities. 	<p>The WRMP should seek to contribute towards targets for energy efficiency.</p> <p>The SEA assessment framework should include consideration of energy consumption and efficiency.</p>
European Union (2014) <i>Seventh Environmental Action Programme to 2020 'Living well, within the limits of our planet'</i>	

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<p>The seventh Environmental Action Programme defines environmental priority objectives to be achieved by the EU up to 2020. As part of the programme, the EU aims to protect natural capital; promote resource-efficient and low-carbon growth; and safeguard health and wellbeing linked to pollutants, chemicals and climate change. The nine objectives and actions set out in the programme are:</p> <ul style="list-style-type: none"> • to protect, conserve and enhance the Union's natural capital; • to turn the Union into a resource-efficient, green, and competitive low-carbon economy; • to safeguard the Union's citizens from environment-related pressures and risks to health and wellbeing; • to maximise the benefits of the Union's environment legislation by improving implementation; • to increase knowledge about the environment and widen the evidence base for policy; • to secure investment for environment and climate policy and account for the environmental costs of any societal activities; • to better integrate environmental concerns into other policy areas and ensure coherence when creating new policy; • to make the Union's cities more sustainable; and • to help the Union address international environmental and climate challenges more effectively. 	<p>The assessment framework should, where relevant, reflect the objectives of the programme.</p>
European Union (2015) <i>Invasive Alien Species Regulation (1143/2014/EU)</i>	
<p>This Regulation seeks to address the problem of invasive alien species in a comprehensive manner so as to protect native biodiversity and ecosystem services, as well as to minimize and mitigate the human health or economic impacts that these species can have.</p>	<p>The SEA assessment framework should include guide questions relating to invasive species.</p>

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Department for Business, Energy and Industrial Strategy (BEIS) formerly the Department for Energy and Climate Change (DECC) (2010) CRC Energy Efficiency Scheme	
<p>The CRC Energy Efficiency Scheme is a Government backed legislative carbon emissions trading scheme and covers large business and public sector organisations in the UK. RC was intended to have a significant impact on reducing UK carbon emissions, offering the potential to save money through energy efficiency. It was designed to drive changes in behaviour and infrastructure, generate corporate awareness of the detrimental impacts of carbon emissions, and improve energy management practice. The Government announced in March 2016 that the scheme will be abolished from the end of the 2018/2019 compliance year.</p>	<p>The WRMP should seek to help contribute towards achieving carbon reduction.</p> <p>The SEA assessment should cover topics that will help to ensure that carbon emissions are reduced.</p>
BEIS (formerly DECC) (2011) National Policy Statements for Energy Infrastructure	
<p>The energy National Policy Statements (NPSs) set out national policy against which proposals for major energy projects will be assessed and decided on by the Infrastructure Planning Commission. The following six NPSs have been designated:</p> <ul style="list-style-type: none"> - Overarching NPS for Energy (EN1); - Fossil Fuel Electricity Generating Infrastructure NPS (EN2); - Renewable Energy Infrastructure NPS (EN3) ; - Gas Supply Infrastructure & Gas and Oil Pipelines NPS (EN4); - Electricity Networks Infrastructure NPS (EN5); - Nuclear Power Generation NPS (EN6). <p>The Overarching NPS for Energy sets out that the purpose of the NPSs is to develop a clear, long-term policy framework which facilitates investment in the necessary new infrastructure (by the private sector) and in energy efficiency. The NPS highlights that the construction, operation and decommissioning of this infrastructure can lead to increased demand for water, involve discharges to water and cause adverse ecological effects resulting from physical modifications to the water environment. The NPSs expect applicants to undertake an assessment of the existing status of, and impacts of the proposed project on, water quality, water resources and physical characteristics of the water environment.</p> <p>The NPSs reiterate and are underpinned by the target to cut greenhouse gas emissions by at least 80% by 2050, compared to 1990 levels.</p>	<p>The WRMP may need to consider the potential impact of major energy proposals on water resources in the Portsmouth Water area.</p> <p>The SEA should consider the cumulative effects of the WRMP and any major energy proposals which may affect water resources in the Portsmouth Water operational area.</p>
Department of Communities and Local Government (DCLG) (2014) National Planning Policy for Waste	
<p>Sets out detailed waste planning policies for local authorities. States that planning authorities need to:</p> <ul style="list-style-type: none"> • Need to use a proportionate evidence base in preparing Local Plans • Identify sufficient opportunities to meet the identifies needs of their area for the management of waste streams • Identifying suitable sites and areas for waste facilities 	<p>The WRMP may need to consider the potential impact of proposals on waste generation and on waste management facilities in the Portsmouth Water area.</p> <p>The SEA should consider the effects of the WMRP on waste generation and management capacity.</p>
Defra (2010) Air Pollution: Action in a Changing Climate	
<p>This document highlights the health benefits that can be achieved through closer integration of air quality and climate change policies. Air pollution often originates from the same activities that contribute to climate change (notably transport and electricity generation), so linkages between these policy areas could help ensure that they are managed most effectively. Air quality/climate change co-benefits can be realised through actions such as promoting low-carbon vehicles and renewable sources of energy that do not involve combustion.</p> <p>The document aims to set ambitious but realistic air quality targets, and to ensure that climate and air quality targets are better aligned in future.</p>	<p>The WRMP should seek to ensure that air quality, climate change and human health are not adversely affected by the options.</p> <p>The SEA should include guide questions relating to the effects of options on human health and the environment.</p>
Defra (2011) Biodiversity 2020: A strategy for England's wildlife and ecosystem services	
<p>This new biodiversity strategy for England provides a comprehensive picture of how we are implementing our international and EU commitments. It sets out the strategic direction for biodiversity policy for the next decade on land (including rivers and lakes) and at sea.</p> <p>The strategy sets 20 targets across 5 strategic goals:</p>	<p>The WRMP should contribute towards meeting the targets and objectives within the strategy.</p> <p>The SEA should include objectives to improve status of biodiversity and enhance benefits</p>

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<ul style="list-style-type: none"> - Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society; - Reduce the direct pressures on biodiversity and promote sustainable use; - Improve status of biodiversity by safeguarding ecosystems, species and genetic diversity; - Enhance the benefits to all from biodiversity and ecosystem services; and - Enhance implementation through participatory planning, knowledge management and capacity building. 	<p>of biodiversity and its ecosystem services, and reduce pressures on ecosystems.</p>
Defra (2006) Shoreline Management Plan Guidance	
<p>A shoreline management plan (SMP) is a coastal defence management tool. It is a large-scale assessment of the risks associated with coastal processes and helps to reduce these risks to people and the developed, historic and natural environment. This guidance document sets out Defra's and WAG's strategy for managing flooding and coastal erosion.</p> <p>The guidance includes the following objectives:</p> <ul style="list-style-type: none"> - set out the risks from flooding and erosion to people and the developed, historic and natural environment within the SMP area; - identify opportunities to maintain and improve the environment by managing the risks from floods and coastal erosion; - identify the preferred policies for managing risks from floods and erosion over the next century; - identify the consequences of putting the preferred policies into practice; - set out procedures for monitoring how effective these policies are; - inform others so that future land use, planning and development of the shoreline takes account of the risks and the preferred policies; - discourage inappropriate development in areas where the flood and erosion risks are high; and - meet international and national nature conservation legislation and aim to achieve the biodiversity objectives. 	<p>The WRMP should take into account its effects on areas with a SMP.</p> <p>The SEA assessment should take into account the effects of the options on the coast where relevant.</p>
Defra (2007) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland	
<p>The Air Quality Strategy sets out air quality objectives and policy options to further improve air quality in the UK to benefit public health, quality of life and help to protect our environment. The strategy sets out objectives relating to particles, nitrogen dioxide, ozone, sulphur dioxide, polycyclic aromatic hydrocarbons, benzene, 1,3- butadiene, carbon monoxide, lead, nitrogen oxides and sulphur dioxide.</p>	<p>The WRMP should take account of air quality objectives in the strategy.</p> <p>The SEA should include guide questions relating to the effects of options on human health and the environment.</p>
Defra, Scottish Government, Welsh Government (2015) The Great Britain Invasive Non-native Species Strategy	
<p>This Strategy aims to address invasive non-native species (INNS) issues in Great Britain (GB), maintaining the approach of the first version of the policy published in 2008 and a policy review in 2003. The Strategy covers the terrestrial, freshwater and marine environments and also species native to one part of a country that become invasive in areas outside their natural range.</p>	<p>Implementation of the WRMP should take account of the implications of Invasive Non-native species.</p> <p>The SEA Assessment Framework could give consideration to issues associated with Invasive Non-native species.</p>
Defra (2011) Natural Environment White Paper	
<p>The Natural Environment White Paper (2011) recognises that nationally, the fragmentation of natural environments is driving continuing threats to biodiversity. It sets out the Government's policy intent to:</p> <ul style="list-style-type: none"> - improve the quality of the natural environment across England; - move to a net gain in the value of nature; - arrest the decline in habitats and species and the degradation of landscapes; - protect priority habitats; - safeguard vulnerable non-renewable resources for future generations; - support natural systems to function more effectively in town, in the country and at sea; and - create an ecological network which is resilient to changing pressures. 	<p>The WRMP should reflect the Government's policy intent set out in the White Paper.</p> <p>The SEA assessment framework should include objectives, indicators and targets that reflect the Government's policy intent set out in the White Paper.</p>

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<p>By 2020, the Government wants to achieve an overall improvement in the status of the UK's wildlife including no net loss of priority habitat and an increase of at least 200,000 hectares in the overall extent of priority habitats. Under the White Paper, the Government has also put in place a clear institutional framework to support nature restoration which includes Local Nature Partnerships creating new Nature Improvement Areas (NIAs).</p>	
Defra (2012) National Policy Statement for Waste Water	
<p>This National Policy Statement (NPS) sets out Government policy for the provision of major waste water infrastructure. It will be used by the Infrastructure Planning Commission (IPC) to guide its decision making on development consent applications for waste water developments that fall within the definition of Nationally Significant Infrastructure Project (NSIP) as defined in the Planning Act 2008. As well as considering the general need for new waste water infrastructure, this NPS covers two NSIPs which have been assessed as required to meet this need.</p>	<p>The WRMP should consider any unforeseen NSIP proposals that come forward prior to adoption which may affect water resources in the Portsmouth Water area.</p> <p>The SEA should consider the cumulative effects of the WRMP and any unforeseen NSIP proposals that come forward which may affect water resources in the Portsmouth Water area.</p>
Defra (2012) UK post 2010 Biodiversity Framework	
<p>The Framework is to set a broad enabling structure for action across the UK between now and 2020:</p> <ol style="list-style-type: none"> To set out a shared vision and priorities for UK- scale activities, in a framework jointly owned by the four countries, and to which their own strategies will contribute; To identify priority work at a UK level which will be needed to help deliver the Aichi targets and the EU Biodiversity Strategy To facilitate the aggregation and collation of information on activity and outcomes across all countries of the UK, where the four countries agree this will bring benefits compared to individual country work; and To streamline governance arrangements for UK- scale activity <p>The Framework sets out 20 new global 'Aichi targets' under 5 strategic goals:</p> <ul style="list-style-type: none"> Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society Reduce the direct pressures on biodiversity and promote sustainable use To improve the status of biodiversity by safeguarding ecosystems species and genetic diversity Enhance the benefits to all from biodiversity and ecosystem services Enhance implementation through participatory planning, knowledge management and capacity building 	<p>The WRMP should contribute towards meeting the targets and objectives within the framework.</p> <p>The SEA should include objectives to improve status of biodiversity and enhance benefits of biodiversity and its ecosystem services, and reduce pressures on ecosystems.</p>
Defra (2013) The National Adaptation Programme – Making the Country Resilient to a Changing Climate	
<p>This Programme contains a mix of policies and actions to help adapt successfully to future weather conditions, by dealing with the risks and making the most of the opportunities.</p> <p>It sets out a number of objectives, including:</p> <ul style="list-style-type: none"> To provide a clear local planning framework to enable all participants in the planning system to deliver sustainable new development, including infrastructure that minimises vulnerability and provides resilience to the impacts of climate change. To increase the resilience of homes and buildings by helping people and communities to understand what a changing climate could mean for them and to take action to become resilient to climate risks. <p>To ensure infrastructure is located, planned, designed and maintained to be resilient to climate change, including increasingly extreme weather events.</p>	<p>The WRMP should ensure that proposals are resilient to the effects of climate change. Where possible, options should be considered that enhance resilience.</p> <p>The SEA should consider the effects of options on climate change resilience.</p>
Defra (2013) Waste Management Plan for England	
<p>Sets out the Government's ambition to work towards a more sustainable and efficient approach to resource use and management.</p> <p>The document includes measures to:</p> <ul style="list-style-type: none"> Encourage reduction and management of packaging waste Promote high quality recycling Encourage separate collection of bio-waste Promote the re-use of products and preparing for re-use activities. 	<p>The WRMP may need to consider the potential impact of proposals on waste generation and on waste management facilities in the Portsmouth Water area.</p> <p>The SEA should consider the effects of the WMRP on waste</p>

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	generation and management capacity.
Defra (2016) Creating a Great Place for Living – Enabling Resilience in the Water Sector	
Climate change and population growth are putting increasing pressure on the water sector in England. The sector needs to adapt to ensure that it can continue to meet the needs of people, businesses and the environment – and the Government’s framework needs to adapt too. This roadmap sets out how Defra will enhance its policy framework during this Parliament to secure the long-term resilience of the sector, helping to deliver a cleaner, healthier environment, benefiting people and the economy.	<p>The WRMP should have regard to longer term planning beyond the minimum 25 year period.</p> <p>The SEA Assessment Framework should include an objective and question relating to longer term resilience of water supply.</p>
Environment Agency (2016) Water Resources Planning Guidelines	
The water resources planning guideline provides a framework for water companies to follow in developing and presenting their water resources plans. It sets out good practice behind the composition of a plan, the approaches to developing a plan and the information that a plan should contain. Companies should follow this guideline to ensure that their plans cover the requirements specified by the Water Industry Act 1991.	These guidelines will be used by water companies to develop their WRMP. An appreciation of the processes used to develop the WRMP will benefit the SEA.
Environment Agency (2008) Better Sea Trout and Salmon Fisheries: Our Strategy for 2008-2021	
<p>The strategy has the goal of more sea trout and more salmon in more rivers bringing more benefit. This goal is to be brought about through achieving three broad targets:</p> <ol style="list-style-type: none"> 1 Self-sustaining sea trout and salmon in abundance in more rivers; 2 Economic and social benefits optimised for sea trout and salmon fisheries; 3 Widespread and positive partnerships, producing benefits. <p>There are twelve more detailed targets lying below these broad goals which relate to salmon and fisheries. These could be relevant to monitoring the effects of the WRMP, e.g. a target of 70% of rivers outside the ‘at risk’ (i.e. better than) the ‘at risk’ category in 2011 and 2021 to demonstrate rivers meeting their potential for salmon</p>	<p>The WRMP should take the strategy into account where the option may have an effect on salmon and trout, e.g. where an option may involve inserting or removing a barrier to fish.</p> <p>The SEA should include a guide question in relation to the effects of options on recreation (i.e. recreational angling) and also appropriate targets in monitoring proposals.</p>
Environment Agency (2009) Water for People and the Environment: Water Resource Strategy for England and Wales	
<p>Environment Agency’s water resources strategy sets out how Environment Agency believe water resources should be managed England and Wales to 2050 and beyond to ensure that there will be enough water for people and the environment. It sets out how water resources should be managed within Defra frameworks in its water strategy for England’s ‘Future Water’</p> <p>Objectives in the strategy are set out under four broad themes: adapting to and mitigating climate change; a better water environment; sustainable planning and management of water resources; and, water and the water environment are valued.</p> <p>This strategy sets out the following objectives:</p> <ul style="list-style-type: none"> - Ecology is more resilient to climate change because abstraction pressures have been reduced and a diverse network of habitats has been allowed to develop; - The resilience of supplies and critical infrastructure is increased to reduce the impacts of climate change; - Flexible and incremental solutions in water resources management allow adaptation to climate change as it happens; - Everyone is able to make more informed decisions and choices about managing water resources, protecting the environment and choosing options to avoid security of supply problems; - Greenhouse gas emissions from using water resources are minimised and properly considered in future decisions; - Measures will be in place to make sure that water bodies achieve Water Framework Directive objectives; - Abstraction is sustainable, the environment is protected and improved and supplies remain secure; - Environmental problems caused by historic unsustainable abstractions are resolved; - Catchment management is integrated so that impacts on water resources and the water environment are managed together; - The twin track approach of resource development with demand management is adopted in all sectors of water use; 	<p>The objectives for the WRMP should reflect these objectives.</p> <p>The SEA should seek to promote the protection and enhancement of water resources and to encourage sustainable management of the resource.</p>

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<ul style="list-style-type: none"> - In England, the average amount of water used per person in the home is reduced to 130 litres each day by 2030; - The Environment Agency targets and adapts its approach to reflect the location and timing of pressures on water resources; - In England, water companies implement near-universal metering of households, starting in areas of serious water stress; - Leakage from mains and supply pipes is reduced; - New and existing homes and buildings are more water efficient; - Water resources are allocated efficiently and are shared within regions where there are areas of surplus; - Water pricing for the abstraction and use of water acts as an incentive for the sustainable use of water resources; - Abstractors and users make informed choices to use water more efficiently; - Innovative tariffs are adopted by water companies to maximise savings and minimise issues of affordability; - The needs of wildlife, fisheries, navigation and recreation, as well as the environment and abstractors, are fully taken into account when allocating water resources; - Innovative technology is developed to improve water efficiency by all water users. <p>The strategy includes a number of actions for Environment Agency and others to develop targets for water reduction and efficiency.</p>	
Environment Agency (2011) National Flood and Coastal Erosion Risk Management Strategy for England	
<p>This strategy builds on existing approaches to flood and coastal risk management and promotes the use of a wide range of measures to manage risk. Risk should be managed in a co-ordinated way within catchments and along the coast and balance the needs of communities, the economy and the environment. This strategy will form the framework within which communities have a greater role in local risk management decisions and sets out the Environment Agency's strategic overview role in flood and coastal erosion risk management (FCERM).</p>	<p>The SEA should ensure that the WRMP contributes to the reduction in flood risk and coastal erosion</p>
Environment Agency (2011) Enjoying Water- Strategic Priorities for Water Related Recreation in London and South East England	
<p>This Strategy has a vision of more people in London and the South East enjoying new and improved water related recreation and thus contributing to a better quality of life, health and environment.</p> <p>Nine strategic priorities are set out under three priorities:</p> <p>Framework Priorities:</p> <ul style="list-style-type: none"> - Maximise the benefits of the interactions between policies for environmental protection, climate change and water related recreation. - Embed all forms of water related recreation in national and key local sport, recreation and green infrastructure agendas. - Promote good practice in resolving recreational conflicts. - Use opportunities to enjoy the water environment to develop economic growth, tourism and community regeneration. <p>People Priorities:</p> <ul style="list-style-type: none"> - Improve people's health and wellbeing through increasing participation in water related recreation. - Provide better information on accessible water resources for all and changing water conditions. - Improve school and post 16 education access for young people to enjoy the water environment. <p>Place priorities:</p> <ul style="list-style-type: none"> - Develop an integrated approach to improve access to water especially to 'doorstep' opportunities, reservoirs and the Thames estuary. - Address gaps in provision for all forms of water related recreation and develop a network of hubs with multi-activity centres, 'pay and play' opportunities, rental equipment and good storage. <p>A range of actions required, on a national and local level, are set out under each of these priorities.</p>	<p>The WRMP should take into account the recreational uses that water provides.</p> <p>The SEA should seek to protect and enhance the use of water for recreational purposes</p>
Environment Agency (2013) Managing Water Extraction	

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Managing Water Abstraction (2013) sets out how the EA manage water resources in England and Wales. It is the overarching document that links together our abstraction licensing strategies. The availability of water resources for abstraction is assessed through a Catchment Abstraction Management Strategy (CAMS) approach.	The WRMP will need to sustainably manage abstraction. The SEA should include a guide question relating to the sustainable use of water resources.
Environment Agency (2015) Drought Response: Our Framework for England	
This drought framework sets out: <ul style="list-style-type: none"> • how drought affects different parts of England in different ways • which organisations are involved in managing drought and how they work together • how the Environment Agency and others make decisions and decide on actions to take • how the Environment Agency monitors and measures the impacts of drought • how the Environment Agency reports on drought and communicates with others 	The WRMP should include measures to mitigate/avoid drought. The SEA Assessment Framework should include an objective relating to water and guide questions in relation to water security.
Environment Agency Restoring Sustainable Abstraction Programme	
Environment Agency note that there is evidence to suggest that unsustainable abstraction of groundwater and surface water could be contributing to environmental damage of rivers and wetlands in England and Wales, including sites of national and international conservation importance. In May 1997, at the Government's Water Summit, a commitment was made to reverse the damage caused by past decisions. Environment Agency investigates where over-abstraction has occurred and work with local people to restore sustainable supplies.	The WRMP will need to sustainably manage abstraction. The SEA should include a guide question relating to whether abstraction will contribute to environmental damage of rivers and wetlands.
Environment Agency Areas of water stress: final classification	
The report is the Environment Agency's formal advice on which areas in England are of serious water stress. It highlighted that Portsmouth Water is classified as an area of serious water stress.	The WRMP should seek to manage the water stressed area. The SEA assessment framework should consider the effects of the WRMP on water resources and the associated socio-economic and environmental receptors.
HM Government (1979) Ancient Monuments and Archaeological Areas Act	
This is the main legislation concerning archaeology in the UK. This Act, building on legislation dating back to 1882, provides for nationally important archaeological sites to be statutorily protected as Scheduled Ancient Monuments. Section 61(12) defines sites that warrant protection due to their being of national importance as 'ancient monuments'. These can be either Scheduled Ancient Monuments or "any other monument which in the opinion of the Secretary of State is of public interest by reason of the historic, architectural, traditional, artistic or archaeological interest attaching to it".	The WRMP should seek to avoid adverse impacts on cultural heritage assets. The SEA assessment framework should include specific objectives relating to cultural heritage.
HM Government (1981) Wildlife and Countryside Act	
The Act makes it an offence (with exceptions) to; <ul style="list-style-type: none"> - Intentionally kill, injure or take any wild bird or their eggs or nests; - Intentionally kill, injure, or take, possess, or trade in any wild animal listed in Schedule 5; - Prohibits interference with places used for shelter or protection, or intentionally disturbing animals; and - Pick, uproot, trade in, or possess (for the purposes of trade) and wild plant listed in Schedule 8. The Act also provides for the notification of Sites of Special Scientific Interest (SSSI) and require surveying authorities to maintain up to date definitive maps and statements, for the purpose of clarifying public rights of way.	The WRMP must ensure full compliance with the Act. The SEA should ensure a positive contribution to the wildlife within the operational area.
HM Government (1990) Planning (Listed Building and Conservation Areas) Act 1990	
This Act was passed to better regulate the way in which large and small scale developments were approved by local authorities in England and Wales. It provides local planning authorities the power to take steps requiring land to be cleaned up when conditions adversely affect the amenity of an area.	The WRMP should seek to avoid adverse impacts on cultural heritage assets. The SEA assessment framework should include specific objectives relating to cultural heritage.
HM Government (1994) UK Biodiversity Action Plan (BAP)	

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<p>The aim of the action plan is to conserve and enhance biological diversity in the UK and to contribute to the conservation of national and global biodiversity and include the follow aims to maintain and, where practicable, to enhance:</p> <ul style="list-style-type: none"> - The overall populations and natural ranges of native species and the quality and range of wildlife habitats and ecosystems; - Internationally and nationally important and threatened species, habitats and ecosystems; - Species, habitats and natural and managed ecosystems that are characteristic of Kent; - The biodiversity of natural and semi-natural habitats, where this has diminished over 3 recent decades, and - Public awareness of, and involvement in, conserving biodiversity. 	<p>Ensure that WRMP and SEA encourage conservation and offer protection to areas and species of high conservation importance as identified in this action plan.</p>
HM Government (2000) Countryside and Rights of Way Act 2000	
<p>This act extends the public's ability to enjoy the countryside and safeguards landowners and occupiers. The Act creates a new statutory right of access to open county and registered common land, modernise the right of way system, give greater protection to Sites of Special Scientific Interest (SSSIs), provide greater protection arrangements for Areas of Outstanding Natural Beauty (AONBs) and strengthen wildlife enforcement legislation.</p>	<p>The SEA must make sure that the Act is supported and that public rights of way and access to the countryside are maintained and where possible enhanced.</p>
HM Government (2003) Water Act 2003	
<p>The four broad aims of the Act are</p> <ul style="list-style-type: none"> - the sustainable use of water resources; - strengthening the voice of consumers; - a measured increase in competition; and - the promotion of water conservation. <p>It amends the Water Industry Act 1991 so that water companies:</p> <ul style="list-style-type: none"> - are given a duty to prepare and publicise drought plans; - are placed under a duty to agree and publicise water resource management plans; and - are placed under an enforceable duty to further water conservation. <p>As part of the Act the Water Services Regulation Authority (Ofwat) became the economic regulator of the water and sewage industry in England and Wales.</p>	<p>The WRMP will be used by Ofwat to assess supply-demand balance and quality enhancement elements as part of the Periodic Review of Price Limits. It is therefore important that the WRMP is a fair and transparent review of water resources and is inclusive of the environmental impacts anticipated.</p> <p>The SEA must ensure that the full obligations are met in terms of the environmental implications to abstraction and discharges.</p>
HM Government (2005) UK Sustainable Development Strategy	
<p>The strategy for sustainable development aims to enable all people throughout the world to satisfy their basic needs and enjoy a better quality of life without compromising the quality of life of future generations. This is implemented with 4 key priorities:</p> <ul style="list-style-type: none"> - Sustainable consumption and production; - Climate change; - Natural resource protection; - Sustainable communities. 	<p>The WRMP and SEA must consider and implement the key priorities and objectives of the strategy</p>
HM Government (2006) The Natural Environment and Rural Communities (NERC) Act 2006	
<p>The Act:</p> <ul style="list-style-type: none"> • makes provision about bodies concerned with the natural environment and rural communities; • makes provision in connection with wildlife, sites of special scientific interest, National Parks and the Broads; • amends the law relating to rights of way; • makes provision as to the Inland Waterways Amenity Advisory Council; and • provides for flexible administrative arrangements in connection with functions relating to the environment and rural affairs and certain other functions; and for connected purposes. <p>Section 41 (S41) of the Act required the Secretary of State to publish a list of habitats and species which are of principal importance for the conservation of biodiversity in England. The S41 list is used to guide decision-makers such as public bodies in implementing their duty under section 40 of the Act, to have regard to the conservation of biodiversity in England, when carrying out their normal functions.</p>	<p>SEA objectives must consider the importance of conserving biodiversity and landscape features as set out in the Act.</p>
HM Government (2008) The Climate Change Act 2008	

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<p>This Act aims:</p> <ul style="list-style-type: none"> to improve carbon management and help the transition towards a low carbon economy in the UK; and to demonstrate strong UK leadership internationally, signalling that the UK is committed to taking its share of responsibility for reducing global emissions in the context of developing negotiations on a post-2012 global agreement at Copenhagen next year. 	<p>The WRMP should contribute towards increasing the proportion of energy from renewable energy sources.</p> <p>The SEA assessment framework should include consideration of greenhouse gas emissions and use of energy from renewable energy sources</p>
HM Government (2008) <i>Future Water: The Government's Water Strategy for England</i>	
<p>This strategy sets out how the Government want the water sector to look by 2030 and some of the steps required to achieve it. The vision is for rivers, canals, lakes and seas to have improved for people and wildlife with benefits for angling, boating and other recreational activities and that the supply of excellent quality drinking water is continued. It is for the sustainable delivery of secure water supplies and an improved and protected water environment.</p> <p>The strategy sets out actions to deal with water demand (e.g. introducing stricter water efficiency targets in building regulations for new homes), water supply (e.g. through use of 25 year water resources management plans and encouraging the use of rainwater harvesting where appropriate). No specific targets are listed.</p>	<p>The WRMP should have regard to its contribution towards achieving the strategy.</p> <p>The SEA assessment framework should ensure that the effects on the water sector's sustainability are fully considered.</p>
HM Government (2009) <i>The UK Renewable Energy Strategy</i>	
<p>The Strategy sets out to:</p> <ul style="list-style-type: none"> the mechanisms to provide financial support for renewable electricity and heat worth around £30 billion between now and 2020; Drive delivery and clear away barriers; Increase investment in emerging technologies and pursue new sources of supply; and Create new opportunities for individuals, communities and business to harness renewable energy. 	<p>The WRMP should contribute towards increasing the proportion of energy from renewable energy sources.</p> <p>The SEA assessment framework should include consideration of the use of energy from renewable energy sources.</p>
HM Government (2009) <i>Marine and Coastal Access Act 2009</i>	
<p>The Marine and Coastal Access Act sets out a number of measures including the establishment of Marine Conservation Zones (MCZs) and Marine Spatial Plans. It also includes amendments to the Salmon and Freshwater Fisheries Act, 1975.</p>	<p>The WRMP should take into account its effects on coastal areas.</p> <p>The SEA assessment should take into account the effects of the actions on the coast where relevant.</p>
HM Government (2010) <i>Flood and Water Management Act 2010</i>	
<p>The Flood and Water Management Act 2010 aims to provide better, more sustainable management of flood risk for people, homes and businesses, help safeguard community groups from unaffordable rises in surface water drainage charges and protect water supplies to the consumer. The Act will also implement recommendations made by Sir Michael Pitt in his review of the 2007 floods. This will include giving water companies new powers to better control non-essential domestic uses of water during periods of water shortage. Additionally, Lead Local Flood Authorities (LLFAs) in England and Wales have a duty to prepare and maintain local level Flood Risk Management Strategies.</p> <p>Does not contain any targets.</p>	<p>The WRMP should be in conformity with the Act.</p> <p>The SEA should include objectives relating to flooding and water use.</p>
HM Government (2011) <i>UK Renewable Energy Roadmap</i>	
<p>The Renewable energy roadmap, published in 2011 sets out how the UK will reach the goal of generating 15% of UK energy use from renewables by 2020. It presented a framework and set of actions for the delivery of renewable energy deployment. The first update of the Roadmap reported on progress up to the end of 2012 and the second update provides analysis on further achievements and changes that have taken place in 2013.</p>	<p>The WRMP should contribute towards increasing the proportion of energy from renewable energy sources.</p> <p>The SEA assessment framework should include consideration of the use of energy from renewable energy sources.</p>
HM Government (2011) <i>Carbon Plan: Delivering our Low Carbon Future</i>	

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<p>This sets out how the UK will achieve decarbonisation within the framework of energy policy:</p> <ul style="list-style-type: none"> To make the transition to a low carbon economy while maintaining energy security, and minimising costs to consumers, particularly those in poorer households. 	<p>The WRMP should contribute towards increasing the proportion of energy from renewable energy sources.</p> <p>The SEA assessment framework should include consideration of the use of energy from renewable energy sources.</p>
HM Government (2011) UK Marine Policy Statement	
<p>The Marine Policy Statement (MPS) sets out the framework for preparing Marine Plans and taking decisions affecting the marine environment, supporting the delivery of the following high level marine objectives:</p> <ul style="list-style-type: none"> Achieving a sustainable marine economy; Ensuring a strong, healthy and just society; Living within environmental limits; Promoting good governance; Using sound science responsibly. <p>Does not contain any targets.</p>	<p>The WRMP should take into account its effects on coastal areas.</p> <p>The SEA assessment should take into account the effects of the actions on the coast/marine environment where relevant.</p>
HM Government (2011) Water for Life: White Paper	
<p><i>Water for Life</i> describes a vision for future water management in which the water sector is resilient, in which water companies are more efficient and customer focused, and in which water is valued as the precious and finite resource it is.</p> <p><i>Water for Life</i> includes several proposals for deregulating and simplifying legislation, to reduce burdens on business and stimulate growth. Ofwat's proposals for reducing its regulatory burdens complement these.</p>	<p>WRMP should ensure that future water management is resilient, efficient and customer focused</p> <p>In order to ensure future water management is resilient SEA should consider resilience to climate change and should consider the human environment to ensure water companies remain customer focused.</p>
HM Government (2015) Infrastructure Act 2015	
<p>The Infrastructure Act (inter alia) gives environmental authorities new powers to require landowners to take action on invasive non-native species or permit others to enter the land and carry out those operations.</p>	<p>The SEA assessment framework should include guide questions relating to invasive species.</p>
HM Government (2016) The Culture White Paper	
<p>The White Paper includes a number of actions that are relevant to the historic environment:</p> <ul style="list-style-type: none"> Support Historic England to establish Heritage Action Zones in England, working with partners to stimulate the productivity of the historic environment through regeneration and growth. Support the heritage sector to advise local communities on how they can make best use of their historic buildings. 	<p>WRMP should contribute to conserving and enhancing the historic environment</p> <p>The SEA assessment framework should ensure consideration of the conservation and enhancement of the historic environment.</p>
HM Government (2016) Environmental Permitting (England and Wales) Regulations 2016 SI 1154	
<p>The Regulations provide a consolidated system of environmental permitting in England and Wales, and transpose the provisions of 15 EU Directives. Provides a system for environmental permits and exemptions for industrial activities, mobile plant, waste operations, mining waste operations, water discharge activities, groundwater activities, flood risk activities and radioactive substances activities. It also sets out the powers, functions and duties of the regulators.</p> <p>Certain flood risk activities are now regulated under the Environmental Permitting Regulations, with environmental permits required for some activities. There are slight variations between England and Wales.</p>	<p>The WRMP should accord with these Regulations.</p>
HM Government (2017) Conservation of Habitats & Species Regulations 2017	
<p>These regulations consolidate all the various amendments made to the Conservation (Natural Habitats_ Regulations 1994 in respect of England and Wales. The 1994 Regulations transposed Council Directive</p>	<p>The WRMP must ensure full compliance with the Regulations.</p>

National Plans and Programmes	
Purpose of the Document, including Objectives and Targets relevant to the Water Resources Management Plan and SEA	Relationships and Influences on the WRMP and the SEA
<p>92/43/EEC on the conservation of natural habitats and of wild fauna and flora (EC Habitats Directive) into national law.</p> <p>The Regulations provide for the designation and protection of 'European sites', the protection of 'European protected species', and the adaptation of planning and other controls for the protection of European Sites.</p> <p>Under the Regulations, competent authorities i.e. any Minister, government department, public body, or person holding public office, have a general duty, in the exercise of any of their functions, to have regard to the EC Habitats Directive.</p> <p>New provisions implement aspects of the Marine & Coastal Access Act 2009. These provisions provide for:</p> <ul style="list-style-type: none"> - the transfer of certain licensing functions from Natural England to the Marine Management Organisation (MMO); - Marine Enforcement Officers to use powers under the Marine Act to enforce certain offences under the Habitats Regulations. 	<p>The SEA should take into account the effects of the actions on biodiversity</p>
HM Government (2018) <i>A Green Future: Our 25 Year Plan to Improve the Environment</i>	
<p>This report outlines the following aims that the UK Government hopes to achieve in the next 25 years:</p> <ol style="list-style-type: none"> 1. Clean air. 2. Clean and plentiful water. 3. Thriving plants and wildlife. 4. A reduced risk of harm from environmental hazards such as flooding and drought. 5. Using resources from nature more sustainably and efficiently. 6. Enhanced beauty, heritage and engagement with the natural environment. 7. Mitigating and adapting to climate change. 8. Minimising waste. 9. Managing exposure to chemicals. 10. Enhancing biosecurity. 	<p>The WRMP may need to consider sustainable development in it's all its forms and protect the important natural resources and assets of the area, with a particular focus on net environmental gain.</p>
Ministry of Housing, Communities and Local Government (DCLG) (2018) <i>National Planning Policy Framework</i>	
<p>The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and how these are expected to be applied. The NPPF constitutes guidance for local planning authorities and decision-takers both in drawing up plans and as a material consideration in determining applications.</p> <p>At the heart of the NPPF is a presumption in favour of sustainable development, which should be seen as a golden thread running through both plan-making and decision-taking. The NPPF sets out three overarching objectives:</p> <ol style="list-style-type: none"> a) an economic objective – to help build a strong, responsive and competitive economy, by ensuring that sufficient land of the right types is available in the right places and at the right time to support growth, innovation and improved productivity; and by identifying and coordinating the provision of infrastructure; b) a social objective – to support strong, vibrant and healthy communities, by ensuring that a sufficient number and range of homes can be provided to meet the needs of present and future generations; and by fostering a well-designed and safe built environment, with accessible services and open spaces that reflect current and future needs and support communities' health, social and cultural well-being; and c) an environmental objective – to contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy. <p>The NPPF states that these objectives should be delivered through the preparation and implementation of plans and the application of the policies in the NPPF; however, notes that the objectives are not criteria against which every decision can or should be judged.</p> <p>The NPPF then sets out the guidance for 12 key planning policies topics, for subjects such as the supply homes, building a competitive economy and conserving and enhancing the natural environment.</p>	<p>The WRMP should take into consideration the policies set out in the NPPF insofar as they relate to the area covered by the WRMP.</p>
HM Treasury (2016) <i>National Infrastructure Delivery Plan</i>	
<p>This document is the Government's updated National Infrastructure Delivery Plan. It sets out the plan to 2021 and beyond and takes a targeted approach to infrastructure investment and delivery across different sectors. It contains major commitments to improve the UK's transport, energy, communications, waste,</p>	<p>The WRMP will be produced as indicated in the Delivery Plan.</p>

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Purpose of the Document, including Objectives and Targets relevant to the Water Resources Management Plan and SEA	Relationships and Influences on the WRMP and the SEA
water, housing and flood and coastal erosion, as well as steps to attract new private sector investment. It includes reference to the production of Water Resources Management Plans and the Ofwat price review.	
JNCC and Defra (2012) <i>UK Post-2010 Biodiversity Framework</i>	
The framework sets out UK priorities for work on the Convention on Biological Diversity, and follows on from the 1994 UK Biodiversity Action Plan. It sets out a vision that, 'by 2050, biodiversity is valued, conserved, restored and wisely used, maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people'. The goals and activities to meet this aim are grouped under the categories of International / European context; facilitating and contributing to common country approaches and solutions; evidence provision; and reporting. The WRMP should support the protection and enhancement of biodiversity.	The SEA assessment should include criteria relating to the protection of species and habitats.
Ofwat (2008) <i>Water Supply and Demand Policy</i>	
Summarised the key areas of water supply and demand, focusing on water efficiency, leakage, metering, and climate change.	<p>The WRMP should ensure it balances demand and supply issues.</p> <p>The SEA assessment framework should ensure that consideration is given to the socio-economic and environmental impact of any demand and supply policies.</p>
Ofwat ((2016) <i>Our regulatory approach for water and wastewater services in England and Wales</i>	
This decision document sets out the future regulatory framework for the water and wastewater industry in England and Wales to enable the water sector to address the challenges it faces and to help build trust and confidence among customers and wider society. It outlines the changes to company licences that flow from the new regulatory framework. It also sets out specific areas for further consultation about the role of markets and the regulatory framework for the 2019 price review.	<p>The WRMP should have regard to the emerging regulatory framework.</p> <p>The SEA Assessment Framework should include questions in relation to water supply.</p>
Natural England (2011) <i>UK Geodiversity Action Plan</i>	
<p>The UKGAP sets out a framework for enhancing the importance and role of geodiversity across the UK, and provides a shared context and direction for geodiversity action through a common aim, themes, objectives and targets which link national, regional and local activities.</p> <p>The themes (on which the plan's objectives are based) include: furthering our understanding of geodiversity; gathering and maintaining information on our geodiversity; conserving and managing our geodiversity; inspiring people to value and care for our geodiversity; and sustaining resources for our geodiversity. It also aims to influence planning policy, legislation and development design.</p>	<p>The WRMP should take into account the aims of the UKGAP.</p> <p>The SEA assessment should consider effects of options on geodiversity and outline enhancement and mitigation opportunities where these are identified.</p>
Water UK (2016) <i>Water Resources Long Term Planning Framework 2015-2065</i>	
This report examines the long- term risk of drought, taking into account climate change projections and how best to manage these, including the role of WRMPs	<p>The WRMP should have regard to longer term planning beyond the minimum 25 year period.</p> <p>The SEA Assessment Framework should include an objective and question relating to longer term resilience of water supply.</p>

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Purpose of the Document, including Objectives and Targets relevant to the Water Resources Management Plan and SEA	Relationships and Influences on the WRMP and the SEA
Environment Agency (2009) <i>South East Hampshire Catchment Flood Management Plan; Arun and Western Streams Catchment Flood Management Plan</i>	
<p>The Catchment Flood Management (CFMP) for the South East Hampshire area provides an overview of the flood risk across the catchment and provides policies for each of the sub areas identified. The main sources of flood risk are from groundwater and surface water (although there is a risk from fluvial flooding which can be exacerbated by tidal conditions). There are some 3,500 properties within the catchment that have a 1% risk of flooding in any given year. Critical infrastructure also at risk includes 6 electricity sub-stations, 2 sewage / water treatment works and 2 schools.</p> <p>The CFMP for Arun and Western Streams covers the areas to the east of the South East Hampshire CFMP. It highlights that there are a number of critical infrastructure services at risk including 2 emergency services, 6 schools, 4 sewage / water treatment works, 9 electricity sub stations and 4 hospital / clinics. The CFMP emphasises that the catchment has a history of fluvial, surface water, groundwater flooding and tidally influenced flooding.</p>	<p>The WRMP should take the CFMP into account.</p> <p>The SEA should include a guide question relating to flood risk.</p>
Environment Agency (2013) <i>Arun and Western Streams Abstraction Licensing Strategy</i>	
<p>This Licensing Strategy sets out how water resources are managed in the Arun & Western Streams CAMS area. It provides information about where water is available for further abstraction and an indication of how reliable a new abstraction licence may be.</p>	<p>The WRMP should take the Strategy into account.</p> <p>The SEA should include a guide question relating to sustainable water use.</p>
Environment Agency (2013) <i>East Hampshire Abstraction Licensing Strategy</i>	
<p>This Licensing Strategy sets out how water resources are managed in the East Hampshire CAMS area. It provides information about where water is available for further abstraction and an indication of how reliable a new abstraction licence may be.</p>	<p>The WRMP should take the Strategy into account.</p> <p>The SEA should include a guide question relating to sustainable water use.</p>
Environment Agency and Defra (2015) <i>River Basin Management Plan South East River Basin District</i>	
<p>The South East River Basin Management Plan (RBMP) sets out how the water environment will be managed and provides a framework for more detailed decisions to be made. It is part of the implementation of the Water Framework Directive.</p>	<p>The WRMP should reflect the broad targets set out in the RBMP.</p> <p>To this end, the SEA objectives should reflect the need to manage water resources on a catchment basis in a sustainable manner to help improve the quality of water resources.</p>
Environment Agency (2016) <i>Flood Risk Management Plan South East River Basin District</i>	
<p>By law Environment Agency (EA) and Natural Resources Wales (NRW) must produce flood risk management plans (FRMPs) for each River Basin District. The Plan sets out measures to prevent risk, prepare for risk, protect from risk and recover from flooding.</p>	<p>The WRMP should be consistent with the measures set out in the FRMP.</p> <p>The SEA Assessment Framework should include guide questions in relation to flood risk.</p>
Water Resources in the South East (WRSE) Group (2016) <i>An Overview of the WRSE</i>	
<p>WRSE is an alliance of the six South East water companies (including Portsmouth Water), the Environment Agency, Ofwat, Consumer Council for Water, Natural England and Defra, to develop long term plans for securing water supplies in the South East.</p> <p>The objectives of the WRSE work are to:</p> <ul style="list-style-type: none"> • Develop a strategy to share water resources within the study area; • Satisfy Government aspirations; and • Meet relevant parts of the national water resource planning guidelines. <p>The overall intent of the WRSE Group is to determine a regional water resources strategy that will inform but not replace the statutory duties of the water companies in the development of their own WRMPs and Business Plans.</p>	<p>The WRMP should consider issues that cannot be modelled in the regional approach. These include the need to create best value plans, which balance affordable supplies while protecting the environment; to consider customers and stakeholder views; and the need to incorporate pertinent technological, environmental, socio-economic and water quality issues.</p>

Regional Plans and Programmes	
Purpose of the Document, including Objectives and Targets relevant to the Water Resources Management Plan and SEA	Relationships and Influences on the WRMP and the SEA
	The SEA Assessment Framework should include consideration of issues at the regional scale, e.g. cumulative and synergistic effects.
Water Companies (Various) Drought Plans	
<p>Drought Plans set out the steps that each water company will take through the stages of developing drought, drought, severe drought and recovery from drought to ensure their supply of water resources. Drought Plans must be produced by all water companies to fulfil their requirements under the Water Act 2003. Those Drought Plans relevant to the WRMP are:</p> <ul style="list-style-type: none"> - Portsmouth Water Drought Plan (December 2013); - Southern Water Final Drought Plan (February 2013); and - South East Water Drought Plan (September 2013). <p>A brief overview of these plans is provided below.</p> <p>Portsmouth Water Drought Plan: The drought plan identifies the following demand management options that could be implemented as a drought progresses:</p> <p>Appeals to customers for voluntary restraint in their use of water</p> <p>Enhanced leakage control by the Company including pressure reduction</p> <p>The imposition of temporary bans on certain activities</p> <p>The application of further restrictions under a Drought Order</p> <p>The potential supply side options that could be implemented include</p> <p>Drought Permits or Orders</p> <p>Lowering of borehole pumps to maintain source yields</p> <p>Recommissioning unused sources</p> <p>Commissioning unused Portsmouth Water boreholes</p> <p>Commissioning unused licence from private boreholes</p> <p>Increasing drought yields at existing sources</p> <p>Southern Water Final Drought Plan:</p> <p>Southern Water's publicly available drought plan has been redacted for security reasons. This means that it is not possible to identify specific sources that would be used in the event of a drought. The following is a generic summary of the options that the company would consider:</p> <p>In addition to a phased introduction of demand side measures, the company would consider:</p> <p>Applying for Drought Permits or Orders to increase water supplies,</p> <p>Optimise the use of its existing water resources and other potential sources of supplies, by considering:</p> <p>Variations to the operation of the company's own sources;</p> <p>Inter-company bulk transfers of water supplies;</p> <p>Re-commissioning of unused sources;</p> <p>Enhancing abstraction at existing sources;</p> <p>Tankering water from adjacent WRZs and other water companies;</p> <p>Emergency desalination;</p> <p>Construction of new satellite boreholes;</p> <p>Distribution network modifications; and</p> <p>Wastewater recycling.</p> <p>South East Water Drought Plan: South East Water set out a phased approach for managing drought. This includes:</p> <p><i>Mild Drought</i></p> <ul style="list-style-type: none"> - Water conservation campaigns and calls for voluntary restraint; - Continue active leakage control (including enhanced leakage detection); - Initiate pressure management to reduce demand; - Review water conservation schemes; - Prepare to implement temporary bans on water use; - Optimise operations to conserve supplies; - Improve efficiency of the network to distribute water between connections and resource zones; - Consider infrastructure connectivity or source improvements and / or accelerated planned works; - Review disused sources for reinstatement (where SEW have an abstraction licence); - Seek extension to existing bulk supplies; 	<p>The WRMP will need to be in accordance with Portsmouth Water's Drought Plan and plans of neighbouring companies, taking into account those triggers and supply and demand side options which are relevant to the Portsmouth Water area.</p> <p>The SEA assessment framework should include a guide question on the effects of the WRMP on water resources and commentary on whether they affect the water resource zones' ability to manage drought. The baseline should, where appropriate, take into account relevant information from neighbouring plans.</p>

Regional Plans and Programmes	
Purpose of the Document, including Objectives and Targets relevant to the Water Resources Management Plan and SEA	Relationships and Influences on the WRMP and the SEA
<ul style="list-style-type: none"> - Consider options for new bulk supplies and progress if feasible; - Consider and review Drought Order (to restrict demand) application; - Consider and review Drought Permit application(s); - Consider Drought Order (to vary licence linked to accelerating planned works) application if appropriate. <p><i>Moderate Drought</i></p> <ul style="list-style-type: none"> - Defer non essential maintenance programme; - Further optimisation of operations to conserve supplies; - Implement enhanced leakage detection programme; - Visit high demand commercial users and complete more water efficiency audits; - Consider implementing temporary bans on water use – Phase 1 options; - Development of feasible infrastructural connectivity or source improvements and/or accelerate planned works; - Reinstate disused sources (that SEW have an abstraction licence for); - Consider and prepare Drought Order (to restrict demand) application; - Consider and prepare Drought Order (to vary licences linked to accelerating planned works) application if appropriate; - Consider and prepare Drought Permit application(s); - Review and consider emergency planning procedures for a drought. <p><i>Moderate or Severe Drought</i></p> <ul style="list-style-type: none"> - Consider implementing temporary bans on water use Phase 2 options; - Apply for and implement Drought Order (to restrict demand); - Commission feasible infrastructure connectivity or source improvements and/or accelerated planned works; - Apply for and implement Drought Order (to vary licences linked to accelerating planned works) application; - Apply for and implement Drought Permit(s). <p><i>Severe Drought</i></p> <ul style="list-style-type: none"> - Continue to consider, prepare, apply for and implement further Drought Permit / Order application(s); - Apply for Emergency Drought Orders; - Plan for emergency situation. 	
Water Companies (various) Water Resources Management Plans	
<p>Water Resources Management Plans (WRMPs) have been produced by all water companies to fulfil their requirements under the Water Act 2003. Those WRMPs relevant to the Portsmouth Water plan are</p> <p>Southern Water (2014) Final Water Resources Management Plan;</p> <p>South East Water (2014) Final Water Resources Management Plan</p> <p>WRMPs set out how companies will manage the balance between supply and demand for water. Where supply demand deficits occur, water companies are required to identify options to address these deficits to ensure security of supply.</p> <p>Southern Water supplies water to 2.26 million customers in Southern and South East England. The company operates ten water resources zones, those adjacent to the Portsmouth Water supply area are Sussex Worthing; Sussex North and Hampshire South.</p> <p>South East Water supplies water to 2.1 million people in South East England. The company has eight water resource zones of which, resource zone 5 supplies Petersfield and surrounding area and is adjacent to the PWOA.</p>	<p>The WRMP will need to be in accord with neighbouring WRMPs.</p> <p>The SEA should include a guide question relating to water resources.</p>
Environment Agency (2012) Application of SEA Principles to the modelling options of the Water Resources for the South East	
<p>The Water Resources in the South East (WRSE) group, comprising seven water companies in South East England and led by the Environment Agency, has been investigating the potential for regional solutions to meeting the water needs of South East England. The WRSE Group has undertaken a 'SEA exercise', applying SEA principles to the output of the water resource modelling. The 'SEA Exercise' has the following stated purposes:</p> <ul style="list-style-type: none"> - to develop a consistent approach to the screening process by individual water companies for inclusion of options in the model; - to flag up compatibility issues that an option may have with the SEA principles; and 	<p>The WRMP will need to be in accord with neighbouring WRMPs.</p> <p>The SEA should include a guide question relating to water resources.</p>

Regional Plans and Programmes	
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<p>- to highlight environmental concerns within the identified modelling options that have been put forward as part of the WRSE project .</p> <p>The WRSE group acknowledge that the work undertaken does not constitute a statutory SEA. The assessment takes into account economic considerations of each option and does not present detailed analysis of the secondary, cumulative and synergistic environmental and social impacts of each option. A further stated purpose of the report is that it can 'act as a common SEA thread' for the individual company-level dWRMP SEAs. In undertaking the 'SEA exercise', an assessment framework was developed in consultation with participating water companies, the Environment Agency and Ofwat. The authors consider that the application of this framework to the water company dWRMP SEAs would enable consistency of assessment of options across the water companies that comprise the WRSE Group.</p>	

Sub-regional/ Local Plans and Programmes	
Purpose of the Document, including Objectives and Targets relevant to the Water Resources Plan and SEA	Relationships and Influences on the Water Resources Plan and the SEA
Chichester Harbour Conservancy <i>Chichester Harbour AONB Management Plan 2014-2019</i>	
<p>- Chichester Harbour Conservancy has a duty to prepare an AONB Management Plan as the framework for the delivery of the statutory purposes and duty. The Management Plan is the single most important document for the AONB, setting out the guiding principles, vision, objectives and actions for managing the area from 2014 until 2019.</p>	<p>The WRMP should have regard to the AONB.</p> <p>The SEA assessment framework should give consideration to the effects of the WRMP on the implementation of the AONB management plan.</p>
Arun District Council (2003) <i>Arun District Local Plan 2003 and emerging Local Plan</i>	
<p>These planning policy documents set out the vision for the development of the district.</p> <p>The emerging Local Plan will set out a vision for the future of Arun up to 2031. It sets the planning framework for the district and will detail planning policy and identify the amount of development proposed and where it should be located. The emerging Local Plan is currently undergoing examination in public.</p> <p>The current policies for guiding development are set out in the Local Plan which was adopted in 2003. Of particular note are policies GEN 23 Water Environment, GEN 24 Energy and Water Conservation, GEN25 Water Resources and GEN 26 Water Quality. These highlight that development in the district will only be permitted where adequate water resources are available or will be provided in time to serve the development, that water quality will not deteriorate, water efficiency will be promoted and there will not be adverse effects on the water environment.</p>	<p>The WRMP should have regard to the existing and emerging Local Plan.</p> <p>The SEA assessment framework should consider the effects of the WRMP on the achievement of the Plan vision.</p>
Chichester District Council (2015) <i>Local Plan: Key Policies</i>	
<p>The Chichester Local Plan: Key Policies provides the broad policy framework and a long-term strategy to manage development, protect the environment, deliver infrastructure and promote sustainable communities within Chichester District, excluding the area within the South Downs National Park, for the period to 2029. Policies of particular relevance to the WRMP include:</p> <ul style="list-style-type: none"> • Policy 9: Development and Infrastructure Provision • Policy 12 Water Management in the Apuldrum Wastewater Treatment Catchment • Policy 40: Sustainable Design and Construction • Policy 42: Flood Risk and Water Management 	<p>The WRMP should have regard to the Local Plan.</p> <p>The SEA assessment framework should consider the effects of the WRMP on the achievement of the Plan vision.</p>
Chichester District Council et. al (2010) <i>North Solent Shoreline Management Plan</i>	
<p>The Shoreline Management Plan (SMP) sets out a framework for future management of the coastline and coastal defences. It promotes policies into the 22nd Century. The objectives are to:</p> <ul style="list-style-type: none"> - Define the coastal flooding and erosion risks to people and the developed, historic and natural environments; - Identify the preferred policies for managing those risks; - Identify the consequences of implementing the preferred policies; - Set out procedures for monitoring the effectiveness of the policies; and - Comply with environmental legislation and social obligations. <p>The coastline around Portsmouth, Havant and Gosport, and within the harbours has been designated as hold the line.</p>	<p>The WRMP should have regard to the potential effects of sea level rise and proposed management approaches along the coastline.</p> <p>The SEA assessment framework should consider the effects the WRMP may have on the implementation of the SMP.</p>
East Hampshire District Council and South Downs National Park Authority (2014) <i>Local Plan Part 1: Core Strategy</i>	
<p>The Joint Core Strategy provides a policy framework that plans for new development in East Hampshire and was adopted by the Council and the National Park Authority in 2014. Policy CP26 relates specifically to water resources/water quality and sets out that development will be required to protect the quality and quantity of water, and make efficient use of water.</p> <p>The Local Plan Part 2: Housing and Employment Allocations was adopted by the Council in April 2016. It does not cover the National Park Authority area.</p>	<p>The WRMP should have regard to the Local Plan.</p> <p>The SEA assessment framework should consider the effects of the WRMP on the achievement of the Plan vision.</p>
Eastleigh Borough Council (2016) <i>Local Plan Review 2001-2011 & Forthcoming Local Plan</i>	
<p>The new Local Plan, when finalised, will set out the policies and plans to guide the future development of Eastleigh Borough in the period up to 2036. It will identify the scale of development required during this period and the key locations to meet this need.</p>	<p>The WRMP should have regard to the Local Plan and forthcoming Local Plan.</p> <p>The SEA assessment framework should consider the effects of the</p>

Sub-regional/ Local Plans and Programmes	
Purpose of the Document, including Objectives and Targets relevant to the Water Resources Plan and SEA	Relationships and Influences on the Water Resources Plan and the SEA
	WRMP on the achievement of the Plan vision.
Fareham Borough Council (various) Local Plan (including Core Strategy (2011), Development Sites and Policies (June 2015), and Welborne Plan (2015))	
The Fareham Borough Local Plan consists of three parts and sets out the planning strategy for the Borough up to 2026. Of particular relevance to the WRMP is Core Strategy Policy Natural Resources and Renewable Energy.	The WRMP should have regard to the Local Plan. The SEA assessment framework should consider the effects of the WRMP on the achievement of the vision.
Gosport Borough Council (2015) Local Plan	
The Local Plan sets out Gosport Borough Council's planning strategy for the Borough over the period from 2011 to 2029. Policy LP39 relates specifically to water resources and states that the Borough Council together with its partners will seek to manage the use of water resource.	The WRMP should have regard to the Local Plan. The SEA assessment framework should consider the effects of the WRMP on the achievement of the Plan vision.
Havant Borough Council (various) Core Strategy and Allocations	
The Core Strategy was adopted in 2011 and states the vision for the borough to be cleaner, safer and more prosperous. In particular theme Six – Caring for Our Borough sets out a number of policies to protect the natural environment. It also highlights that the importance of Source B Springs.	The WRMP should have regard to the Local Plan. The SEA assessment framework should consider the effects of the WRMP on the achievement of the vision and policies.
Partnership for Urban South Hampshire (2010/2012) Green Infrastructure Strategy and Implementation Framework	
The strategy is based upon the rigorous assessment of potential impacts on green infrastructure assets in the sub-region and associated biodiversity, ensuring that additional pressures from growth are minimised, mitigation packages are identified and that opportunities to enhance green assets are maximised.	The WRMP should have regard to Green Infrastructure. The SEA assessment framework should consider the potential effects on green infrastructure from the implementation of the WRMP.
Partnership for Urban South Hampshire (2008) Integrated Water Management Strategy	
The objectives of the Integrated Water Management Strategy are to: <ul style="list-style-type: none"> - Guide and inform the level and location of development to be accommodated in South Hampshire; - Identify a preferred high level strategy for water management for the period to 2026 including general location and timing of infrastructure requirements; and - Identify the further work necessary to implement the preferred strategy. The report highlights that South Hampshire is designated as 'serious water stressed' and that the installation of water meters on all households may help reduce demand by between 5-15%.	The WRMP should have regard to the Strategy. The SEA assessment framework should consider the effects of the WRMP on housing and population growth, economic costs and the environment.
Portsmouth City Council (2012) Local Plan (incl. The Portsmouth Plan – Core Strategy)	
The Local Plan sets out the development framework for the city of Portsmouth. The Core Strategy sets out the vision for Portsmouth to 2027. It envisages the city as the premier waterfront city with an unrivalled maritime heritage – a great place to live, work and visit. The objectives are to: <ul style="list-style-type: none"> - Make Portsmouth an attractive and sustainable city; - Make Portsmouth an accessible city with sustainable and integrated transport; - Develop Portsmouth as a city of innovation and enterprise with a strong economy and employment opportunities for all; - Make Portsmouth a city in which everyone feels and is safe; - Deliver affordable / quality housing where people want to live; - Encourage and enable healthy choices for all and provide appropriate access to health care and support; - Enhance Portsmouth's reputation as a city of culture, energy and passion offering access for all to arts, sports and leisure; and - Ensure there is adequate supporting infrastructure for the new development and growth of the city. 	WRMP should give potential consideration to the Local Plan The SEA assessment framework should consider the effects of the WRMP on the achievement of the vision.

Sub-regional/ Local Plans and Programmes	
Purpose of the Document, including Objectives and Targets relevant to the Water Resources Plan and SEA	Relationships and Influences on the Water Resources Plan and the SEA
A number of policies are included detailing approaches towards achieving the vision. Of particular relevance are those related to the water environment, including PCS11 – Flood Risk which aims to reduce the risk of surface flooding and PCS14 – Sustainable design and construction, which aims to improve water efficiency of new developments.	
Solent Local Enterprise Partnership (2014) Solent Strategic Economic Plan	
<p>The Strategic Economic Plan sets out a plan for growth for the Solent. It identifies the following strategic priorities:</p> <ul style="list-style-type: none"> Supporting new businesses, enterprise and ensuring SME survival and growth. Enabling infrastructure priorities including land assets, transport and housing, reducing flood risk and improving access to superfast broadband. Establishing a single inward investment model to encourage companies to open new sites in the region, supported by effective marketing. Investing in skills to establish a sustainable pattern of growth, ensuring local residents are equipped to take up the jobs that are created and businesses can source local skills and labour to underpin growth. Developing strategic sectors and clusters (interconnected groups and businesses) of marine, aerospace and defence, advanced manufacturing, engineering, transport and logistics businesses, low carbon, digital and creative and the visitor economy – establishing the area as a business gateway, at both local and international levels and developing local supply chains. Building on our substantial knowledge assets to support innovation and build innovative capacity in the Solent area to stimulate growth in Solent businesses and in new high growth sectors, particularly linked to our HE excellence. 	<p>The WRMP should, where possible, support economic growth and local jobs creation.</p> <p>The SEA assessment framework should include guide questions relating to economic growth and jobs creation.</p>
South Downs National Park Authority (2013) Partnership Management Plan	
<p>The Partnership Management Plan sets out the vision and outcomes for the National Park up to 2050, policies that are for five years and beyond and a delivery framework showing projects and initiatives. The outcomes identified in the Plan are as follows:</p> <ul style="list-style-type: none"> Outcome 1: The landscape character of the National Park, its special qualities and local distinctiveness have been conserved and enhanced by effectively managing land and the negative impacts of development and cumulative change. Outcome 2: There is increased capacity within the landscape for its natural resources, habitats and species to adapt to the impacts of climate change and other pressures. Outcome 3: A well-managed and better connected network of habitats and increased population and distribution of priority species now exist in the National Park. Outcome 4: The condition and status of cultural heritage assets and their settings is significantly enhanced, many more have been discovered and they contribute positively to local distinctiveness and sense of place. People connected with places Outcome 5: Outstanding visitor experiences are underpinned by a high quality access and sustainable transport network providing benefits such as improved health and wellbeing. Outcome 6: There is widespread understanding of the special qualities of the National Park and the benefits it provides. Outcome 7: The range and diversity of traditional culture and skills has been protected and there is an increase in contemporary arts and crafts that are inspired by the special qualities of the National Park. Outcome 8: More responsibility and action is taken by visitors, residents and businesses to conserve and enhance the special qualities and use resources more wisely. Outcome 9: Communities and businesses in the National Park are more sustainable with an appropriate provision of housing to meet local needs and improved access to essential services and facilities. Outcome 10: A diverse and sustainable economy has developed which provides a range of business and employment opportunities, many of which are positively linked with the special qualities of the National Park. Outcome 11: Local people have access to skilled employment and training opportunities <p>Those policies specifically related to water include:</p> <ul style="list-style-type: none"> Policy 23: Improve the sustainability of water resources and wastewater management through partnership working across the water sector. Policy 24: Support and promote river catchment management approaches that integrate sustainable land management, wildlife conservation, surface and groundwater quality and flood risk management. Policy 25: Actively promote water efficiency measures and more sustainable patterns of domestic, industrial, farming and leisure water use, to reduce overall water use. 	<p>The WRMP should support the delivery of the Partnership Management Plan.</p> <p>The SEA assessment framework should include a specific guide question relating to effects on the National Park.</p>

Sub-regional/ Local Plans and Programmes	
Purpose of the Document, including Objectives and Targets relevant to the Water Resources Plan and SEA	Relationships and Influences on the Water Resources Plan and the SEA
<ul style="list-style-type: none"> Policy 26: Raise awareness of the importance of chalk streams and rivers and develop a programme of restoration and rehabilitation. 	
South Downs National Park Authority (emerging) South Downs National Park Local Plan	
<p>The National Park Authority is currently preparing a Local Plan that will cover the period 2014 to 2032. Consultation on preferred options was undertaken in September 2015, consultation on the pre-submission draft commenced in September 2017 and runs to November 2017. Those policies of the preferred options consultation document potentially relevant to the WRMP include:</p> <ul style="list-style-type: none"> Strategic Policy SD15: Aquifers Strategic Policy SD16: Rivers and Watercourses Strategic Policy SD30: Strategic Infrastructure Provision 	<p>WRMP should give consideration to the emerging Local Plan</p> <p>The SEA assessment framework should consider the effects of the WRMP on the achievement of the emerging Plan vision and on the National Park.</p>
Winchester Borough Council and South Downs National Park Authority (2013) Local Plan Part 1 Joint Core Strategy and Local Plan Part 2 (adopted 2017)	
<p>The adopted Local Plan Part 1 covers the administrative area of Winchester District including the area of the South Downs National Park Authority that lies within the District. It covers the period to 2031. Policy CP17 relates to the water environment and states that the authority will support the development or expansion of water supply, surface water drainage and wastewater treatment facilities where they are needed to serve existing or new development or in the interests of securing long term supply, provided that the need for such facilities is consistent with other policies such as the development strategy, flood risk, contamination and protection of the natural and built environment.</p>	<p>The WRMP should have regard to the Local Plan.</p> <p>The SEA assessment framework should ensure that consideration is given to the effects that the WRMP is likely to have in relation to the Local Plan.</p>
Biodiversity Action Plans (BAPs)	
<p>The overarching BAP for the area is the Hampshire BAP. It sets out a number of objectives including:</p> <ul style="list-style-type: none"> To audit the nature conservation resource of Hampshire; To identify habitats and species of priority nature conservation concern; To prepare action plans for habitats; To raise awareness and involvement in biodiversity conservation; To monitor and review progress. <p>There are some 493 priority species in Hampshire. The water and biodiversity habitat action plan is of particular relevance as a number of river catchment habitats lie within the Portsmouth Water boundary. The objectives of the priority habitats identified in the action plan are to:</p> <ul style="list-style-type: none"> Maintain the rich and varied biodiversity of rivers and wetlands in Hampshire and strongly resist plans and activities that will further damage or degrade the resource; Take effective and urgent action to restore damaged and degraded river and wetland habitats and species populations in Hampshire; Ensure a comprehensive and properly targeted programme of river and wetland monitoring; Promote communication and public awareness. <p>Similarly, the shorebirds BAP highlights a number of objectives for conserving and promoting bird populations. These include:</p> <ul style="list-style-type: none"> Maintain the populations of shorebirds utilising Hampshire's coastal habitat during winter and on migration; Maintain the populations of the breeding birds nesting on Hampshire's coast; Establish a stable breeding population of roseate terns and increase the populations of Mediterranean gulls and little terns by 25% by 2010; Establish a comprehensive understanding of the distributions status and an ecological requirement of birds using Hampshire's coastal habitats during winter and on migration through appropriate research, survey and monitoring; Promote communication, education and awareness of the status and needs of birds. <p>Furthermore, the Portsmouth LBAP covers several bird species including Skylark, Corn Bunting and Grey Partridge. It sets out actions to encourage and specify the improvement in habitat to improve farmland bird populations. No specific targets are listed.</p> <p>Also of relevance is the Sussex BAP which aims to advance biodiversity conservation in Sussex. Objectives include:</p> <ul style="list-style-type: none"> To maintain and enhance the wildlife and habitats that give Sussex its character; To identify priority habitats and species which are important in Sussex and which are important on a national and international scale; 	<p>The WRMP should have regard to BAP objectives.</p> <p>The SEA assessment framework should ensure that consideration is given to the effects that the WRMP is likely to have in relation to ecological receptors.</p>



Sub-regional/ Local Plans and Programmes	
Purpose of the Document, including Objectives and Targets relevant to the Water Resources Plan and SEA	Relationships and Influences on the Water Resources Plan and the SEA
<ul style="list-style-type: none">- To set realistic but ambitious targets and timescales for priority habitats and species;- To ensure that biodiversity action continues as a joint initiative;- Raise public awareness and encourage involvement in biodiversity.	

Appendix C

Schedule of Consultation Responses

Portsmouth Water published a Strategic Environmental Assessment (SEA) Scoping Report as part of the initial stage of the SEA of the Draft Water Resources Management Plan (dWRMP) for a consultation period of five weeks ending 26th August 2016. Responses were received to the consultation from the following organisations:

- ▶ Historic England
- ▶ Natural England;
- ▶ Environment Agency;
- ▶ Arun District Council;
- ▶ South Downs National Park Authority; and
- ▶ Sussex Wildlife Trust.

Tables C.1 to C.6 of this note provide a summary of the comments received from the consultees together with responses and actions that were taken.

Portsmouth Water published an Environmental Report alongside the draft WRMP for consultation between 5th March and 25th May 2018, following submission to Defra in December 2017. Responses were received to the consultation from the following organisations:

- ▶ Environment Agency; and
- ▶ Natural England;
- ▶ Hampshire and Isle of Wight Wildlife Trust; and
- ▶ Sussex Wildlife Trust.

Tables C.7 to C.10 provide a summary of the comments received from the consultees together with responses and actions taken in this updated Environmental Report.

Table C.1 Historic England

Consultation Question	Section of Scoping Report	Consultee Response	Response/Action
Q1. Do you think that this Scoping Report sets out sufficient information to establish the context for the SEA of the draft WRMP in terms of the review of the plans and programmes and baseline evidence and analysis? If not, which areas do you think have been missed and where is information on these topics available?	General	Highlights that general advice on Sustainability Appraisal and the historic environment is set out in Historic England's publication 'Strategic Environmental Assessment, Sustainability Appraisal and The Historic Environment': http://www.historicengland.org.uk/images-books/publications/strategic-environmental-assessment-sustainability-appraisal-historic-environment/ .	Comment noted. These publications will be considered in undertaking the SEA of the draft WRMP.
	Section 2: Review of Plans and Programmes	States that the plans and programmes set out in Table 2.1 and Appendix B of the Scoping Report should include the Convention for the Protection of the Architectural Heritage of Europe (Granada Convention) and the 2016 Culture White Paper.	Agreed. The Convention for the Protection of the Architectural Heritage of Europe (Granada Convention) was included in the review of plans and programmes and the 2016 Culture White Paper will be included in the review of plans and programmes contained in the Environmental Report.
	Section 2: Review of Plans and Programmes	Highlights that under the sub-regional/local plans and programmes set out in Table 2.1 (and Appendix B) of the Scoping Report, the East Hampshire and Sussex Downs Areas of Outstanding Natural Beauty (AONB) no longer exist, having both been de-designated in 2010 when the South Downs National Park was designated, and their Management Plans have been superseded by the South Downs National Park Partnership Management Plan 2013.	Comment noted. Reference to the Hampshire and Sussex Downs AONB Management Plans will be removed.
	Section 2: Review of Plans and Programmes	States that the key objectives and policy message for cultural heritage set out in Table 2.2 of the Scoping Report should preferably be " <i>Conserving and enhancing cultural heritage and archaeological sites</i> ".	Agreed. The objective/policy message in Table 2.2 of the Environmental Report will be amended to reflect this response.
	Section 2: Review of Plans and Programmes	States that the key sources for cultural heritage set out in Table 2.2 of the Scoping Report should include the European Convention on the Protection of the Archaeological Heritage, the Convention for the Protection of the Architectural Heritage of Europe, the Ancient Monuments and Archaeological Areas Act 1979, the Planning (Listed Buildings and Conservation Areas) Act 1990, the South Downs National Park Partnership Management Plan and the Chichester Harbour AONB Management Plan.	Agreed. The key sources suggested in this response will be included in Table 2.2 of the Environmental Report.
	Section 3: Baseline Analysis	States that Section 3.8 of the Scoping Report could refer to the Hampshire Historic Landscape Character Assessment for historic (non-registered) landscapes e.g. the Forest of Bere.	Agreed. The Hampshire Historic Landscape Character Assessment will be reviewed and the relevant historic (non-registered) landscapes will be referred to in the Environmental Report.

Consultation Question	Section of Scoping Report	Consultee Response	Response/Action
Q2. Do you agree that the main economic, social and environmental issues identified are relevant to the SEA of the draft WRMP. If not, which issues do you think need to be included or excluded?	Section 3: Key Sustainability Issues	Welcomes, in principle, the identification of <i>“the need to protect and enhance areas, features, landscapes and sites of archaeological and cultural heritage interest, and their settings”</i> as a key sustainability issue in sub-section 3.8 and Table 3.9 of the Scoping Report. However, to align more closely with the National Planning Policy Framework, suggests that this issue be reworded as <i>“the need to conserve and enhance the historic significance of buildings, monuments, features, sites, places, areas and landscapes of archaeological and cultural heritage interest, and their settings”</i> .	Agreed. The key sustainability issue for cultural heritage will be revised as per this response in the Environmental Report
Q3. Do you agree with the proposed approach to the SEA of the draft WRMP? Do the SEA objectives and guide questions that comprise the assessment framework cover a sufficient range of environmental, social and economic topics? If not, which objectives/ guide questions should be amended and which other objectives/ guide questions do you believe should be included?	Section 4: Approach to the Assessment	Welcomes the proposed SEA Objective 9 and, in principle, the three proposed guide questions in Table 4.2 of the Scoping Report. States that if archaeology is to be separated from the rest of the historic environment, would prefer the second guide question to be <i>“Will the option conserve or enhance archaeologically important sites and/or remains?”</i>	Agreed. The second guide question under SEA Objective 9 will be reworded as per this response.
	Section 4: Approach to the Assessment	Agrees with the illustrative guidance under SEA Objective 9 in Appendix C (Proposed Definitions of Significance) of the Scoping Report. However, considers that there is no need to qualify archaeological sites (which should be “archaeological sites and remains”) with “important”.	Agreed. The second guide question under SEA Objective 9 and the definitions of significance will be revised with reference to <i>“important archaeological sites”</i> removed and replaced with <i>“archaeological sites and remains”</i> .
	Section 4: Approach to the Assessment	Does not agree that under the SEA Objective 9 in Appendix C (Proposed Definitions of Significance) of the Scoping Report <i>“there will be no damage to known archaeological important sites”</i> is “significant positive” or “minor positive”. States that positive effects would be those that enhance or better reveal the significance of the archaeological sites or remains. If the option would not enhance or cause any damage to such sites or remains then the effect should be neutral. If the option would have no effect on such sites or remains (or on other heritage assets) then the effect should be “neutral” or there is no relationship.	Agreed. The definitions of significance under SEA Objective 9 will be revised.
	Section 4: Approach to the Assessment	With regard to SEA Objective 9 in Appendix C (Proposed Definitions of Significance) of the Scoping Report, asks whether there should not also be a reference to the degree of harm when distinguishing between “minor negative” and “significant negative”	Disagree. The definitions of significance for a minor negative effect and significant negative effect under SEA Objective 9 distinguish between effects on undesignated heritage assets (minor effect) and

Consultation Question	Section of Scoping Report	Consultee Response	Response/Action
		e.g. the total loss of a non-designated heritage asset could be considered to be “significant negative”.	designated heritage assets (significant effect). Loss or adverse effect to an undesignated heritage asset, even though its loss highly undesirable, would not have an equivalence to the loss or damage to a SAM or grade 1 listed building. Its inclusion would diminish the distinctions between the categories.

Table C.2 Natural England

Consultation Question	Section	Consultee Response	Response/Action
Q1. Do you think that this Scoping Report sets out sufficient information to establish the context for the SEA of the draft WRMP in terms of the review of the plans and programmes and baseline evidence and analysis? If not, which areas do you think have been missed and where is information on these topics available?	Section 3: Baseline Analysis	States that the baseline evidence for statutory designated sites in Section 3.2 of the Scoping Report should also identify Marine Conservation Zones in the marine area adjacent to the Portsmouth Water operation area (PWOA). These include, for example, Fareham Creek MCZ.	Agreed. Marine Conservation Zones in the marine area adjacent to the PWOA will be identified in the Environmental Report (Figure 3.1 has been updated).
	Section 3: Baseline Analysis	Highlights that the baseline evidence on the condition of SSSIs in Section 3.2 of the Scoping Report relies on many assessments that date back to 2010 or earlier. For water dependent sites in particular these assessments may not reflect the current situation due to revision of favourable condition standards for river and lake SACs and SSSIs, and more recent environmental information from work on the updated River Basin Management Plan. States that reported condition assessments for water dependent SSSIs should thus be treated with caution and this should be recognised in the evidence base.	Comment noted. Text will be added to the Environmental Report to indicate that the baseline evidence on the condition of SSSIs within the PWOA may not reflect the current situation (for the reasons stated in Natural England's response) and should thus be treated with caution; however, in the absence of more recent information, the site condition information will remain in Section 3.2 concerning the biodiversity baseline (excepting points below).
	Section 3: Baseline Analysis	Highlights that Natural England is currently working on updating the reported condition of estuary and harbour SSSIs. Assessment of water quality in relation to the designated features at a whole site level indicates that there is likely to be an area shift to unfavourable condition due to eutrophication pressure. An update on SSSI condition is provided in a Natural England commissioned report ¹⁰² on nitrogen inputs to	Comment noted. The baseline evidence on the condition of SSSIs within the PWOA will be updated in the Environmental Report.

¹⁰² Gooday, R., Hockeridge, B., Lee, D., Stockley, V. and Wright, E. 2015. Solent Harbours nitrogen management investigation. Report by ADAS UK Ltd to Natural England

Consultation Question	Section	Consultee Response	Response/Action
		these sites and the relevant part is provided as an annex to this response letter.	
	Section 3: Baseline Analysis	Considers that the baseline evidence for non-statutory protected sites and other biodiversity in Section 3.2 of the Scoping Report is poorly informed on priority habitats. States that more attention is required on identifying priority habitats, their distribution and condition, in particular those likely to be most relevant to the WRMP. This includes priority river habitat, the distribution of which is identified in a recent Natural England report ¹⁰³ that brings together various information sources, including survey in the South Downs area that overlaps with the PWOA.	Comment noted. Additional information will be provided in the Environmental Report on priority habitats, their distribution and condition. Reference will be made to the Natural England report ² .
	Section 3: Baseline Analysis	States that the baseline assessment for water (coastal water quality) in Section 3.4 of the Scoping Report is misleading as it encompasses many water bodies that lie well away from the PWOA. Highlights that transitional water bodies bordering the PWOA are assessed by the Environment Agency as being predominantly at WFD Moderate status on water quality ¹⁰⁴ .	Comment noted. The Environmental Report will take into account the water quality of only those water bodies within the PWOA. Reference will be made to the Environment Catchment Management Explorer data ³ .
	Section 3: Baseline Analysis	Considers that the information provided on the landscape baseline characteristics and evolution of the baseline in Section 3.9 of the Scoping Report is insufficient and requires further work. Suggests that the report refers to relevant parts of the landscape character assessment reports for the National Park and AONB in revising this section.	Comment noted. The Environmental Report will take into account information contained within the landscape character assessment reports for the South Downs National Park and the Chichester Harbour AONB.
	Section 3: Baseline Analysis	States that any local landscape designations in development plans should be identified in Section 3.9 of the Scoping Report.	Comment noted. Local landscape designations contained in Development Plans are not available as a GIS layer. Reference will, however, be made to local landscape designations in the Environmental Report.
Q2. Do you agree that the main economic, social and environmental issues identified are relevant to the SEA of the draft WRMP. If not, which issues do you think need to be included or excluded?	Section 3: Key Sustainability Issues	In Section 3.2 of the Scoping Report (Biodiversity), suggests rewording the 3rd bullet point (NTS1, key sustainability issues) to <i>"...increase and improve the condition of priority habitats and habitats of priority species, and restore populations of these species and other specially protected species"</i> . Considers that this better aligns with legislative and policy requirements, and gives a clearer focus on the wider biodiversity issue outside designated sites.	Agreed. The third key sustainability issue will be reworded as per this response.
	Section 3: Baseline Analysis	States that the SEA needs to recognise that the maintenance and strengthening of ecosystem services provided by natural environmental processes is a key sustainability matter. This overarches several of the identified topics. For example on soils, improving soil health (e.g. through better structure and carbon content) can reduce rapid run-off and increase infiltration to groundwater, provide attenuation of peak flows and improve riverine de-nitrification processes	Comment noted. Ecosystem services highlights the interconnections between different topics considered, and whilst it is not proposed to include a separate assessment objective, consideration of the effects on the range of ecosystem services will be given during the completion of the cumulative effects of the plan (and

¹⁰³ <http://publications.naturalengland.org.uk/publication/5104941191397376>

¹⁰⁴ <http://environment.data.gov.uk/catchment-planning/ManagementCatchment/3082>

Consultation Question	Section	Consultee Response	Response/Action
		thereby addressing issues on aquifer re-charge, flooding, watercourse siltation and water quality. The effect on ecosystem services is not readily examined by considering various environmental topics separately. Suggests that ecosystem services is identified as an overarching topic and issues in maintaining and strengthening natural processes, particularly those relevant to the water environment, are listed.	reporting within the appropriate section of the Environmental Report).
Q3. Do you agree with the proposed approach to the SEA of the draft WRMP? Do the SEA objectives and guide questions that comprise the assessment framework cover a sufficient range of environmental, social and economic topics? If not, which objectives/ guide questions should be amended and which other objectives/ guide questions do you believe should be included?	Section 4: Approach to the Assessment	States that the proposed approach to the SEA appears to be reasonably robust but that the methodology outlined in Section 4.5 of the Scoping Report on secondary, cumulative and synergistic effects is rudimentary. Considers that this element to the SEA requires more attention to ensure these effects are adequately addressed in the assessment process. This might include the identification of principles and a further set of questions to guide assessment.	Disagree. It is considered that the proposed approach to the assessment of secondary, cumulative and synergistic effects is appropriate. No change.
	Section 4: Approach to the Assessment	Highlights a need for an additional SEA objective on ecosystem services. This might be framed as follows: <i>"to maintain and strengthen ecosystem services provided by natural environmental processes, especially those relevant to the water environment"</i> .	Disagree. Given the broad range of factors included within the scope of ecosystem services, it is not considered appropriate to introduce one assessment objective to capture the effects (which will combine the effects arising from a number of different topics). However, in recognition of the importance of ecosystem services, consideration will be given in the completion of the assessment of the cumulative effects of the WRMP within the appropriate section of the Environmental Report.
	Section 4: Approach to the Assessment	States that a number of guide questions should be developed, particularly for example on soil health, water infiltration and retention (by vegetation, soils, wetland and floodplain storage in both rural and urban situations), naturalness of watercourse morphology, riparian vegetation structure.	Agreed. The following additional guide questions have been included in the assessment framework: <ul style="list-style-type: none"> • Will the option affect riparian vegetation structure? • Will the option protect and enhance soil health? • Will the option enhance water infiltration and retention? Whilst we have considered whether a guide question could be added concerning the naturalness of watercourse morphology, the strategic nature of the assessment, and the high level nature of some of the option descriptions means it is premature to consider the issue, which

Consultation Question	Section	Consultee Response	Response/Action
			however, will be important aspect to consider for individual schemes.
	General	States that the SEA should be mindful of new policy or the application of newly emerging information to current policy that may influence the background situation. Examples of this include improved water resource modelling on abstraction and compliance with river flow objectives, improved information on the risk to groundwater water resources from nitrate and urban pollution, revision to favourable condition standards for river SACs and SSSIs, new site designations and the identification of priority river habitat sites. The SEA process should establish that options brought forward for assessment are reasonable in capacity in relation to likelihoods of change in the background situation and thereby enable action to address undesirable environmental situations. During the presentation it was suggested this could be achieved through adequate headroom in deployable water resources. Taking this approach the adequacy of headroom should be demonstrated against risks of change in the background situation and should inform the SEA process.	Comment noted.

Table C.3 Arun District Council

Consultation Question	Section	Consultee Response	Response/Action
Q1. Do you think that this Scoping Report sets out sufficient information to establish the context for the SEA of the draft WRMP in terms of the review of the plans and programmes and baseline evidence and analysis? If not, which areas do you think have been missed and where is information on these topics available?	Section 3: Baseline Analysis	Highlights that part of Climbing Beach SSSI (West Beach) is also an LNR which has not been included within the list of LNRs.	Comment noted. West Beach LNR will be added to the list of LNRs in Table 3.1.
	Section 3: Baseline Analysis	With regard to Soils and Land Use (Section 3.3 of the Scoping Report), highlights that the Arun Local Plan 2011-2031 (ALP from here on) was submitted to the Planning Inspectorate at the beginning of 2015. Further evidence on objectively assessed housing need commissioned not long after submission indicated that there was a significant addition to the numbers. The Inspectors determined that 845 dwellings per annum would be the most appropriate level to begin with in terms of objectively assessed need. As a result, the Examination of the ALP has been suspended since February and the Council are	Comment noted. The current housing policy position will be reflected in the Environmental Report.

Consultation Question	Section	Consultee Response	Response/Action
		in the process of gathering evidence to help determine what it may be able to sustainably accommodate. The outcome of this work will not be until the end of the year. However, the level of increase is important with regards to the SEA of the WRMP both in terms of at least two of the themes and potential assessment going forward.	

Table C.4 Sussex Wildlife Trust

Consultation Question	Section	Consultee Response	Response/Action
Q1. Do you think that this Scoping Report sets out sufficient information to establish the context for the SEA of the draft WRMP in terms of the review of the plans and programmes and baseline evidence and analysis? If not, which areas do you think have been missed and where is information on these topics available?	Section 3: Baseline Analysis	Recommends that the following documents are considered as part of the baseline analysis for biodiversity and water (Sections 3.2 and 3.4 of the Scoping Report): State of Sussex Wetlands Report 2012 ¹⁰⁵ and Sussex Chalk Streams Report.	Comment noted. Where appropriate, the baseline analysis will be updated using information from the State of Sussex Wetlands Report 2012 and Sussex Chalk Streams Report.
Q2. Do you agree that the main economic, social and environmental issues identified are relevant to the SEA of the draft WRMP. If not, which issues do you think need to be included or excluded?	General	Supports the inclusion of biodiversity and water in Section 3 of the Scoping Report. Additionally, would like to see consideration of impacts on Ecosystem Services as part of the SEA.	Comment noted. Ecosystem services highlights the interconnections between different topics considered, and whilst it is not proposed to include a separate assessment objective, consideration of the effects on the range of ecosystem services will be given during the completion of the cumulative effects of the plan (and reporting within the appropriate section of the Environmental Report).
	Section 3: Key Sustainability Issues	Supports the key sustainability issues relevant to the WRMP for biodiversity.	Comment noted.
Q3. Do you agree with the proposed approach to the SEA of the draft WRMP? Do the SEA objectives and guide questions that comprise the assessment framework cover a sufficient range of environmental, social and economic topics? If	Section 4: Approach to the Assessment	Supports the inclusion of Objective 1 in Table 4.2 of the Scoping Report; however, considers that the proposed guide questions should be amended to remove 'where appropriate' from the first and fourth questions. States that this qualification is not necessary or consistent with the other guide questions.	Agreed. The guide questions under SEA Objective 1 have been revised as per this response.

¹⁰⁵ <https://sussexwildlifetrust.org.uk/discover/aroundsussex/wetlands/sussex-wetland>.

Consultation Question	Section	Consultee Response	Response/Action
not, which objectives/ guide questions should be amended and which other objectives/ guide questions do you believe should be included?			
	Section 4: Approach to the Assessment	States that the 'Commentary' section of the feasible options assessments (Table 4.3 of the Scoping Report) can include an explanation of whether the particular option enhances in addition to protects biodiversity.	Comment noted. Where appropriate and relevant, the assessment of feasible options will consider whether an option enhances biodiversity.
	Section 4: Approach to the Assessment	Requests changes to the Proposed Definitions of Significance in Appendix C of the Scoping Report. Considers that for Objective 1 the guidance is inconsistent and needs to be made clearer. In particular, it is not clear what 'designated habitats' are in the guidance for significant positive effects and minor positive effects. Also notes that habitats are not mentioned at all in the guidance for neutral effects. This should be amended so that all levels of effect consider impacts on designated and non-designated sites, priority habitats and species.	Comment noted. Designated habitats should read sites and this will be amended. Reference to priority habitats will be included in the definitions of significance.
	Section 4: Approach to the Assessment	Would like to see consideration of ecological networks. Suggests that this could be done through reference to making or severing habitat links within the illustrative guidance. This would be in line with the third key question for Objective 1 (Table 4.2 of Scoping Report).	Agreed. Reference to ecological networks will be included in the definitions of significance.
	Section 4: Approach to the Assessment	Notes that the illustrative guidance for negative effects on Objective 4 (Appendix C of the Scoping Report) only refers to the location of infrastructure on floodplains. However, notes that the majority of flooding in Sussex comes from surface water runoff, therefore impacts on surface water flow should also be considered.	Agreed. Reference to surface water flooding will be included in the definitions of significance.
	Section 4: Approach to the Assessment	Objects to options that generate less than 100 tonnes CO ₂ e being assessed as having a neutral effect on Objective 5. States that any generation of carbon emissions must be seen as having a negative effect on an objective 'to limit the causes, effects of and adaptation to climate change'	Comment noted. However, for a strategic plan, in which we are trying to assess likely significant effects, thresholds need to be established. Within the context of the scale of some of the options proposed, the 100 tCO ₂ e threshold is sufficient to discriminate the effects of very small scale schemes.

Table C.5 Environment Agency

Consultation Question	Section	Consultee Response	Response/Action
Q1. Do you think that this Scoping	Section 1: Introduction	Asks whether the SEA study area is the same as Portsmouth Water's supply area	Comment noted. For the purposes of the baseline analysis, information has

Consultation Question	Section	Consultee Response	Response/Action
Report sets out sufficient information to establish the context for the SEA of the draft WRMP in terms of the review of the plans and programmes and baseline evidence and analysis? If not, which areas do you think have been missed and where is information on these topics available?		(what about options/sources outside of supply area such as Itchen)? States that the study area should not necessarily be limited to the Water Company's supply area, but include areas that could be directly or indirectly affected by the WRMP options e.g. transfer options. Considers that relevant baseline information should have been collected for the study area. Suggests that the SEA study area should be defined to ensure that the potential environmental effects of transfers are included.	principally been provided for areas/sites only found within the PWOA. Where transfers are identified as WRMP options, the effects both within the PWOA and beyond this boundary will be considered and assessed drawing on relevant baseline information as appropriate; however, for the purposes of scoping the assessment, it is not considered necessary to expand the geographic scope of the baseline analysis.
	Section 1: Introduction	States that it would be useful to see where SEA fits in and how it informs the development of the WRMP.	Comment noted. Section 1.5 and Figure 1.3 of the Scoping Report describe the relationship between the SEA and WRMP development process. No change.
	Section 2: Review of Plans and Programmes	States that the review of plans and programmes should include: Updated EA flood risk management plans, EA drought plans, Ofwat Towards 2020, Defra Guiding principles, WaterUK long term planning project and WRSE Phase 1 and Phase 2 (when complete) reports.	Agreed. The plans and programmes referred to in this response will be reviewed and included in the Environmental Report.
	Section 3: Baseline Analysis	Asks why is the Itchen SAC not included in Table 3.1 of the Scoping Report.	Comment noted. The River Itchen SAC has already been listed in Table 3.1. No change.
	Section 3: Baseline Analysis	Suggests that a summary of the current WFD status and objectives for surface waterbodies in the SEA Study Area be included in the baseline analysis.	Agreed. A summary of the WFD status and objectives for surface waterbodies in the SEA Study Area will be included in Environmental Report.
	Section 3: Baseline Analysis	Asks whether detailed information on flood zones will be gathered to inform the assessment? Information on the likely future trends in flood risk should also be identified	Comment noted. The baseline information presented in the Scoping Report provides a general overview of flood risk across the PWOA which is considered to be sufficient for the purposes of assessing WRMP options. No change.
Q3. Do you agree with the proposed approach to the SEA of the draft WRMP? Do the SEA objectives and guide questions that comprise the assessment framework cover a sufficient range of environmental, social and economic topics? If not, which	Section 4: Approach to the Assessment	Is not clear why air quality has been scoped out of the SEA – states that there will be air quality impacts and that just because the effects are temporary, it should still be assessed, and appropriate mitigation measures identified and monitoring put in place. Ask if not included within the SEA, where would this be captured?	Disagree. As set out in Table 4.1 of the Scoping Report, effects on air quality are not considered likely to be significant and therefore are not material to the SEA of the draft WRMP. Consistent with the SEA of the 2014 WRMP and the SEA of the River Basin Management Plan for the South East (Environment Agency, 2014) the topic has therefore been scoped out of the assessment.

Consultation Question	Section	Consultee Response	Response/Action
objectives/ guide questions should be amended and which other objectives/ guide questions do you believe should be included?			
	Section 4: Approach to the Assessment	Asks whether SEA Objective 3 could include a no deterioration criteria.	Agreed. The following additional guide question will be included in the assessment framework: <i>"Will the option prevent the deterioration of Water Framework Directive (WFD) waterbody status (or potential)?"</i>
	Section 4: Approach to the Assessment	Asks whether SEA Objective 4 could include a guide question on the vulnerability of new or improved water resources assets as critical infrastructure which needs to remain operational in a flood event.	Comment noted. The assessment framework includes the following guide question: <i>"Will the option be at risk of flooding or be affected by flooding, if it occurred?"</i> In this context, the vulnerability of infrastructure to flood risk will be considered. No change.
	Section 4: Approach to the Assessment	Would like further information on how the cumulative effects assessment will be undertaken. Suggests that the outputs from the Water Resources in the South East (WRSE) project could be used to inform this assessment.	Comment noted. It is considered that the proposed approach to the assessment of secondary, cumulative and synergistic effects is appropriate. Where appropriate, outputs from the WRSE project will be utilised in the assessment.
	Section 4: Approach to the Assessment	States that there is no detail in the Scoping Report on how mitigation measures will be assessed and included?	Disagree. As set out in Section 4.4, the assessment of preferred options will consider the potential to avoid, minimise, reduce, mitigate or compensate for the identified effect(s) with evidence (where available). No change.
	Section 4: Approach to the Assessment	Asks whether a monitoring plan to identify any unforeseen significant effects will be included in the Environmental Report.	Comment noted. A monitoring framework will be included in the Environmental Report.
	Section 4: Approach to the Assessment	With regard to the definitions of significance (Objective 2), notes that no options are expected to have significant positive effects. Asks whether consideration could be given to a catchment management scheme with farmers.	Comment noted.
	Section 4: Approach to the Assessment	With regard to the definitions of significance (Objective 3), notes that there is no mention in the criteria of reducing demand.	Disagree. The definitions of significance include the following criteria: <i>"The option achieves savings through demand management and does not require abstraction to achieve yield."</i> No change.
	Section 4: Approach to the Assessment	Asks how the screening will be used in the options appraisal and selection of feasible options? Suggests that it would have been useful to see an example option be taken through the screening and scoring as an illustration.	Comment noted.

Table C.6 South Downs National Park Authority

Consultation Question	Section	Consultee Response	Response/Action
All	General	States that the Scoping Report is very comprehensive and covers the relevant economic, social and environmental issues. Also states that the assessment framework will lead to a thorough approach.	Comment noted.
All	General	Highlights that the recent project 'Secrets of the High Woods' contains information on cultural heritage which may be relevant for the assessment. This project used Lidar survey data to identify numerous new archaeological sites across the wooded areas of the South Downs, undoubtedly some of these sites will be of National significance. The report can be downloaded from the Historic England website ¹⁰⁶ with additional information on specific sites available on the Historic Environment Records, held by the Hampshire and West Sussex County Councils and Chichester District Council.	Comment noted.

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<http://research.historicengland.org.uk/Report.aspx?i=15425&ru=%2fResults.aspx%3fp%3d1%26n%3d10%26m%3d14%26ry%3d2016%26ns%3d1>

Table C.7 Environment Agency (on the Environmental Report accompanying the Draft WRMP)

Consultation Question	Section	Consultee Response	Response/Action
Q1. Does the assessment set out in this SEA Environmental Report describe the likely significant environmental effects of the feasible and preferred options?		None received	N/A
Q2. Do you think that there are other likely significant environmental effects that should have been identified that would have affected the choice of preferred option included in the Draft Water Resources Management Plan?		It is not clear whether/how the SEA has influenced the preparation of the draft plan and selection of the preferred options and how the least cost plan was amended to include the best environmental options.	<p>Comment noted.</p> <p>The SEA report includes a summary in Figure 1.3 of the interlinkages between the SEA process and the development of the WRMP. The Assessment Methodology (section 4.4) outlines the assessment approach to the options. Section 6.1 and Section 6.3 of the revised Environmental Report provides information on the factors (and decision making processes) that informed the selection of the preferred options. In this regard, they are supplementary to the information outlined with the dWRMP with respect to the options appraisal, environmental appraisal and programme appraisal.</p> <p>The SEA Post Adoption Statement (PAS), consistent with regulation 16(4) of The Environmental Assessment of Plans and Programmes Regulations 2004, will include details of how environmental considerations have been integrated into the final WRMP and how the findings of the Environmental Report have been taken into account. The PAS will also present the reasons for choosing the options that make up the final WRMP, in the light of the others considered.</p>
		<p>The company has not undertaken a WFD assessment of all the options in its plan. It is noted that the baseline analysis outlines the current baseline status of river, coastal and groundwater bodies. The SEA Environmental Report, however, does not provide any specific explanation of the basis on which any potential effects on WFD objectives and waterbody status have been assessed for the options under consideration and their construction and operational phases.</p> <p>In reporting on SEA objective 3 (water), the assessment matrices in places refer to previous WFD investigations / assessments/ modelling (e.g. pages E5; E8; F8; F21), but the background to these references is not provided and it is unclear whether this previous work requires updating in the context of the draft WRMP 2019 and how any updates will be progressed. For example, in places the need for further modelling is highlighted</p>	<p>Comment noted.</p> <p>It is not appropriate to consider the effects of all the WRMP options on WFD water bodies. These will include options for demand management and water efficiency and leakage that will not have any effect on WFD water bodies (and would be outside the scope of a WFD assessment).</p> <p>The effects on WFD for the water supply options have been considered, where appropriate, against the SEA Objective 3 (To protect and enhance water quality and surface and groundwater resources and the ecological status of water bodies). Information used within the assessment of each has been drawn from the collected baseline information presented in Section 3 of the initial and revised Environmental Report (which includes references to previous studies undertaken by (or on behalf of)</p>

Consultation Question	Section	Consultee Response	Response/Action
		<p>(e.g page E14; F41). The draft WRMP includes further details on activities under the National Environment Programme (3.3.6 and 3.3.7) and it is stated that abstraction at identified sites is considered by Portsmouth Water to be sustainable as current licences have been varied.</p> <p>Elsewhere the draft plan (6.6.3 Maximise Deployable Output) highlights that the Environment Agency has raised concerns about WFD waterbody deterioration in relation to two options (Street R021a and R023a). It is not clear how potential impacts on water and in particular WFD requirements have been evidenced for options and the significance of effects assessed, including any risk to WFD compliance.</p> <p>The company should detail within its SEA Environmental Report how and on what basis the potential effects of the proposed options on WFD waterbody status have been assessed and how any further assessment will be progressed to address any identified potential risk to WFD compliance.</p>	<p>Portsmouth Water for a variety of water bodies as well as information from the EA e.g. WFD Classification Data for South East River Basin District. The definitions of significance (Appendix D) provide the basis for scoring any identified effects for all SEA assessment objectives (including objective 3) which have been recorded for the options.</p> <p>R021a Source O DO Recovery is incorrectly described as 'Street' in the EA submission and there may be some unintended confusion with R023a Source H DO Recovery.</p> <p>In the case of R021a, as no additional abstraction outside the current licence would occur, the operation of the option was assessed as neutral against SEA objective 3. In the case of R023a, the assessment notes that 'the EA has expressed some reservations that this option could have a negative effect on the lower reaches of the River Meon during periods of low flow in combination with existing abstractions for spray irrigation... In the 2016 WFD classification (Cycle 2) the River Meon was classified as at moderate ecological status and good chemical status. The magnitude of the potential impact on the River Meon remains uncertain until further investigation is conducted. On this basis, whilst within licensed amount, the operation of this option is assessed as having an uncertain effect on water quality and quantity (SEA Objective 3)'.</p> <p>Portsmouth Water will determine what further actions are required, as part of the finalisation of the WRMP.</p>
		<p>In the revised submitted version of dWRMP (March 2018), it is noted that Option R060 has been removed and Options R021a and R023a have been included in the assessment (sections 5.2; 5.3; 6.2 and Appendix E). However, concern still remains around potential secondary, synergistic and cumulative effects of the options. Section 6.3 focuses on the potential in-combination effects with other plans, but has limited information on the potential cumulative effects of the preferred options that comprise the draft plan and whether any significant environmental effects are likely due their interaction.</p>	<p>Comment noted.</p> <p>The SEA for the Draft WRMP presented the assessment of in combination impacts of the options included in the preferred plan. The results were reported in Table NTS.7 of the non-technical summary (the last two rows show the cumulative effects in construction and operation) and described on pages 20 to 25 of the non-technical summary.</p> <p>The full results of the in-combination assessment were presented in section 6.2 on pages 114 to 122 of the SEA Environmental Report. Section 6.3 of the Environmental Report (page 123-126) followed on from this assessment of cumulative impacts of options in the preferred plan and was a separate analysis which focused on the effects of the options that comprised the Draft WRMP preferred plan in combination with other plans and programmes.</p> <p>The Revised Plan contains a slightly different combination of options and therefore the assessment within the SEA Environmental Report has been updated</p>

Consultation Question	Section	Consultee Response	Response/Action
			accordingly. The results from the updated analysis have been included within the Draft Final WRMP.
		The plan contains carbon emissions associated with most preferred options in AMEC SEA Appendix E. However, the plan does not clearly present greenhouse gas emission estimates associated with: R021a deployable output Recovery R023a deployable output Recovery Current operations.	Comment noted. Estimates of embodied and operational carbon have been included for all options.
Q3. Do you agree with the proposed arrangements for monitoring the significant effects of the implementation of the WRMP? If not, what measures do you propose?		None received	N/A

Table C.8 Natural England (on the Environmental Report accompanying the Draft WRMP)

Consultation Question	Section	Consultee Response	Response/Action
Q1. Does the assessment set out in this SEA Environmental Report describe the likely significant environmental effects of the feasible and preferred options?		None received	N/A
Q2. Do you think that there are other likely significant environmental effects that should have been identified that would have affected the choice of preferred option included in the Draft Water Resources Management Plan?		Natural England broadly welcomes the principle of developing a winter storage reservoir at Havant Thicket as a key element of the water resource planning in the dWRMP. By enabling the export of larger bulk supplies, the reservoir provides a key part of the solution to sustainability reductions required from Southern Water licence abstractions on the River Itchen SAC and River Test SSSI. These reductions are necessary to meet the conservation requirements of these two rivers in relation to their SAC and SSSI objectives on flow. Indirectly the reservoir will benefit the conservation of the Rivers Itchen and Test and, being in close proximity to important bird areas on the Solent (including large SPAs), is likely to attract an important freshwater bird interest if suitable habitat and sanctuary conditions are provided. These are highly significant positive impacts. Nonetheless we recognise that more work will be required to fully understand and mitigate the potential impacts of the scheme upon biodiversity. We are less content with unqualified statements in the dWRMP that the reservoir provides	Comment noted. In extensive commentary on the effects of R013 on SEA Objective 1 (To ensure the protection and enhancement of biodiversity, priority habitats and species), consideration is given to the construction and operational effects on European sites, national designated sites, other habitats and protected species. The assessment notes that construction of the new Havant Thicket reservoir 'would result in a significant loss of semi-rural greenfield land and woodland/BAP site (currently under review regarding their status as Ancient Woodland); specifically, the Avenue (7.93 ha) and Upper Lake, Middle Clearing (2.53 ha), Round Wood (2.48 ha), and a Corsican Pine plantation (3.66 ha). Construction could therefore result in direct habitat loss, in addition to temporary localised effects on protected species within the vicinity (reptiles, dormice, and bats); however, substantial efforts are being made by Portsmouth Water to develop appropriate mitigation measures in partnership with Natural England and guided by an agreed set of

Consultation Question	Section	Consultee Response	Response/Action
		<p>biodiversity benefits (e.g. paras 1.6 and 6.6.1). These statements also do not properly reflect the assessment of this proposal on biodiversity in the SEA which identified a minor negative effect from construction and a minor positive effect from operation.</p> <p>The reservoir will result in an extensive loss of terrestrial habitat, including areas with habitat and habitat of species of principal importance that fall under the requirements of Section 40 of the Natural Environment and Rural Communities Act 2006. Most notable is the loss of woodland habitat, much on ancient sites. This is a significant negative impact. As yet the company has not demonstrated how it will meet legislative and national planning policy requirements concerning this loss of biodiversity. This is ongoing work for which the company is seeking formal advice from Natural England, we will continue to work positively with them on this scheme. The dWRMP should recognise that there is also a loss of biodiversity from a winter storage reservoir at Havant Thicket and that measures will be required in conjunction with any authorisations for the reservoir to adequately meet legislative and national planning policy considerations. We also consider the levels of significance given to the biodiversity impacts of the proposed reservoir in the SEA are too low and should be reviewed.</p>	<p>mitigation principles. Given these cited mitigative measures and assuming that they are effectively implemented, and the licensing requirement for protected species, the effects on biodiversity (SEA Objective 1) are assessed as a minor negative'.</p> <p>In consequence the effects are assessed taking into account mitigation to provide a rounded assessment. No change is proposed.</p>
Q3. Do you agree with the proposed arrangements for monitoring the significant effects of the implementation of the WRMP? If not, what measures do you propose?		None received	N/A

Table C.9 Hampshire and Isle of Wight Wildlife Trust (on the Environmental Report accompanying the Draft WRMP)

Consultation Question	Section	Consultee Response	Response/Action
Q1. Does the assessment set out in this SEA Environmental Report describe the likely significant environmental effects of the feasible and preferred options?		None received	N/A
Q2. Do you think that there are other likely significant environmental effects		On the supply side, the company propose only Deployable Output improvements in AMP7, which make best use of existing water resources by modifying infrastructure	<p>Comment noted.</p> <p>In the case of the WFD effects on source H, the SEA (in the assessment of option</p>

Consultation Question	Section	Consultee Response	Response/Action
that should have been identified that would have affected the choice of preferred option included in the Draft Water Resources Management Plan?		to improve operability. Of the schemes discussed, we note that most have minor negative and more substantial positive effects under the various criteria considered within the Strategic Environmental Assessment (SEA), the exception being 'Source H' for which the abstraction itself may be contributing to the risk of deterioration under WFD on the River Meon. This does not appear to be reflected in the SEA, and so raises the question of whether the underlying impacts of any schemes (rather than just the changes proposed to them) have been adequately considered in the Environmental Assessment process. It is important that the SEA is used not only to screen out any options that would be entirely environmentally unacceptable, but also to identify the opportunities for mitigating any of the negative impacts identified for the options that are to be taken forward.	R023a), notes that 'the EA has expressed some reservations that this option could have a negative effect on the lower reaches of the River Meon during periods of low flow in combination with existing abstractions for spray irrigation... In the 2016 WFD classification (Cycle 2) the River Meon was classified as at moderate ecological status and good chemical status. The magnitude of the potential impact on the River Meon remains uncertain until further investigation is conducted. On this basis, whilst within licensed amount, the operation of this option is assessed as having an uncertain effect on water quality and quantity (SEA Objective 3)'. Portsmouth Water will determine what further actions are required, as part of the finalisation of the WRMP.
Q3. Do you agree with the proposed arrangements for monitoring the significant effects of the implementation of the WRMP? If not, what measures do you propose?		None received	N/A

Table C.10 Sussex Wildlife Trust (on the Environmental Report accompanying the Draft WRMP)

Consultation Question	Section	Consultee Response	Response/Action
Q1. Does the assessment set out in this SEA Environmental Report describe the likely significant environmental effects of the feasible and preferred options?		The final option contained within the dWRMP is that of a Drought Permit (DP) that would allow additional abstraction from 'Source S' during times of severe drought. The scheme has been assessed as having a potentially negative effect on biodiversity and water quantity & quality in the SEA due to the likely exacerbation of the effects of drought on the local water system. SWT encourages Portsmouth Water to be proactive in mitigating this risk by implementing habitat enhancements in advance of a DP being applied for.	Comment noted.
Q2. Do you think that there are other likely significant environmental effects that should have been identified that would have affected the choice of preferred option included in the Draft		None received	N/A

Consultation Question	Section	Consultee Response	Response/Action
Water Resources Management Plan?			
Q3. Do you agree with the proposed arrangements for monitoring the significant effects of the implementation of the WRMP? If not, what measures do you propose?		None received	N/A



Appendix D

Definitions of Significance

Objective	Key Questions	Effect	Description	Illustrative Guidance
1. To ensure the protection and enhancement of biodiversity, priority habitats and species	Will the option protect and enhance priority species, habitats and sites designated for their nature conservation value?	++	Significant Positive	The option would result in a major enhancement of the quality of designated habitats due to changes in flow or groundwater levels, water quality or habitat creation and enhancement measures. The option would result in a major increase in the population of a priority species.
	Will the option protect and enhance non-designated sites and local biodiversity?	+	Minor Positive	The option would result in a minor enhancement of the quality of designated and/or non-designated habitats due to changes in flow or groundwater levels, water quality or habitat creation and enhancement measures. The option would result in a minor increase in the population of a priority species.
	Will the option provide opportunities for new habitat creation or restoration and link existing habitats as part of the development process?	0	Neutral	The option would not result in any effects on European or national designated sites and/or species (including both designated and non-designated species).
	Will the option protect and enhance coastal and marine habitats and species?	-	Minor Negative	The option will result in minor, short term negative effects on non-designated sites (e.g. through decreases in flows/water quality, or some loss of habitat leading to a temporary loss of ecosystem structure and function).
	Will the option result in a change in the quality of habitats due to changes in groundwater/river water quality or quantity?	--	Significant Negative	The option would have a residual negative effect on European or national designated sites and/or protected species (i.e. on the interest features and integrity of the site, by preventing any of the conservation objectives from being achieved or resulting in a long term decrease in the population of a priority species). These effects could not be reasonably mitigated. The option will result in major, long term negative effects on non-designated sites (e.g. through decreases in flows/water quality, or significant loss of habitat leading to a long term loss of ecosystem structure and function).
	Will the option affect riparian vegetation structure?	?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain
2. To ensure the appropriate and efficient use of land and protect soil quality and geodiversity	Will the option minimise the loss of best and most versatile agricultural land?	++	Significant Positive	No option is expected to have a significant positive effect on achieving this objective.
	Will the option protect and enhance soil health?	+	Minor Positive	The option is located on a brownfield site and has no effect on soils or existing land use. The option results in the remediation of contaminated land.
	Will the option minimise conflict with existing land use patterns?	0	Neutral	The option has no effect on soils or land use
	Will the option minimise land contamination? Will the option utilise previously developed (brownfield) land?	-	Minor Negative	The option is not located on a brownfield site and/or results in a minor loss of best and most versatile agricultural land, or is in conflict with existing land use. The option results in land contamination. The option would have minor negative effects on protected geologically important sites.

Objective	Key Questions	Effect	Description	Illustrative Guidance
	Will the option protect and enhance protected sites designated for their geological interest and wider geodiversity?	--	Significant Negative	The option is not located on a brownfield site and results in a major loss of best and most versatile agricultural land, or is in substantial conflict with existing land use. The option results in land contamination. The policy/proposal would have significant negative effects on protected geologically important sites.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.
3. To protect and enhance water quality and surface and groundwater resources and the ecological status of water bodies	Will the option minimise the demand for water resources?	++	Significant Positive	The option results in addressing failure of WFD Good Ecological Status/Good Ecological Potential.
	Will the option protect and improve surface water, groundwater and coastal water quality?	+	Minor Positive	The option achieves savings through demand management and does not require abstraction to achieve yield.
	Will the option result in changes to river flows?	0	Neutral	The option would have no discernible effect on river flows or surface/coastal water quality or on groundwater quality or levels.
	Will the option result in changes to groundwater levels?	-	Minor Negative	The option would result in minor decreases in river flows. River and/or coastal water quality may be affected and lead to short term or intermittent effects on receptors (e.g. designated habitats, protected species or recreational users of rivers and the coastline) that could not be avoided but could be mitigated. The option would result in minor decreases in groundwater quality or levels.
	Will the option prevent the deterioration of Water Framework Directive (WFD) waterbody status (or potential)?	--	Significant Negative	The option would result in major decreases in river flows. River and/or coastal water quality may be affected and lead to long term or continuous effects on receptors (e.g. designated habitats, protected species or recreational users of rivers and the coastline) that could not reasonably be mitigated. The option results in the deterioration of WFD classification. The option would result in major decreases in groundwater quality or levels.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.
4. To reduce the risk of flooding	Will the option have the potential to cause or exacerbate flooding in the catchment area?	++	Significant Positive	No options are expected to have a significant positive effect on achieving this objective.
	Will the option have the potential to help alleviate flooding in the catchment area?	+	Minor Positive	The option has the potential to help alleviate flooding in the catchment.
	Will the option enhance water infiltration and retention?	0	Neutral	The option involves the construction of above-ground water supply infrastructure, but is located outside floodplain areas. It is anticipated that the option will neither cause nor exacerbate flooding in the catchment.
	Will the option be at risk of flooding or be affected by flooding, if it occurred?	-	Minor Negative	The option involves the construction of above-ground water supply infrastructure and is located within the 1 in 1000 year floodplain.
		--	Significant Negative	The option involves the construction of above-ground water supply infrastructure and is located within the 1 in 100 year floodplain.

Objective	Key Questions	Effect	Description	Illustrative Guidance
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.
5. To limit the causes and effects of climate change and increase resilience to the consequences of climate change	<p>Will the option reduce vulnerability to the effects of climate change by appropriate adaptation?</p> <p>Will the option increase environmental resilience to the effects of climate change?</p> <p>Will the option reduce or minimise greenhouse gas emissions?</p> <p>Will the option deliver new infrastructure that is energy efficient or makes use of renewable energy sources?</p>	++	Significant Positive	The option will reduce operational carbon emissions by more than 1,000 tonnes CO ₂ e/year.
		+	Minor Positive	The option will result in a sustained decrease in greenhouse gas emissions and will increase resilience/decrease vulnerability to climate change effects. The option will reduce operational carbon emissions by between 100 and 1,000 tonnes CO ₂ e/year
		0	Neutral	The option would have no discernible effect on greenhouse gas emissions, nor would the option increase resilience/decrease vulnerability to climate change effects. The option will generate carbon emissions of less than 100 tonnes CO ₂ e during construction. The option will generate operational carbon emissions of between -99 and +99 tonnes CO ₂ e/year.
		-	Minor Negative	The option will have a minor impact on resilience/decrease vulnerability to climate change effects. The option will generate carbon emissions of between 100 and 1,000 tonnes CO ₂ e during construction. The option will generate operational carbon emissions of between 100 and 1,000 tonnes CO ₂ e/year.
		--	Significant Negative	The option will have a major impact on resilience/significantly decrease vulnerability to climate change effects. The option will generate carbon emissions of greater than 1,000 tonnes CO ₂ e during construction. The option will generate operational carbon emissions of more than 1,000 tonnes CO ₂ e/year.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.
6. To maintain and enhance the economic and social wellbeing of the local community	<p>Will the option ensure sufficient infrastructure is in place for predicted population increases?</p> <p>Will the option create local employment opportunities?</p> <p>Will the option support the local and regional economy?</p> <p>Will the option ensure that an affordable supply of water is</p>	++	Significant Positive	The option results in an increase of 300 or more construction FTEs (on the basis that this is roughly 5% of the construction jobs found within Portsmouth, Gosport and Havant districts). The option requires 'high' capital expenditure of >£10 million to implement. The option provides an additional yield of >10 Ml/d.
		+	Minor Positive	The option results in less than 300 construction FTEs (on the basis that this will be less than 5% of the construction jobs found within Portsmouth, Gosport and Havant districts). The option requires 'medium' capital expenditure of between £3million and £10 million to implement. The option provides an additional yield of 1-10 Ml/d.

Objective	Key Questions	Effect	Description	Illustrative Guidance
	<p>maintained and vulnerable customers protected?</p> <p>Will the option avoid disruption through effects on the transport network?</p>	0	Neutral	<p>The option has no effect on local employment opportunities, the regional or local economy, or on recreational facilities.</p> <p>The option requires 'low' capital expenditure of less than £3 million.</p> <p>The option provides an additional yield of <1 MI/d.</p>
		-	Minor Negative	<p>The option would have a minor adverse impact on road traffic and congestion.</p> <p>It is not expected that any options will have a negative effect on employment opportunities or the economy.</p>
		--	Significant Negative	<p>The option would have a significant adverse impact on road traffic and congestion.</p> <p>It is not expected that any options will have a negative effect on employment opportunities or the economy.</p>
		?	Uncertain	<p>From the level of information available the effect that the option would have on this objective is uncertain.</p>
7.To ensure the protection and enhancement of human health	<p>Will the option ensure the continuity of a safe and secure drinking water supply?</p> <p>Will the option ensure that surface water and bathing water quality are maintained within statutory standards?</p> <p>Will the option adversely affect human health by resulting in increased noise and/or adverse effects on air quality?</p> <p>Will the option affect opportunities for recreation and physical activity?</p>	++	Significant Positive	<p>The option leads to a major increase in yield (>10 MI/d) of drinking water, has a sustained positive effect on the health of local communities and will ensure that surface water and bathing water quality is maintained within statutory limits.</p> <p>The option creates new, and significantly enhances existing, recreational facilities within the operational area.</p>
		+	Minor Positive	<p>The option leads to a minor increase in yield (1-10 MI/d) of drinking water, has a temporary positive effect on the health of local communities and will ensure that surface water and bathing water quality is maintained within statutory limits.</p> <p>The option enhances existing recreational facilities within the operational area.</p>
		0	Neutral	<p>No option is expected to have a neutral effect on achieving this objective.</p>
		-	Minor Negative	<p>The option results in the deterioration of surface water or bathing water quality and has a temporary effect on human health (e.g. noise or air quality).</p> <p>The option reduces the availability and quality of existing recreational facilities within the operational area.</p>
		--	Significant Negative	<p>The option results in the deterioration of surface water or bathing water quality and has a long term effect on human health (e.g. noise or air quality).</p> <p>The option results in the removal of existing recreational facilities within the operational area.</p>
		?	Uncertain	<p>From the level of information available the effect that the option would have on this objective is uncertain.</p>
8. To promote the wise use of resources	Will the option minimise the demand for raw materials?	++	Significant Positive	<p>The option involves reducing leakage from the supply network or is a water efficiency option with a yield of >5 MI/d.</p>

Objective	Key Questions	Effect	Description	Illustrative Guidance
	<p>Will the option lead to reduced leakage from the supply network?</p> <p>Will the option improve efficiency in water consumption?</p> <p>Will the option seek to minimise the demand for raw materials?</p> <p>Will the option reduce or minimise energy use?</p> <p>Will the option promote the re-use and recycling of waste materials and reduce the proportion of waste sent to landfill?</p> <p>Will the option promote the use of sustainable design and materials?</p>	+	Minor Positive	<p>The option will re-use or recycle substantial quantities of waste materials and any new infrastructure will incorporate substantial sustainable design measures and materials. There will be no increase in energy consumption.</p> <p>The option involves reducing leakage from the supply network or is a water efficiency option with a yield of <5 Ml/d.</p>
		0	Neutral	The option will largely rely on existing infrastructure and only require small quantities of additional materials to realise yield. No additional energy use required.
		-	Minor Negative	<p>The option will require new infrastructure with only limited opportunities for the re-use or recycling of waste materials. There are limited opportunities for sustainable design or the use of sustainable materials.</p> <p>The option results in a minor increase in energy consumption.</p>
		--	Significant Negative	<p>The option will require significant new infrastructure that cannot be provided through the re-use or recycling of waste materials. There are no opportunities for sustainable design or the use of sustainable materials.</p> <p>The option results in a major increase in energy consumption.</p>
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.
9. To conserve and enhance cultural and historic assets	<p>Will the option conserve or enhance the historic environment, including heritage assets such as historic buildings, conservation areas, features, places and spaces, and their settings?</p> <p>Will the option avoid or minimise damage to archaeologically important sites?</p> <p>Will the option affect public access to, or enjoyment of, features of cultural heritage?</p>	++	Significant Positive	<p>The option will result in enhancements to designated heritage assets and/or their setting, fully realising the significance and value of the asset, such as:</p> <ul style="list-style-type: none"> ○ Securing repairs or improvements to heritage assets, especially those identified in the Historic England Buildings/Monuments at Risk Register; ○ Improving interpretation and public access to important heritage assets.
		+	Minor Positive	The option will result in enhancements to heritage assets and/or their setting, whether designated or not.
		0	Neutral	The option will have no effect on cultural heritage assets or archaeology.
		-	Minor Negative	<p>The option will result in the loss of significance of undesignated heritage assets and/or their setting, notwithstanding remedial recording of any elements affected.</p> <p>There will be limited damage to known, undesignated archaeology important sites with a consequent loss of significance only partly mitigated by archaeological investigation.</p>

Objective	Key Questions	Effect	Description	Illustrative Guidance
		--	Significant Negative	<p>The option will diminish the significance of designated heritage assets and/or their setting such as:</p> <ul style="list-style-type: none"> Demolition or further deterioration in the condition of designated heritage assets especially those identified in the Historic England Buildings/Monuments at Risk Register; Loss of public access to important heritage assets and lack of appropriate interpretation. <p>There will be major damage to known, designated archaeology important sites with a consequent loss of significance only partly mitigated by archaeological investigation.</p>
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.
10. To conserve and enhance landscape character and other protected features	<p>Will the option avoid adverse effects on, and enhance where possible, protected/designated landscapes (including woodlands), townscapes or seascapes such as National Parks or AONBs be avoided?</p> <p>Will the option affect public access to existing landscape features?</p> <p>Will the option minimise adverse visual impacts?</p>	++	Significant Positive	The option results in new, above ground infrastructure that significantly enhances the local landscape, townscape or seascape.
		+	Minor Positive	The option results in new, above ground infrastructure that has a minor positive effect on the local landscape, townscape or seascape.
		0	Neutral	The option results in new, above ground infrastructure but is not located within or visible from a protected/designated landscape, townscape or seascape and has no effect on the character or public amenity value of setting.
		-	Minor Negative	The option results in new, above ground infrastructure that has a minor negative effect on the local landscape, townscape or seascape.
		--	Significant Negative	<p>The option would have a negative effect on a designated landscape or feature (i.e. significant visually intrusive infrastructure) whose effects could not be reasonably mitigated.</p> <p>The option results in new, above ground infrastructure that has a major negative effect on the local landscape, townscape or seascape.</p>
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.

Appendix E

Feasible Options Assessment Matrices

This appendix presents the findings of the assessment of the feasible options (four supply options, three customer demand options, five water efficiency options, three leakage options and three drought options).

Key to Assessments

Score	Description	Symbol
Significant Positive Effect	Significant positive effect of the Water Resources Management Plan option on this objective	++
Minor Positive Effect	Positive effect of the Water Resources Management Plan option on this objective	+
Neutral	Overall neutral effect of the Water Resources Management Plan option on this objective	0
Minor Negative Effect	Negative effect of the Water Resources Management Plan option on this objective	-
Significant Negative Effect	Significant negative effect of the Water Resources Management Plan option on this objective	--
No Relationship	There is no clear relationship between the Water Resources Management Plan option and the achievement of the objective or the relationship is negligible.	~
Uncertain	The Water Resources Management Plan option has an uncertain relationship to the objective or the relationship is dependent on the way in which the aspect is managed. In addition, insufficient information may be available to enable an assessment to be made.	?
Mixed Effect	Mixed positive and negative effect of the Water Resources Management Plan option on this objective	+/-

Option	Stage	1. Biodiversity	2. Geology and Soils	3. Water Quantity and Quality	4. Flood Risk	5. Climate Change	6. Economic and Social Wellbeing	7. Human Health	8. Waste and Resources	9. Cultural Heritage	10. Landscape
R013 Havant Thicket Winter Storage Reservoir (23 MI/d)	Construction	-	-	0	0	--	++/-	-	-	-	--
	Operation	+/?	0	0	+	+	++	++	-	0	+/?

Construction

This option would involve the development of a new pumped storage reservoir with a capacity of 8,800 MI on Portsmouth Water's land holding at Havant Thicket (170 ha.). Water would be sourced from the Source B spring source during the winter period and pumped to Havant Thicket Reservoir for use in the summer within the existing annual average licence of 98MI/d; specifically, the new reservoir would deliver 23 MI/d with a peak deployable output of 50 MI/d though this would be subject to the hands-off flows of Lake A and Stream A. Implementation of the scheme would also require a new c.8.4km single raw water main consisting of two parts: an oversized 1600mm main to Hermitage Stream to allow rapid gravity drawdown and an 800mm main to Source B Pumping Stations and WTW. It should be noted that both pumping stations and WTW at Source B would require minor refurbishments to increase peak output from 40 MI/d to 50 MI/d which would include new pumps, a large external standby generator, and a new DAF plant for the WTW. Treated output would then flow to Works A WTW which would direct water to Reservoir A via a new c.8.4km main and Reservoir B via a new c.4km main. In order to facilitate these secondary transfers to the service reservoirs, Works A WTW would require minor refurbishment/reinforcement to its suction main.

The proposed reservoir site, new pipelines, and ancillary infrastructure modifications are not situated within or immediately adjacent to any European designated conservation sites; however, there are several SACs/SPAs/Ramsars within 5km of the scheme: Chichester and Langstone Harbours Ramsar/SPA/SSSIs (c.3.5km from the proposed reservoir site and c.650m from the Works A – Reservoir B pipeline), Solent Maritime SAC (3.5km from the proposed reservoir site and 650m from the Works A – Reservoir B pipeline), Solent and Isle of Wight Lagoons SAC (2km from the Works A pipelines), and Portsmouth Harbour Ramsar/SPA/SSSI (307m from a section of the Works A – Reservoir A pipeline). Portsmouth, Chichester, and Langstone Harbours are large, sheltered estuarine basins comprised of extensive sand and mud-flats rich in invertebrates as well as beds of algae and eelgrasses. These sites also support nationally significant wetland bird populations: Little Tern; Ringed Plover; Redshank; Dark-bellied Brent Goose; and Dunlin. Langstone and Chichester harbours are part of the Solent Maritime SAC (11,325 ha.), a national exemplar for estuaries, which supports a range of protected habitats and vegetation including Atlantic salt meadows and shifting dunes. It is considered unlikely that excavation nor construction of the reservoir would have any significant effects on the priority interest features of these sites (ecological habitats and flora) due to a lack of clear impact pathways though minor temporary noise disturbance could affect avifauna traveling within proximity of the works. For example, the construction of the Works A – Reservoir A pipeline may disturb wildfowl and waders at Portsmouth Harbour due to proximity though timing of the works (avoiding known times of population surges) should prevent significant impacts. Three small ephemeral water courses drain across the proposed reservoir site which join to form Riders Lane Stream which flows into the Hermitage Stream, and subsequently, Langstone Harbour and the Solent Maritime SAC; consequently, construction of the reservoir in addition to excavation across Hermitage Stream may indirectly

introduce pollution/debris within the stream which may affect ecological features such as in-river habitats, mobile aquatic species, and designated biota. It should be noted, however, site specific mitigation and established best practice should prevent significant effects to both local ecosystems and the harbours. Construction could temporarily alter water processes associated with these streams although the implementation of operational mitigation (compensation flows) should prevent adverse effects on downstream water flow/in-river habitats. Furthermore, Warblington Meadows SSSI would be 2.1km from the Works A – Reservoir B pipeline whereas three other SSSIs would be within the general vicinity of the Works A – Reservoir A pipeline: Portsdown (489m), Hook Heath Meadows (2.1km), and Lye Heath Marsh (2.7km). These sites are characterised by their nationally significant environmental features and designated flora species; however, proposed pipelines would primarily be routed along the urban road network which, in conjunction with scheme specific mitigation and established best practice, do not present any clear impact pathways to these protected ecological features or the local wildlife utilising these sites. It should be noted that excavation between Hermitage Stream – Source B water works would utilise urban grassland which may result in minor temporary disturbance to proximate habitats and wildlife. The construction/refurbishment of ancillary infrastructure would be situated on existing operational sites within an urban setting such that effects to proximate habitats and/or wildlife would be minor if not negligible. In general, implementation of the scheme would predominantly entail construction of the new Havant Thicket reservoir which would result in a significant loss of semi-rural greenfield land and woodland/BAP site (currently under review regarding their status as Ancient Woodland); specifically, the Avenue (7.93 ha) and Upper Lake, Middle Clearing (2.53 ha), Round Wood (2.48 ha), and a Corsican Pine plantation (3.66 ha). Construction could therefore result in direct habitat loss, in addition to temporary localised effects on protected species within the vicinity (reptiles, dormice, and bats); however, substantial efforts are being made by Portsmouth Water to develop appropriate mitigation measures in partnership with Natural England and guided by an agreed set of mitigation principles. Given these cited mitigative measures and assuming that they are effectively implemented, and the licensing requirement for protected species, the effects on biodiversity (SEA Objective 1) are assessed as a minor negative.

Construction of the reservoir would involve a significant loss of semi-rural greenfield land; however, land-intake would consist of Grade 4 and non-agricultural land which is considered poor soil quality though the site is currently used for grazing. A new access road would be constructed to allow construction and operational traffic to join the reservoir site from the B2149 along an existing Forestry Commission gravel track. The construction/refurbishment of ancillary infrastructure would be situated on previously developed land which should have a neutral effect on land/soil quality. The proposed excavation routes would primarily underlay the road network (urban classified land) or non-agricultural land with minor sections of excavation situated on Grade 3b agricultural land (Works A – Reservoir A pipeline). Disturbed land would, however, be reinstated following the completion of construction. On balance, this option has been assessed as having a negative effect on SEA Objective 2.

The new Havant Thicket reservoir would require a significant scale of excavation and construction which poses a high risk of soils and silt entering the three drainage streams on-site, and subsequently, Hermitage Stream and Langstone Harbour. Extraction works for the reservoir footprint could also disturb or pollute groundwater resources. Notwithstanding, it is anticipated that best practices will be adhered to and mitigation implemented (such as dust suppression, soil containment and emergency response procedures) such that construction of the overall scheme would not affect water quality. Implementation of compensation/maintenance flows in conjunction with cited mitigative measures should further assist in preventing the diversion and/or obstruction of water flow from the three ephemeral drainage streams on-site. Consequently, this option has been assessed as having a neutral effect on water quantity (SEA Objective 3).

The proposed reservoir would not be situated within a flood zone nor is it anticipated that construction would result in or exacerbate flooding elsewhere. The proposed Havant Thicket – Source B pipeline route would traverse and/or be immediately adjacent to Flood Zones 2/3 originating from Riders Lane Stream and Hermitage Stream whereas the Works A – Reservoir B pipeline would traverse a Flood Zone 3 emerging from Hermitage Stream. Excavation though it is expected that works could be scheduled to avoid periods of flooding. Furthermore, excavation should not cause or exacerbate flooding elsewhere. Overall, this option has been assessed as having a neutral effect on Objective 4.

There would be c.44k vehicle movements over the 8 year implementation period (c. 5.5k per annum / 15 HGV movements per day) which could result in minor traffic congestion along the A3, A2030, B2149, B2177, and sections of the local road network which are utilised within pipeline routing or lead to targeted/proposed infrastructure. It should be noted, however, that the majority of material used in the construction of the reservoir embankments would be sourced on-site which would help reduce adverse effects resulting from transportation. Overall, the construction of this option would generate up to 20.4k tCO₂e (principally embodied in construction materials) which, together with resource use, e.g. fuel consumption, and waste generation, has been assessed as having a significant negative effect on Objective 5.

The construction of the option would represent a substantial capital investment (£81m) that could have a significant positive effect on the local economy associated with employment opportunities and supply chain benefits generated by the development together with spend by construction workers and contractors. Notwithstanding, utilisation of the road network for the majority of pipeline routing in conjunction with an increase in HGV movements is expected to cause congestion/driver delay within central and south-west Havant and northern Portsmouth. Consequently, the temporary disruption of movement may result in residual impacts on ease of access to Portsmouth and Langstone Harbours which could affect local/tourist economies (depending on the timing of the works) though such effects would be minor if not negligible. Excavation along public highways/local roads may also temporarily effect local community institutions (e.g. educational, religious, and civic establishments) situated along

the routes regarding the loss of amenity and utility though such effects are expected to be minor and potentially mitigated through construction scheduling. Overall, the option has been assessed as having a mixed significant positive and minor negative effects on economic and social wellbeing (Objective 6).

Construction of the Havant Thicket Reservoir is not expected to significantly affect opportunities for recreation and physical activity as the majority of the site is not accessible for recreational purposes due to its current use as grazing land. There may, however, be minor adverse effects on adjacent sites used for recreation (Forestry Commission Havant Thicket, Rowland's Castle, Staunton Country Park). A public bridleway crosses the proposed reservoir site though the Forestry Commission have previously indicated that this path can be permanently diverted around the boundary of the reservoir to the north using existing tracks before construction commences. Construction of the reservoir may temporarily affect water flow within Hermitage Stream during the construction period which could adversely affect angling on the stream and further downstream sites though this currently uncertain. Furthermore, excavation could result in a temporary disruption of use or loss of amenity to proximate grounds which host recreational walking and sport such as Hermitage Stream walking paths, St. Thomas More's rugby and recreational grounds, Bidbury Mead recreational grounds, Paulsgrove Park, and Watersedge Park. Construction of the reservoir may affect human health due to temporary noise disturbance and air quality impacts (dust); specifically, residential receptors west of Swanmore Road), east of B2149, and receptors further to the south beyond Staunton Country Park though significant effects are not expected as the majority of these residential properties are set back from the site boundary and screened by existing trees. Excavation and HGV movements would primarily be routed through residential neighbourhoods including Leigh Park, Havant, Bedhampton, Farlington, Drayton, Cosham, and Paulsgrove which would result in adverse but temporary noise disturbance and potential adverse air quality impacts. The construction/refurbishment of ancillary infrastructure, particularly within Source B water works, may result in additional disturbance for proximate residential receptors. Overall, this option has been assessed as having a negative effect on human health (Objective 7).

Implementation of the proposed scheme would require a significant scale of new infrastructure and energy requirements, however, a majority of material used in the construction of the embankments would be sourced on-site, e.g. the reuse clay excavated from the footprint of the reservoir void, which would help reduce adverse effects resulting from resource use. Additionally, it is not envisaged that construction of the reservoir nor any other components within the scheme would result in significant waste streams. Overall, this option has been assessed as having a minor negative effect on Objective 8.

The proposed reservoir site does not contain any designated heritage assets within its boundaries; specifically, the Castle Ancient Scheduled Monument is c. 1.3km from the proposed site whereas nine Grade II Listed Buildings range from 250m to 450m. Due to the significant woodland buffer around the site, it is unlikely that construction would significantly affect the visual amenity of their settings though minor temporary impacts on amenity may occur due to the scale of the works and intervening vantage points within the woodland screening. It should be noted that a southern section of the site is designated as part of the Sir George Staunton Registered Park and Gardens (Grade II listed) which would be directly affected by construction, e.g. loss of the Avenue woodland. It is expected that site-specific mitigation and best practice (additional features and landscaping complementary to the historic landscape) would minimise negative effects on the setting of the historical assets. There are a range of Ancient Scheduled monuments situated along the proposed excavation routes range from 884m to 144m (Fort Nelson) such that works may result in minor temporary effects to the amenity of their settings. Similarly, there are approximately 28 Grade II / II* Listed Buildings situated along the proposed excavation routes with 14 assets under 50m: the Golden Lion (10m), Bedhampton Arts Centre (12m), Manor Cottage (10m), New Inn (15m), and Nelson Monument (5m). Consequently, works could result in temporary adverse impacts on the visual amenity of their settings though no significant effects are expected to their structural integrity. Overall, this option has been assessed as having a negative effect on Objective 9.

The proposed reservoir is c. 1.1km from the South Down National Park and c. 3.5km from the Chichester Harbour AONB. Because the site is visible from the South Downs National Park from a distance (to the east of Rowlands Castle), recreational receptors may perceive the works (plant, machinery, excavations and other related activities) as impacting the landscape and visual amenity associated with the national park's setting. Similarly, proximate residential receptors may also perceive construction as altering the local greenfield setting, and more so, the wider landscape character of the area. It should be noted, however, that effects would be somewhat mitigated by screening from the woodland cover. Excavation would range from 1.3km to 1.5km from the Chichester Harbour AONB though it is unlikely works would result in a significant effect on the visual amenity of the AONB due to the urban setting. Similarly, construction/refurbishment of ancillary infrastructure would be situated on present operational sites such that works are expected to have a negligible effect on their proximate settings. Overall, the magnitude of change resulting from the scheme would be large and the works relatively long term (up to 8 years) thus the option has been assessed as having a significant negative effect on Objective 10.

Operation

The operation of the new reservoir would deliver 23 MI/d with a peak deployable output of 50 MI/d (subject to the hands-off flows of Lake A and Stream A) which would remain within the existing annual average licence of 98MI/d. Although water discharge from Source B spring source currently feed into Langstone and Chichester Harbours through the Hermitage Stream and an unnamed watercourse, the current licence requires maintenance of a minimum residual flow to the Hermitage Stream. Other potential effects (water quality; effects of emergency drawdown; effects on birds) have previously

been investigated and are unlikely to be significant. Overall, it is assumed that the current licence would have been reviewed by the EA under the Habitats Regulations Review of Consents process thus operation is not expected to have any significant effects alone or in combination on any European conservation sites, e.g. Chichester and Langstone Harbours Ramsar/SPA/SSSIs, Solent Maritime SAC, Solent and Isle of Wight Lagoons SAC, and Portsmouth Harbour Ramsar/SPA/SSSI. The new reservoir might help contribute to the creation of a new habitat though this would depend on its design and management. The integration of additional habitat creation measures could include retained wetland with islands along the reservoir's northern shore where there is no requirement for embankments. The creation of the new wetland could benefit birds using Chichester, Langstone, and Portsmouth harbours (e.g. to provide a safe roost for birds displaced by human activity) as well as diverting recreational activity away from the harbour, especially during winter/roosting season. Overall, the operation of this option has been assessed as having a minor positive effect on biodiversity though uncertainty remains regarding the magnitude of benefit resulting from habitat creation.

There would be no operational effects on soils/land use resulting from the new reservoir (discounting the initial land-intake during the construction stage) or the new pipelines. There would be a 10m easement on the pipeline to protect it from future development which is likely to lead to some land sterilisation but this would be negligible since the majority of the pipeline underlays the urban road network.

The operation of this option would reduce the flows of water entering Hermitage Stream via Riders Lane Stream, and subsequently, Chichester and Langstone Harbours; however, abstraction would operate during periods when Stream A and Source B springs flows are sufficient to support drawdown. Furthermore, operation would remain within the current abstraction licence therefore it is assumed compensation releases to Riders Lane Stream and Hermitage Stream would be required under the terms of consents at the site. Regular discharges from the reservoir may consequently improve flows in the Riders Lane Stream and the Hermitage Stream throughout operation. Prior water quality modelling work has demonstrated that the operation of this option is not expected to cause deterioration in Water Framework Directive status of the Chichester and Langstone Harbours. Modelling has also indicated that there may be some benefit in reducing nitrate concentrations entering Langstone Harbour in addition to moderating peaks in iron and manganese that are currently experienced in the streams. The modelling has also found that phosphate, ammonium, suspended solids and most metal concentrations will also be reduced. Overall, this option has been assessed as having a neutral effect on Objective 3.

The new reservoir would provide flood storage which may assist in managing storm inflows within the Riders Lane Stream and Hermitage Stream catchment area. This operational benefit, however, would be minor if not negligible as Flood Zones 2/3 emerging from Hermitage stream are downstream of the reservoir and relatively small in area. Notwithstanding, the increased uncertainty over future weather patterns suggests that the greater resilience to flooding would have a minor positive effect.

There would be an increased operational energy demand for this option (259,500 kWh/year) as water would need to be pumped from Stream A and Source B springs to the reservoir in addition to pumping treated output from Works A WTW to Reservoir A and Reservoir B. This would result in emissions of 91 tonnes CO₂e/a. It may be possible to use the gravity flow from Havant Thicket Reservoir to Source B Water Works to generate small scale hydro-electricity. Once operational, the reservoir will create a conjunctive use system that will capitalise on forecasted wetter winters by enabling greater storage of water that would otherwise be discharged to the harbour during winter for use in the summer. The reservoir could therefore increase resilience to climatic and environmentally driven supply restrictions in the region. Overall, this option has been assessed as having a minor positive effect on Objective 5 while having a negative effect on waste and resources (Objective 8).

The scheme would not adversely affect human health due to increased noise, nuisance or disruption. The new reservoir could potentially provide new social and recreational facilities and activities such as walking paths, fishing, boating, birdwatching hides, nature interpretation, community space, and picnic areas. The increased capacity of 23 Ml/d would help ensure a continual supply of clean drinking water in cases of pollution incidents at the springs thus generating a significant positive effect on health. Furthermore, operation of the new reservoir may increase foot traffic within Portsmouth (estimated up to 125k visitors a year) which could provide a minor economic boost to local businesses. Additionally, as the site landscaping matures, the reservoir could potentially have a localised beneficial effect on residential house prices for those dwellings located within its vicinity. Overall, the scheme would support economic/population growth which could result in a significant positive effect on the local economy and social-wellbeing.

There would be no operational effects on designated cultural heritage assets.

The proposed reservoir is c. 1.1km from the South Down National Park and c. 3.5km from the Chichester Harbour AONB. Although the reservoir would be visible from the South Downs National Park from a distance (to the east of Rowlands Castle), the maturation of landscaping/planting is expected to minimise any adverse effects perceived by recreational receptors in addition to potentially benefitting the amenity of the national park's setting. Similarly, mitigative measures are expected to help assimilate the new landscape changes within the local setting such that proximate residential receptors will not perceive operation as adversely altering the wider landscape character of the area. New ancillary infrastructure at Source B Water Works is expected to be part-and-parcel to the site such that no effects to the setting of the works are expected. Overall, the operation of the scheme would significantly change the local landscape character; however, the implementation of appropriate mitigative measures



during the construction phase is expected to prevent any long-lasting adverse effects to visual and landscape amenity while potentially providing minor benefits to such. Overall, this option has been assessed as having a minor positive effect on Objective 10 though uncertainty remains on the magnitude of benefit resulting from mitigative measures.

Option	Stage	1. Biodiversity	2. Geology and Soils	3. Water Quantity and Quality	4. Flood Risk	5. Climate Change	6. Economic and Social Wellbeing	7. Human Health	8. Waste and Resources	9. Cultural Heritage	10. Landscape
R021a Source O DO Recovery (1.8 MI/d)	Construction	0	0	0	0	?/-	0	0	-	0	0
	Operation	0	0	0	0	0/?	+	+	0/?	0	0
<p>Construction</p> <p>This option would increase deployable output from three boreholes at Source O. The existing boreholes are connected by horizontal adits which are at a relatively shallow level; as the water level is drawn down in dry conditions the adit is exposed and sediment causes water quality problems. The proposed solution is to extend the casing at the top of Borehole No 2 to block off the adits, and then to deepen the borehole by 24 m so that it matches the depth of Borehole No 1. The borehole pump would then be re-installed at a lower level to give greater drought resilience. The ADO would increase from 3.7 MI/d to the recent actual figure of 5.5 MI/d and would remain within existing licence.</p> <p>This option involves relative small-scale construction works around the existing source boreholes. The boreholes are located over 2 km from designated sites (Kingley Vale SSSI, Chichester and Langstone Harbours SPA / Ramsar and Solent Maritime SAC). Although the boreholes are within a SSSI Impact Risk Zone the option is not listed as a development which could potentially have adverse impacts on Kingley Vale SSSI. The HRA has concluded no effects on designated sites during the construction phase assuming that any risks from contamination of surface waters by site-derived pollutants is adequately managed through the normal project planning process and standard best-practice measures. On this basis it is considered that construction work would not disturb or result in any detrimental impacts on designated sites (SEA Objective 1).</p> <p>Relatively small scale construction works would be carried out in the vicinity of the existing source boreholes. The works include extension of borehole No.2 and closing out of adits with no changes required to above ground pipework. Overall, this option has been assessed as having a neutral effect on geology and soils (SEA Objective 2).</p> <p>It is not expected that construction activity would affect water quality or quantity (SEA Objective 3), provided best practices are adhered to and mitigation implemented (e.g. dust suppression, soil containment and emergency response procedures).</p> <p>The source boreholes are located in Flood Zone 1. The nearest Flood Zone 3 is approximately 650 m southwest originating from Bosham Stream. On this basis, the construction works around the existing source boreholes is not expected to be liable to flooding or to cause or exacerbate flooding elsewhere. Consequently, this option has been assessed as having a neutral effect on flood risk (SEA Objective 4).</p> <p>Emissions of embodied carbon from construction of this option have not been quantified but are estimated to be low given the small scale of the construction works. Consistent with the definitions of significance, this option would have a minor negative effect effect on greenhouse gas emissions with some uncertainty remaining (SEA Objective 5).</p>											

Given the relative small scale of the construction works expenditure is expected to be of insufficient scale to have a discernible positive effect on the local economy (through job creation). Disruption to the local traffic network as a result of construction activities it is not considered significant. This option is therefore considered to have a neutral impact on economic and social wellbeing (SEA Objective 6).

The scale of construction is expected to be minor / low-impact such that it is unlikely the works in the vicinity of the source boreholes would result in the disruption of use or loss of amenity. The cumulative impacts of noise/vibration disturbance and nuisance resulting from construction works is not expected to result in any discernible effect on human health. Consequently, this option has been assessed as having a neutral effect on SEA Objective 7.

The borehole extension and blocking out of adits would require the use of raw materials and associated energy, with limited options to use sustainable materials or recycled product. This has been assessed as having a minor negative effect on waste and resources (SEA Objective 8).

The source boreholes are not located within or adjacent to designated heritage sites. The closest sites is the Funtington Scout Hall (Grade II Listed Building) and a Roman settlement site (Scheduled Monument) approximately 270 m southeast of the boreholes. On this basis it is considered that construction would have a neutral effect on the amenity or structural integrity of the designated heritage sites (SEA Objective 9).

The source boreholes are located within the South Downs National Park. Construction works would be carried out in the vicinity of the existing source boreholes and the scale of the works is expected to be minor / low-impact such that any adverse impacts on local landscape features would be minor and over a short timescale. Overall, this option has been assessed as having a neutral effect on landscape (SEA Objective 10).

Operation

Operation of this option would not have any significant and/or adverse effects on designated sites due to the increased abstraction remaining within the current licence. This option has been assessed as having neutral effect on biodiversity (SEA Objective 1).

No impacts on land use or soils (SEA Objective 2) are anticipated during operational phase.

No additional abstraction outside current licence would occur as a result of this option. This has been assessed as having a neutral effect on water quality and quantity (SEA Objective 3).

The source boreholes are located in Flood Zone 1. Operation of this option is not expected to cause or exacerbate flooding elsewhere and has been assessed as having a neutral effect on flood risk (SEA Objective 4).

Operation of this option will result in a minor increase in energy consumption from pumping and additional water treatment (yield 1.8 Ml/d). Although the total operational carbon emissions for this option have not been quantified these are estimated to be very low, and likely to be below that for the thresholds identified in the definitions of significance. It is considered that this option would have a neutral effect on greenhouse gas emissions but some uncertainty remains (SEA Objective 5).

No nuisance effects are anticipated during operation of this option. This option would contribute towards ensuring the continual supply of safe and secure drinking water (yield 1.8 Ml/d) generating a minor positive effect on human health (SEA Objective 7) as well as supporting economic/population growth which could result in a minor positive effect on the local economy and social-wellbeing (SEA Objective 6).

The operation of this option would not involve additional infrastructure but would result in additional energy consumption. However, whilst this is not yet quantified, this is considered likely to be a very low additional amount, and in consequence, the option has been assessed as having a neutral effect on waste and resource use, with some residual uncertainty (SEA Objective 8).

The source boreholes are not located within or adjacent to designated heritage sites. Operation of this option would have no impact on designated heritage sites (SEA Objective 9).

Although the source boreholes are located within the South Downs National Park the option does not require new or changes to existing above ground infrastructure. Therefore operation of this option would have no impact on landscape features (SEA Objective 10).

Option	Stage	1. Biodiversity	2. Geology and Soils	3. Water Quantity and Quality	4. Flood Risk	5. Climate Change	6. Economic and Social Wellbeing	7. Human Health	8. Waste and Resources	9. Cultural Heritage	10. Landscape
R022a Source J Group – Maximising DO	Construction	0	0	0	0	-	0	0/?	-	0	-
	Operation	0/?	0	0	0	-	++	++	-	0	0

Construction

This option would involve the development of two new boreholes at the existing Source J WTW site which includes a pumping station and three operational boreholes (16 MI/d). The approximate locations of the two new boreholes would be within a 300m radius of the existing WTW and pumping station; specifically, borehole #4 would be within the vicinity of Meadows Farm whereas borehole #5 is situated outside of Yew Tree Cottage. The boreholes would be 140 m deep with additional pumps and new raw water mains (300m) connecting the boreholes to the existing raw water network. Implementation of the scheme would also require modifications to the WTW's treatment processes regarding additional chlorine and orthophosphoric acid treatment. Once operational, the new boreholes will abstract a cumulative 12.5 MI/d thus increasing the facility's overall abstraction volume from the existing DO of 10.2 MI/d to 22.7 MI/d which would remain within the peak existing licence (25.20 MI/d). It should be noted that the new boreholes, pipeline mains, and treatment processes will require periodic maintenance over their lifetime.

The site is not within any statutory or non-statutory biodiversity designations; specifically, Butser Hill SAC is c.12km from the site whereas Portsmouth Harbour (SPA/Ramsar/SSSI), and its subsequent linkages to Solent Maritime SAC, Chichester and Langstone Harbours (SPA/Ramsar/SSSIs), and Solent and Isle of Wight Lagoons SAC are c.15km downstream via an unnamed drainage stream on-site feeding into Wallington River. Prior HRA Screening concluded that there are no clear impact pathways associated with construction to either Butser Hill which has been designated due to its yew dominated woodland. Similarly, construction would not be within the immediate proximity of the unnamed drainage stream on-site which suggests that the risk of introducing pollution/debris within the local water network, and subsequently, Portsmouth Harbour and the other sites is negligible. Lye Heath Marsh SSSI and Hook Heath Meadows SSSI are c. 3.7km from the proposed site, however, it is assumed that the implementation of the new boreholes and pipelines would be low intensity work which may result in localised temporary noise disturbance (drilling) and adverse air quality impacts (dust) though site specific mitigation and established best practice should reduce impacts to minor if not negligible. Furthermore, construction activity would take place within an existing operational site which should further moderate any adverse effects on proximate habitats and wildlife situated within the surrounding greenfield land and the Forest of Bere. Overall, this option has been assessed as having a neutral effect on Objective 1.

There will be a temporary loss of greenfield sites during the construction period as the proposed works would involve drilling two new boreholes (requiring a temporary drilling rig) and pipeline excavation though disturbed land would be reinstated following the completion of the works. Notwithstanding, implementation of the scheme would require permanent land-take (Grade 4 agricultural land) in order to develop the new boreholes though land-take would be minor and situated within Source J WTW's operational footprint which should minimise conflict within existing land-use patterns. No significant construction activity is required at the existing works as it is considered that the additional treatment capacity can be accommodated within the existing facility. Consequently, this option has been assessed as having a neutral effect on Objective 2.

It is not expected that construction of this option would have any effects on water quality or water resources in the area provided standard construction procedures are adopted to ensure that dust, silts, oils or any other pollutants reach groundwater resources.

Construction would not cause or exacerbate flooding in the area, nor would the site be at risk from flooding.

There would be c.365 vehicle movements over the 1 year implementation period (c. 1 HGV movement per day) which is not expected to result in any discernible traffic impacts regarding congestion/delay, and subsequently, any adverse emission impacts. Nonetheless, implementation of the option would require new infrastructure and energy usage with limited opportunity to use recycled materials.; specifically, embodied carbon of new materials (108 tCO₂e) together with the use of plant and machinery (i.e. fuel consumption) is predicted to generate 156 tCO₂e during the construction period which has been assessed as having a minor negative effect on climate change (Objective 5) and waste/resource use (Objective 8).

The construction of the option represents a minor capital investment (£2m) that is not expected to generate a significant number of jobs in the long-term nor result in a discernible effect on the local economy associated with supply chain benefits. Due to the minor scale of the construction works, it is not expected that associated HGV movements will cause congestion and/or disruption/driver delay on the local road network. Overall, the option has been assessed as having a neutral effect on economic and social wellbeing (Objective 6).

The option is not expected to significantly affect opportunities for recreation and physical activity during the construction period although there may be minor temporary noise disturbance (drilling) to walkers within the general vicinity, e.g. Forest of Bere. There may also be a risk of noise disturbance/air quality impacts associated with drilling/excavation which may affect proximate residential receptors; specifically, there are two residential properties which face the site from the north, a residential property to the east, a public house (Chairmakers Arms) to the west, and ribbon development along Forest Road and Apless Lane. It should be noted, however, that the exact location of the new boreholes is uncertain and may be located away from the residential receptors. On balance, this option has been assessed as having a neutral effect on Objective 7 though some uncertainty remains in regard to the unknown location of the boreholes.

The Source J site does not include nor is it situated within close proximity to, any heritage features. The nearest Scheduled Ancient Monuments are located approximately 1.2km to the northeast of the existing water treatment works (three bell barrows between 200 and 300 metres north of Great Ervills Farm). Additionally, three Grade II Listed Buildings are located within the general vicinity of the works: Pillar Box (c. 500m) and Hipley Farm Granary and Tythe Barn (968m). Due to the distance of these assets from the Source J site, it is not expected that construction works would result in any adverse effect on the structural integrity of the assets nor would it affect the visual amenity of their settings due to the woodland buffer along the periphery of the site. Overall, this option has been assessed as having a neutral effect on Objective 9.

The Source J site is not within or immediately proximate to any landscape designations; however, the site is located approximately 1.5 km south of the southern border of the South Downs National Park. Notwithstanding, the minor scale of works required (a drilling rig and other plant/machinery) to construct the borehole headworks and transfer pipelines is considered too distant and of too small a scale to affect the visual and landscape amenity of the National Park and its setting. Furthermore, development would be situated within an established operational area, and therefore, localised landscape/visual impacts are likely to be very minor although works could have short term adverse impacts on proximate residential receptors who may perceive the increased presence of heavy equipment and materials within the greenfield setting as adversely impacting the local landscape character. Overall, this option has been assessed as having a minor negative effect on Objective 10.

Operation

The scheme would abstract a cumulative 12.5 Ml/d thus increasing the facility's overall abstraction volume to 22.7 Ml/d which would remain within the peak existing licence (25.20 Ml/d); consequently, it is assumed that the existing abstraction licence would have been subject to review under the Environment Agency Habitats Regulations Review of Consents process thus significant effects on European designated conservation sites are unlikely. Specifically, prior HRA Screening concluded that there are no likely significant effects on Butser Hill SAC due to a lack of clear impact pathways whereas Solent Maritime SAC does not contain any interest features sensitive to water resource permissions while effects on Portsmouth Harbour (SPA/Ramsar/SSSI), Chichester and Langstone Harbours (SPA/Ramsar/SSSIs), and Solent and Isle of Wight Lagoons SAC would be negligible due to intervening water inputs. Furthermore, prior WFD studies concluded that the Source J source has little impact on the River Wallington such that it is unlikely abstraction would significantly affect in-river habitats and aquatic wildlife. Notwithstanding, it is currently unknown whether increased abstraction would affect

designated conservation sites such as Lye Heath Marsh whose interest features depend on groundwater resources. Consequently, this option has been assessed as having a neutral effect on Objective 1 though uncertainty remains until more contemporary investigations are conducted.

There would be no operational effects on soils/land use.

The option would result in the overall abstraction of up to 22.7 Ml/d which is within the existing abstraction licence. Abstraction would be from a confined chalk aquifer thus effects on river flows are expected to be negligible as there is no direct hydraulic link between groundwater abstraction and surface water flows. Prior WFD assessment further corroborates this assumption as it concluded the Source J source has little impact on the River Wallington, and furthermore, more water could be abstracted from the confined chalk at this location. This option has therefore been assessed as having a neutral effect on Objective 3.

The option would not cause or exacerbate flooding in the area.

The operation of this option would have an operational energy demand of 657,000 kWh/a for groundwater abstraction/pumping which would generate 230 tCO₂e per annum. This has been assessed as having a minor negative effect on climate change (Objective 5) and waste/resource use (Objective 8).

The scheme would not adversely affect human health due to increased noise, nuisance or disruption, nor would it affect opportunities for recreation. The increased capacity of 12.5Ml/d would help ensure a continual supply of clean drinking water, generating a significant positive effect on health as well as supporting economic/population growth which could result in a positive effect on the local economy and social-wellbeing.

There would be no operational effects on designated cultural heritage assets.

The new borehole at the Source J site would introduce new above ground infrastructure within a semi-rural greenfield setting; however, permanent changes to landscape character are considered insignificant as it assumed that the new boreholes will be part-and-parcel to the existing operational site, especially given the fact that only a low-level chamber(s) would be visible at the surface above the borehole(s). Furthermore, it is not expected that the new boreholes would be visible from the South Downs National Park. Overall, any visual impact is expected to be very minor, and a neutral effect has been identified in respect of Objective 10.

Option	Stage	1. Biodiversity	2. Geology and Soils	3. Water Quantity and Quality	4. Flood Risk	5. Climate Change	6. Economic and Social Wellbeing	7. Human Health	8. Waste and Resources	9. Cultural Heritage	10. Landscape
R023a Source H DO Recovery (2 MI/d)	Construction	0	0	0	--	-/0/?	0	0	-	0	0
	Operation	?	0	?	0	0/?	+	+	0/?	0	0

Construction

This option would increase DO from the Source H source which is currently constrained by water quality problems at higher flows. This option would involve cleaning the boreholes of sediment by air lifting following a maximum flow pumping test. Overall, this option would return the source AOD to the licence figure of 9.1 MI/d resulting in a yield benefit of 2 MI/d.

This option involves small-scale construction works around the existing source boreholes. The closest designated site is Galley Down Wood SSSI approximately 3.8 km northwest. Other designated sites over 4 km from the source include The Moors, Bishop's Waltham SSSI and Waltham Chase Meadows SSSI and over 8 km from the source include Botley Wood and Everett's and Mushes Copses SSSI, Solent and Southampton Water RAMSAR / SPA, Upper Hamble Estuary and Woods SSSI, Solent Maritime SAC. The source boreholes are located near the River Meon which is not a European designated site but flows into the Solent and Southampton Water RAMSAR / SPA. It is assumed that cleaning of the source boreholes would be confined within the existing site and best practices would be adhered to. On this basis it is considered that construction work would not disturb or result in any detrimental impacts on these sites (SEA Objective 1).

The small scale construction works (air lifting of the boreholes) would be carried out in the vicinity of the existing source boreholes. No changes are required to above ground pipework. Overall, this option has been assessed as having a neutral effect on geology and soils (SEA Objective 2).

It is not expected that construction activity would affect water quality or quantity (Objective 3), provided best practices are adhered to and mitigation implemented (e.g. dust suppression, soil containment and emergency response procedures).

The source boreholes and pumping station are located in Flood Zone 3 associated with the River Meon. Activities would be at risk of flooding (1 in 100 or greater annual probability of river flooding), but will neither exacerbate nor reduce the risk of flooding. Consequently, due to its location in Flood Zone 3, this option has been assessed as having a significant negative effect on flood risk (SEA Objective 4).

Emissions of embodied carbon from construction of this option have not been quantified but are estimated to be low given the small scale of the construction works associated with borehole air lifting. It is considered that this option would have a minor negative/neutral effect on greenhouse gas emissions with some uncertainty remaining (SEA Objective 5).

The scale of the construction work is expected to be minor and therefore expenditure is likely to be of insufficient scale to have a discernible positive effect on the local economy through generation local employment opportunities. Disruption to the local traffic network as a result of construction activities it is not considered significant. This option is therefore considered to have a neutral impact on economic and social wellbeing (SEA Objective 6).

Given the relative small scale of the construction works which would be limited to the area around the boreholes it is considered unlikely that disruption of use or loss of amenity would occur. The cumulative impacts of noise/vibration disturbance and nuisance resulting from construction works is not expected to result in any discernible effect on human health. Consequently, this option has been assessed as having a neutral effect on SEA Objective 7.

The construction works would require the use of raw materials and associated energy and generate waste, with limited options to use sustainable materials or recycled product. This has been assessed as having a minor negative effect on waste and resources (SEA Objective 8).

The source boreholes are located approximately 50 m of Yew Tree Cottage (Grade II Listed Building). Other designated heritage sites within 150 m from the source include Maypoles, Maypole Cottage and Fir Trees (Grade II Listed Buildings). The scale of the construction work is expected to be minor and limited to the area around the boreholes. On this basis it is considered that construction would have a neutral effect on the amenity or structural integrity of the designated heritage sites (SEA Objective 9).

The source boreholes are located within the South Downs National Park. Construction works would be minor and limited to the area around the existing boreholes such that any adverse impacts on local landscape features would be minor and over a short timescale. Overall, this option has been assessed as having a neutral effect on landscape (SEA Objective 10).

Operation

The additional abstraction would be within the current licence. However, the EA has expressed some reservations that this option could have a negative effect on the lower reaches of the River Meon during periods of low flow in combination with existing abstractions for spray irrigation. As the River Meon flows into the Solent and Southampton Water RAMSAR / SPA, this in combination effect during low flows could affect the designated site although until further investigation is conducted, this is uncertain. On this basis, whilst within licensed amount, the operation of this option is assessed as uncertain on biodiversity (SEA Objective 1).

No impacts on land use or soils (SEA Objective 2) are anticipated during operational phase.

No additional abstraction outside current licence would occur as a result of this option. However as stated above the additional abstraction could have a negative effect on the lower reaches of the River Meon (Main River) during periods of low flow in combination with existing abstractions for spray irrigation. In the 2016 WFD classification (Cycle 2) the River Meon was classified as at moderate ecological status and good chemical status. The magnitude of the potential impact on the River Meon remains uncertain until further investigation is conducted. On this basis, whilst within licensed amount, the operation of this option is assessed as having an uncertain effect on water quality and quantity (SEA Objective 3).

The source boreholes and pumping station are located in Flood Zone 3 associated with the River Meon. This option requires no changes to the existing above ground pipework. Operation of this option is not expected to cause or exacerbate flooding elsewhere although the existing boreholes and pumping station may be at risk of flooding during operation. This option has been assessed as having a neutral effect on flood risk (SEA Objective 4).

The total operational carbon emissions from this option associated with additional energy consumption for pumping and additional water treatment (yield 2 Ml/d) have not been quantified but are estimated to be very low and likely to be below that for the thresholds identified in the definitions of significance. In consequence, it is considered that this option would have a neutral effect on greenhouse gas emissions but some uncertainty remains (SEA Objective 5).

No nuisance effects are anticipated during operation of this option. This option would contribute towards ensuring the continual supply of safe and secure drinking water (yield 2 Ml/d) resulting in a minor positive effect on human health (SEA Objective 7) as well as supporting economic/population growth which could result in a minor positive effect on the local economy and social-wellbeing (SEA Objective 6).

The operation of this option would not involve additional infrastructure but would result in additional energy consumption. However, whilst this is not yet quantified, this is considered likely to be a very low additional amount, and in consequence, the option has been assessed as having a neutral effect on waste and resource use, with some residual uncertainty (SEA Objective 8).

Operation of this option would have no impact on designated heritage sites (SEA Objective 9).

Although the source boreholes are located within the South Downs National Park the option does not require new or changes to existing above ground infrastructure. Therefore operation of this option would have no impact on landscape features (SEA Objective 10).

Option	Stage	1. Biodiversity	2. Geology and Soils	3. Water Quantity and Quality	4. Flood Risk	5. Climate Change	6. Economic and Social Wellbeing	7. Human Health	8. Waste and Resources	9. Cultural Heritage	10. Landscape
R024a Source C DO recovery scheme	Construction	0	0	0	0	0	0	0	0	0	0
	Operation	0	0	0	0	+/-	+	+	+/-	0	0

Construction

This option would primarily involve the infrastructural modification of Source C WTW's treatment process through the installation of disposable cartridge filters in order to reduce turbidity at the WTW. The Source C borehole group cannot currently utilise their peak licenced volume due to turbidity levels resulting from an excess amount of turbid water being drawn into the raw water supply via fissures that feed into the boreholes. Whilst Portsmouth Water is already undertaking catchment management to minimise infiltration of sediments into the aquifer, in association with the EA and NE, turbidity levels in the aquifer are expected to take a long time to respond to catchment management. Consequently, implementation of the new disposable cartridge filters is expected to recover between 4MI/d (ADO) and 5.5MI/d (PDO). There is space at or near the existing GAC tanks within the WTW to install the filters which would make structural modifications to the facility unnecessary. It should be noted that additional abstraction required to achieve PDO is not included within the scope of this option as prior investigation has concluded that water availability within the local East Hampshire area is not conducive to promoting increased abstraction even within existing licensed limits.

It is not expected that installation of the new disposable cartridge filters within Source C WTW would result in any LSE alone and/or in combination on any proximate European conversation sites, e.g. Solent Maritime SAC (6.8km), Solent and Southampton Water SPA/Ramsar (6.8km), River Itchen SAC (8km), and Butser Hill SAC (15.5km) as the scale of work required to implement these components is expected to be minor with a low degree of invasiveness which, in respect to the distance between the development sites and conservation areas, does not present any clear impact pathways to designated ecological features supported by these sites. Additionally, there are several statutory and locally designated conservations areas within the general vicinity of the WTW: Claylands LNR (507m), Dunridge Meadows LNR (577m), the Moors, Bishop's Waltham LNR/SSSI (1.1km), and Galley Down Wood SSSI (1.8km). Because construction would be confined within the established footprints of the existing infrastructure, it is considered unlikely that the works would result in any adverse effects on the designated flora interest features of these sites nor on proximate greenfield habitats and wildlife. Overall, this option has been assessed as having a neutral effect on Objective 1.

No significant construction activity is required at Source C WTW as it is expected that the new disposable cartridge filters will be accommodated within the existing facility. Consequently, this option has been assessed as having a neutral effect on Objective 2.

It is not expected that implementation of this option would have any effects on water quality or water resources in the area provided standard construction procedures are adopted to ensure that dust, silts, oils or any other pollutants reach groundwater resources.

Construction would not cause or exacerbate flooding in the area, nor would the sites be at risk from flooding.

There would be a very low number of vehicle movements over the implementation period which is not expected to result in any discernible traffic impacts regarding congestion/delay, and subsequently, any adverse emission impacts. Nonetheless, implementation of the option would require new infrastructure and energy usage with limited opportunity to use recycled materials.; specifically, embodied carbon of new materials together with the use of plant and machinery (i.e. fuel consumption) is predicted to generate 24 tCO₂e during the construction period which has been assessed as having a neutral effect on climate change (Objective 5) and waste/resource use (Objective 8).

The construction of the option represents a minor capital investment that is not expected to generate a significant number of jobs in the long-term nor result in a discernible effect on the local economy associated with supply chain benefits. Due to the minor scale of the construction works, it is not expected that associated HGV movements will cause congestion and/or disruption/driver delay on the local road network. Overall, the option has been assessed as having a neutral effect on economic and social wellbeing (Objective 6).

The option is not expected to affect opportunities for recreation and physical activity during the construction period as construction would be confined within the existing WTW. Furthermore, the internal installation of the new equipment suggests that any noise associated with installation would be inaudible to proximate residential receptors (Northbrook Farm). Overall, this option has been assessed as having a neutral effect on Objective 7.

Source C WTW site does not include any cultural heritage features. The nearest Scheduled Ancient Monument to the scheme is Bishop Waltham's Palace (c. 780m) while the remaining monuments within the general area exceed 1.5km in distance. Additionally, six Grade II Listed Buildings are proximate to Source C WTW: Northbrook Farmhouse/Granary (154m), Little Green (326m), Bramble Cottage (326m), Old Tanyard Cottage (326m), North Brook Cottage (326m), and Vernon Hill House (402m). Due to the internal installation of the disposable cartridge filters within the WTW, it is not expected that implementation would result in any adverse effect on the structural integrity of the assets nor would it affect the visual amenity of their settings. Any increased vehicle movement in/out of Source C WTW, though very minor in volume, may be perceived by proximate receptors as disturbing the amenity of Northbrook Farmhouse/Granary's setting; however, substantial woodland buffer along the periphery of the WTW should help minimise any perceived adverse effects. On balance, this option has been assessed as having a neutral effect on Objective 9.

Source C WTW is directly situated within the South Downs National Park; however, the proposed works would be confined within the established footprint of the WTW, and furthermore, benefit from substantial woodland buffer along the peripheries of the site. Consequently, localised landscape/visual impacts are likely to be very minor though works could have short term effects on proximate residential receptors who may perceive the increased transportation of equipment and materials within the semi-rural greenfield setting as adversely impacting the designated landscape character. On balance, this option has been assessed as having a neutral negative effect on Objective 10.

Operation

Once the installation of the new disposable cartridge filters is complete, Source C WTW's treatment process will recover between 4Ml/d (ADO) and 5.5Ml/d (PDO). The existing licenced abstraction limit is 31.50 Mld under peak (20.5 Mld under annual average) though present turbidity levels has constrained output to 22.5 Mld PDO (16.5 Mld ADO); consequently, treated output including the newly recovered water would remain within the licenced limit which is assumed to have been subject to review under the Environment Agency Habitats Regulations Review of Consents process. Because additional abstraction is not included within the operational scope of this scheme, it is considered highly unlikely that continued operation under the present licence would significantly or adversely affect European designated conservation sites. Specifically, there is a lack of clear impact pathways to Butser Hill SAC (15.5km) whereas Solent Maritime SAC (6.8km) and Solent and Southampton Water SPA/Ramsar (6.8km) do not contain any interest features sensitive to water resource permissions while effects on River Itchen SAC (8km) would be negligible due to intervening water inputs. Similarly,

the continuation of current abstraction volume is not expected to significantly affect either statutory and locally designated conservations areas nor local habitats and wildlife within the general vicinity of the WTW. Overall, this option has been assessed as having a neutral effect on Objective 1.

There would be no operational effects on soils/land use.

The option would result in the recovery of up to 5.5 MI/d via a modified treatment process at Source C WTW which is within the existing licence. Because additional abstraction is not included within the operational scope of this scheme, present abstraction volumes will be maintained thus operation would have a neutral effect on water quality and water quantity.

The option would not cause or exacerbate flooding in the area.

The scheme would have an operational energy demand of 401,500 kWh/a regarding the utilisation of the filtration cartridges which would generate up to 141 tCO₂e per annum. It should be noted that increased efficiency within the treatment process (maximising treated output) under conditions of severe drought could increase resilience to climatic driven supply restrictions in the region due to forecasted hotter/drier summers. Overall, this option has been assessed as having a mixed minor positive and negative effect on climate change (Objective 5) and waste/resource use (Objective 8).

The scheme would not adversely affect human health due to increased noise, nuisance or disruption, nor would it affect opportunities for recreation. The increased capacity of up to 5.5MI/d would help ensure a continual supply of clean drinking water, generating a minor positive effect on health as well as supporting economic/population growth which could result in a minor positive effect on the local economy and social-wellbeing.

There would be no operational effects on designated cultural heritage assets.

The scheme would not introduce any new above ground infrastructure within the semi-rural greenfield setting of Source C WTW, and furthermore, the South Downs National Park. Consequently, operation would not result in any permanent changes to the local setting or the designated landscape character of the National Park as the new disposable filtration cartridges will be part-and-parcel to the internal WTW structure. Overall, this option has been assessed as having a neutral effect on Objective 10.

Option	Stage	1. Biodiversity	2. Geology and Soils	3. Water Quantity and Quality	4. Flood Risk	5. Climate Change	6. Economic and Social Wellbeing	7. Human Health	8. Waste and Resources	9. Cultural Heritage	10. Landscape
R068 Source S drought permit	Construction	0	0	0	0	0	0	0	0	0	0
	Operation	-/?	0	-/?	0	+	+	+	0	0/?	0
Construction This option would involve increasing the licenced daily abstraction limit of Source S borehole and WTW from 2.5 MI/d to 11 MI/d under severe drought conditions via a new drought permit in order to provide an additional 8.5 MI/d for public consumption. It should be noted that the facility was originally designed to operate under a 11 MI/d abstraction licence which was subsequently reduced to 2.5 MI/d in 1996. Current operation has caused chlorine dosing system problems due to complications resulting from the required underutilisation of equipment to facilitate the reduced licence. As Source S's existing infrastructure maintains a 11 MI/d design capacity, implementation of the new drought permit would not require modifications to the site nor construction of new ancillary infrastructure as operation would revert back to using the higher capacity pumps. Consequently, there is no construction phase associated with this drought option thus no effects on the SEA objectives emerging from construction.											

Operation

The scheme would abstract an additional 8.5 Ml/d under severe drought conditions which would require a new drought permit to increase licenced abstraction limit. It is not expected operation would result in any Likely Significant Effects alone and/or in combination (clear impact pathways) on any proximate European sites, e.g. Arun Valley SPA/SAC/Ramsar (8.5km) and Dunton to Bignor Escarpment SAC/SSSI (5km). The Arun Valley SAC's primary interest feature (Ramshorn snail *Anisus vorticulus*) is dependent on the wash lands of the Arun floodplain (Amberley Wild Brooks SSSI) and the beech forests (Dunton to Bignor Escarpment) do not require high groundwater levels though it is uncertain whether the effects of abstraction would be magnified under drought conditions. Swanbourne Lake and Arundel Wildlife and Wetland Centre, components of Arundel Park SSSI, are c. 6km from the Source S borehole, and share a groundwater supply with the borehole (water accumulates in the lake from subterranean chalk springs). Arundel Park supports a range of ecological features including rare invertebrate species, variety of chalk grassland and woodland, and a diverse breeding bird community which includes shelduck, little grebe and tufted duck which utilise Swanbourne Lake in addition to a number of waders supported by the reed bed in the Wildfowl Reserve. Consequently, abstraction beyond permitted volumes under normal 'dry' conditions is not permitted due to assumed adverse effects on the SSSI's interest features; however, Swanbourne Lake naturally dries out during severe drought conditions which is expected to precede operation of the scheme. It should be noted that the EA previously concluded that impacts from abstraction on an 'already' dry lake may be insignificant which suggests that increased abstraction may have a negligible effect on Swanbourne Lake though potential effects on Arundel Park remain uncertain without further investigation (modelling). Furthermore, Swanbourne Lake would not be spilling during the severe drought conditions thus abstraction is not expected to impact on the downstream Mill Stream regarding in-stream habitats, macrophytes, and mobile aquatic species. In general, the extent of the chalk springs from which groundwater is abstracted is not currently known beyond Swanbourne Lake and Arundel Park; consequently, other designated and non-designated ecological receptors within the scheme's general vicinity, e.g. Fairmile Bottom LNR/SSSI (2.5km), East Dean Park Wood (6km), and Levin Down SSSI (8.3km), may also be effected under drought conditions due to their chalky-based flora interest features. Overall, this option has been assessed as having a negative effect on Objective 1 though uncertainty remains until further investigation is conducted.

There would be no operational effects on land use or the fluvial geomorphology of the scheme's general area.

The option would result in the additional abstraction of up to 8.5 Ml/d of groundwater from subterranean chalk springs. Because these chalk springs supply groundwater to proximate waterbodies within the vicinity of the Source S borehole (e.g. Swanbourne Lake and Arundel Park), the increased abstraction limit may potentially exacerbate the effects of drought on the local water system regarding supply and recovery. This option has therefore been assessed as having a negative effect on Objective 3 though some uncertainty remains until further investigation (modelling) is conducted.

The option is not expected to cause or exacerbate flooding in the general area or further elsewhere due to operation.

The option would not require new infrastructure, and furthermore, operation would occur under severe drought conditions (1 in every 50 years) such that operational energy demand (182,500 kWh) and associated carbon emissions in respect of abstraction/pumping would have a minor, if not negligible, effect. It should be noted that the increase in abstraction volume under conditions of severe drought could increase resilience to climatic driven supply restrictions in the region due to forecasted hotter/drier summers. Overall, this option has been assessed as having a minor positive effect on climate change (Objective 5) and a neutral effect on waste/resource use (Objective 8).

The scheme would not adversely affect human health by increased noise, nuisance or disruption. Because utilisation of the new drought permit would occur under severe drought conditions, it is assumed that recreational activities such as angling/boating would have already been adversely affected by natural water drawdown. In general, increased abstraction under drought powers would enable the continued supply of water. Without these powers in a severe drought, there would be a risk of a deficit, placing public water supplies at an unacceptable risk. The increased capacity of up to 8.5 Ml/d would generate a positive effect on health and social-wellbeing.

Operation of the new drought permit would occur under severe drought conditions thus it is assumed that local waterbodies would have already been adversely affected by natural water drawdown. Consequently, it is not anticipated that increased abstraction would significantly amplify the loss of visual amenity to the settings of cultural heritage assets within the vicinity of affected waterbodies. For example, Swanbourne Lake is expected to have dried up prior to operation such that the visual amenity of Arundel Castle Ancient Scheduled Monument and a range of Grade II Listed Buildings (e.g. Swanbourne Lodge, Hiorns Tower, and Home Farmhouse and ancillary infrastructure) would have already been affected by the alteration of their setting. Notwithstanding, increased abstraction under these conditions has the potential to cause 'dewatering' on archaeological deposits though there are no records of any archaeological deposits in the area. Overall, this option has been assessed as having a neutral effect on Objective 9; however, a degree of uncertainty remains regarding the potential for increased abstraction to exacerbate effects on heritage assets.



Although the scheme would be situated within the South Downs National Park, operation of the new drought permit would occur under severe drought conditions thus it is assumed that local waterbodies, e.g. Swanbourne Lake and Arundel Park, would have already been adversely affected by natural water drawdown. Consequently, it is not anticipated that increased abstraction would significantly amplify the loss of visual amenity of the National Park's waterbodies beyond reasonable expectation. Overall, this option has been assessed as having neutral effect on Objective 10.

Option	Stage	1. Biodiversity	2. Geology and Soils	3. Water Quantity and Quality	4. Flood Risk	5. Climate Change	6. Economic and Social Wellbeing	7. Human Health	8. Waste and Resources	9. Cultural Heritage	10. Landscape
C005 Meter all households where a meter or meter box already exists	Construction	0	0	0	0	-	0	0	-	0	0
	Operation	0	0	+	0	0	0	0	+	0	0

Construction

This option would involve the installation/upgrade of existing metering infrastructure to SMART meters within the premises of previously metered domestic customers over a 3 year implementation period in order to increase consumer awareness regarding water usage, and subsequently, reduce water demand and leakage. Of the 5,000 eligible recipients for this programme, it is assumed that 4,250 customers will avail the SMART metering upgrade. This option has been assessed on this basis, however, effects would be smaller if customer uptake is less than expected. It is therefore anticipated that up to 0.05 MI/d of lost water would be saved following the implementation of this option. It is currently unknown which of the 5,000 eligible customers may avail the SMART Metering installation/upgrade; however, the installation of new SMART Meters is expected to be low-impact.

The proposed works would be targeting existing water network infrastructure (meters) and in consequence, implementation would occur within the existing operational footprints of domestic properties which may encompass a wide range of urban, semi-rural, and rural settings. It is unlikely, however, that construction would have any discernible impacts on immediate biodiversity, priority habitats, e.g. European designated conservation areas, SSSIs, local nature reserves, and etc., or protected species due to the minor to negligible scale of construction associated with implementation. Overall, this option has been assessed as having a neutral effect on biodiversity (SEA Objective 1).

The upgrading of existing metering infrastructure to SMART meters would target existing infrastructure contained within the operational footprints of domestic premises; consequently, implementation would not require any new land-take. This option has therefore been assessed as having a neutral effect on the appropriate and efficient use of land (SEA Objective 2).

It is not expected that the upgrading of existing metering infrastructure to SMART meters would affect river flows or groundwater levels, or on water quality, provided best practices are employed. This option has therefore been assessed as having a neutral effect in respect of SEA Objective 3.

Although it is currently unknown which of the 5,000 eligible customers may avail the SMART Metering upgrade, it is assumed that works could be scheduled to avoid periods of flooding should there be a risk. Furthermore, it is considered highly unlikely that implementation of the scheme would result in and/or exacerbate flooding elsewhere now or in the future. This option has therefore been assessed as having a neutral effect on SEA Objective 4.

The upgrading of existing metering infrastructure to SMART meters is expected to generate carbon emissions throughout the implementation period. It is estimated that there would be up to 1,417 vehicle movements per annum (4,251 over the 3 year implementation period) which corresponds with site visits and the upgrading works. It is assumed, however, that vehicle movements could be clustered as appropriate which may help minimise vehicle emissions. Additionally, the provision and installation of new SMART meters would generate carbon emissions arising from embodied carbon within the new meters (5.05kg CO₂/e). Consequently, this option would generate up to 150 tCO₂e during construction. Overall, it is expected that implementation would result in a minor quantity of carbon emissions (depending on the volume of meters upgraded and the intensity of movement throughout the Portsmouth Water District Metering Zone (DMZ)) which has been assessed as having a minor negative effect on climate change (SEA Objective 5).

The option is expected to represent a low capital investment (£1.5m) which is not expected to generate a significant number of jobs in the long-term nor result in a discernible effect on the local economy associated with supply chain benefits (e.g. associated with the supply of raw materials and appointment of contractors to undertake the works). Due to the moderate volume of vehicle movement associated with site visits and the installation of SMART meters, it is unlikely that implementation would result in adverse impacts on the road network throughout the Portsmouth Water DMZ. Overall, this option has been assessed as having a neutral effect on local community wellbeing (SEA Objective 6).

It is currently unknown which of the 5,000 eligible customers may avail the SMART Metering upgrade; however, the proposed works would be targeting existing water network infrastructure or contained within previously established operational footprints such that the minor scale of implementation should not disrupt the use or result in the loss of amenity to proximate recreational activity and sport. The impacts of noise/vibration disturbance and nuisance resulting from the upgrading of new meters is not expected to result in any discernible effects on human health due to the scale and brevity of installation. Overall, implementation of this scheme is not expected to affect drinking water supply, surface water and bathing water quality, or recreation. This option has therefore been assessed as having a neutral effect on health (SEA Objective 7).

The upgrading to the new SMART meters would require a minor volume of raw materials and energy to implement. Using the estimated carbon emissions associated with the embodied carbon within new meters in addition to HGV greenhouse gas emissions as a proxy, material use and energy requirements are considered to be notable, and the option has therefore been assessed as having a minor negative effect on this objective. Furthermore, this option would generate construction wastes which may include infrastructural waste (original meter infrastructure) in addition to fuel usage for vehicles. Overall, this option has been assessed as having a minor negative effect on sustainable resource use (SEA Objective 8).

It is currently unknown which of the 5,000 eligible customers may avail the SMART Metering upgrade; however, the replacement of prior metering infrastructure is expected to be significantly low-impact. Furthermore, the structural scale of the new SMART meters is expected to be minor such that installation within the operational footprints of domestic sites should have a negligible effect on the structural integrity and visual amenity of historic assets within the general vicinity. Overall, this option has been assessed as having a neutral effect on cultural and historic assets (SEA Objective 9).

The structural scale of the new SMART meters is expected to be minor such that installation should not result in any adverse impacts to the visual or landscape amenity of protected or local settings, e.g. designated national parks, townscapes, seascapes, or AONBs, due to the assumed low-intensity scale of construction in addition to the confined nature of these sites within operational footprints of domestic sites. Overall, this option has been assessed as having a neutral effect on landscape (SEA Objective 10).

Operation

It is assumed that the utilisation of SMART metering by eligible customers would further decrease water demand from previously metered domestic properties in the Portsmouth Water DMZ which should facilitate a greater reduction of leakage within the water distribution network. The effect of increased water efficiency on designated nature conservation sites (e.g. SACs, SPAs, Ramsar and SSSIs) and the ecological quality of habitats and associated groundwater/river water bodies is considered to be slightly positive as the increased efficiency reduces demand for additional water resources and increases resilience of existing network; however, the magnitude of change is assessed as neutral.

The utilisation of SMART metering would not have a discernible effect on the appropriate and efficient use of land (SEA Objective 2).

The utilisation of SMART metering by eligible customers would likely increase/ensure continuity of water supply through a reduction of water demand from previously metered domestic properties, and subsequently, a reduction of leakage within the water distribution network (the option has a design capacity of 0.05 Ml/d), generating a minor positive effect in respect of water quantity (SEA Objective 3).

Overall, increased water efficiency may protect and slightly enhance the quality and quantity of the surface water environment and the groundwater resource, and/or rates of recharge.

It is considered unlikely that the utilisation of SMART metering would result in and/or exacerbate flooding elsewhere now or in the future. This option has therefore been assessed as having a neutral effect on SEA Objective 4.

Once the installation of new SMART meters is complete, the cumulative effects of reduced leakage and greater water efficiency through lowered water demand by previously metered domestic customers may result in a minor reduction of energy required to process and pump water (-26 tCO₂e/year). Furthermore, operational emissions to air in respect of vehicle movement are expected to be negligible (up to 1,417 movements per annum in respect of meter readings). Overall, the reduction of net operational greenhouse gas emissions in respect of energy savings is considered a negligible benefit; consequently, this option has been assessed as having a neutral effect on climate change (SEA Objective 5).

It is assumed that the utilisation of SMART metering by previously metered customers would assist in decreasing network leakage through lowered water demand which should help reduce water loss in the Portsmouth Water DMZ. Operation is therefore likely to increase/ensure continuity of water supply thus helping ensure that a greater volume of water is available for future populations, commercial increases, and any seasonal demands. However, an increase of up to 0.05 Ml/d is insufficient to have a substantive effect and overall the option is assessed as having a neutral effect on the local economy and local community wellbeing (SEA Objective 6).

The scheme should not significantly affect human health by increased noise, nuisance or disruption nor would it affect opportunities for recreation. It is assumed that the cumulative effects of lowered water demand would help increase/ensure continuity of water supply through water efficiency. Overall, an increase of up to 0.05 Ml/d would help ensure a continual supply of clean drinking water, however, is insufficient to have a substantive effect and overall the option is assessed as having a neutral effect on health (SEA Objective 7).

No significant amount of resources or energy would be required once the upgrading of prior metering infrastructure to SMART metering is complete. As illustrated by the scale of operational carbon savings associated with reduced treatment and pumping of water (-26 tCO₂e/year), operation has been assessed as having negligible energy savings. Notwithstanding, a further decrease in water demand from previously metered domestic properties should facilitate greater leakage reduction within the water distribution network. On balance, this option has been assessed as having a positive effect on the sustainable use of resources (SEA Objective 8).

There are no discernible risks or clear impact pathways to cultural/historic heritage assets regarding the use of SMART metering. This option has therefore been assessed as having a neutral effect on cultural and historic assets (SEA Objective 9).

There are no discernible risks or clear impact pathways to either the visual amenity or character of proximate local and designated landscapes, townscapes, or seascapes such as AONBs or national parks regarding the use of SMART metering. This option has therefore been assessed as having a neutral effect on landscape (SEA Objective 10).

Option	Stage	1. Biodiversity	2. Geology and Soils	3. Water Quantity and Quality	4. Flood Risk	5. Climate Change	6. Economic and Social Wellbeing	7. Human Health	8. Waste and Resources	9. Cultural Heritage	10. Landscape
C006 Metering on change of occupancy - all properties	Construction	0	0	0	0	--	++/-	0	--	0	0
	Operation	0	0	+	0	++	+	+	++	0	0
<p>Construction</p> <p>The option would involve the installation of meters into households that currently do not have a meter, on the change of ownership. This option would require Portsmouth Water to be notified by a relevant authority at point of sale and given access to the property to install a new 'dumb' meter that would be read once every six months once installed. The option would start in 2025/26 and is assumed to go through to 2044/45 and an estimated 94,727 meters would be installed over the period. Implementation is assumed to achieve a 15% saving per annum in water use per property. This option has been assessed on this basis, however, effects would be smaller if customer uptake is less than expected. It is therefore anticipated that up to 4.68 Ml/d of lost water would be saved following the implementation of this option. Whilst the total number of meters is significant, installation would be spread over a 20 year period, with the installation being considered to be low-impact.</p> <p>The proposed works would be targeting new properties that do not have a meter and in consequence, implementation would occur within the existing operational footprints of domestic properties which may encompass a wide range of urban, semi-rural, and rural settings. It is unlikely, however, that construction would have any discernible impacts on immediate biodiversity, priority habitats, e.g. European designated conservation areas, SSSIs, local nature reserves, and etc., or protected species due to the minor to negligible scale of construction associated with implementation. Overall, this option has been assessed as having a neutral effect on biodiversity (SEA Objective 1).</p> <p>The installation of the new metering infrastructure would be contained within the operational footprints of domestic premises; consequently, implementation would not require any new land-take. This option has therefore been assessed as having a neutral effect on the appropriate and efficient use of land (SEA Objective 2).</p> <p>It is not expected that the installation of metering infrastructure would affect river flows or groundwater levels, or on water quality, provided best practices are employed. This option has therefore been assessed as having a neutral effect in respect of SEA Objective 3.</p> <p>It is assumed that works could be scheduled to avoid periods of flooding should there be a risk. Furthermore, it is considered highly unlikely that implementation of the scheme would result in and/or exacerbate flooding elsewhere now or in the future. This option has therefore been assessed as having a neutral effect on SEA Objective 4.</p> <p>The installation of metering infrastructure is expected to generate carbon emissions throughout the implementation period. It is estimated that there would be up to 133,716km/a from vehicle movements (with an average of 75,758km/a over the 20 year implementation period) which corresponds with site visits and the installation works. It is assumed, however, that vehicle movements could be clustered</p>											

as appropriate which may help minimise vehicle emissions. Additionally, the provision and installation of new meters would generate carbon emissions arising from embodied carbon within the new meters (5.05kg CO₂/e). Consequently, this option would generate up to 2,294 tCO₂e during construction which has been assessed as having a significant negative effect on climate change (SEA Objective 5).

The option is expected to represent a significant capital investment (£21.5m) which is expected to generate a number of long term jobs and which could have effects on the local economy associated with supply chain benefits (e.g. associated with the supply of raw materials and appointment of contractors to undertake the works). However, whilst the total is substantial, it is spread over a 20 year period which will lessen the impact in any one year. Due to the significant volume of vehicle movement associated with site visits and the installation of meters, it is likely that implementation would result in adverse impacts on the road network throughout the Portsmouth Water DMZ. Overall, this option has been assessed as having a mixed significant positive and minor negative effect on local community wellbeing (SEA Objective 6).

The proposed works would be contained within the operational footprints of domestic premises such that the scale of implementation should not disrupt the use or result in the loss of amenity to proximate recreational activity and sport. The impacts of noise/vibration disturbance and nuisance resulting from the installation of new meters is not expected to result in any discernible effects on human health due to the scale and brevity of installation; however, there may be some localised effects from traffic movements. Overall, implementation of this scheme is not expected to affect drinking water supply, surface water and bathing water quality, or recreation. This option has therefore been assessed as having a neutral effect on health (SEA Objective 7).

The installation of new meters would require a raw materials and energy to implement. Using the estimated carbon emissions associated with the embodied carbon within new meters in addition to vehicle greenhouse gas emissions as a proxy, material use and energy requirements are considered to be notable, and the option has therefore been assessed as having a significant negative effect on this objective. Furthermore, this option would generate construction wastes which may include infrastructural waste in addition to fuel usage for vehicles. Overall, this option has been assessed as having a significant negative effect on sustainable resource use (SEA Objective 8).

Whilst it is unknown which properties would be affected, it is expected that the installation of new metering infrastructure will be low-impact. Installation will take place within the operational footprint of domestic sites and should have a negligible effect on the structural integrity and visual amenity of historic assets within the general vicinity. Overall, this option has been assessed as having a neutral effect on cultural and historic assets (SEA Objective 9).

The structural scale of the new meters is expected to be minor such that installation should not result in any adverse impacts to the visual or landscape amenity of protected or local settings, e.g. designated national parks, townscapes, seascapes, or AONBs, due to the assumed low-intensity scale of construction in addition to the confined nature of these sites within operational footprints of domestic sites. Overall, this option has been assessed as having a neutral effect on landscape (SEA Objective 10).

Operation

It is assumed that the use of meters by customers would decrease water demand (by on average 15% per property when compared to unmetered properties in the Portsmouth Water DMZ). The effect of increased water efficiency on designated nature conservation sites (e.g. SACs, SPAs, Ramsar and SSSIs) and the ecological quality of habitats and associated groundwater/river water bodies is considered to be slightly positive as the increased efficiency reduces demand for additional water resources and increases resilience of existing network; however, the magnitude of change is assessed as neutral.

The utilisation of metering would not have a discernible effect on the appropriate and efficient use of land (SEA Objective 2).

The utilisation of metering by eligible customers would likely increase/ensure continuity of water supply through a reduction of water demand from previously metered domestic properties, and subsequently, a reduction of leakage within the water distribution network (the option has a design capacity of 4.68 Ml/d, generating a minor positive effect in respect of water quantity (SEA Objective 3)).

Overall, increased water efficiency may protect and slightly enhance the quality and quantity of the surface water environment and the groundwater resource, and/or rates of recharge.

It is considered unlikely that the utilisation of metering would result in and/or exacerbate flooding elsewhere now or in the future. This option has therefore been assessed as having a neutral effect on SEA Objective 4.

Once the installation of new meters is complete, the cumulative effects of reduced leakage and greater water efficiency through lowered water demand by previously metered domestic customers is anticipated to result in a significant reduction of energy required to process and pump water (-2,516 tCO₂e/year). Whilst, operational carbon emissions from vehicle movement are expected (estimated up to 33,444 km per annum) arising from meter readings, carbon emissions associated with the movements are small compared to the reduction in energy use. Overall, the reduction of net operational greenhouse gas emissions in respect of energy savings is considered a significant benefit; consequently, this option has been assessed as having a significant positive effect on climate change (SEA Objective 5).

It is assumed that the use of metering by customers would assist in decreasing network leakage through lowered water demand which should help reduce water loss in the Portsmouth Water DMZ. Operation is therefore likely to increase/ensure continuity of water supply thus helping ensure that a greater volume of water is available for future populations, commercial increases, and any seasonal demands. An increase of up to 4.68 Ml/d will have a minor positive effects (when compared to the definition of significance) and overall the option is assessed as having a minor positive effect on the local economy and local community wellbeing (SEA Objective 6).

The scheme should not significantly affect human health by increased noise, nuisance or disruption nor would it affect opportunities for recreation. It is assumed that the cumulative effects of lowered water demand would help increase/ensure continuity of water supply through water efficiency. Overall, an increase of up to 4.68 Ml/d would help ensure a continual supply of clean drinking water and overall the option is assessed as having a minor positive effect on health (SEA Objective 7).

No significant amount of resources or energy would be required once the metering infrastructure installation is complete. As illustrated by the scale of operational carbon savings associated with reduced treatment and pumping of water (-2,516 tCO₂e/year), operation has been assessed as having significant energy savings which has been assessed as having a significant positive effect on the sustainable use of resources (SEA Objective 8).

There are no discernible risks or clear impact pathways to cultural/historic heritage assets regarding the use of metering. This option has therefore been assessed as having a neutral effect on cultural and historic assets (SEA Objective 9).

There are no discernible risks or clear impact pathways to either the visual amenity or character of proximate local and designated landscapes, townscapes, or seascapes such as AONBs or national parks regarding the use of metering. This option has therefore been assessed as having a neutral effect on landscape (SEA Objective 10).

Option	Stage	1. Biodiversity	2. Geology and Soils	3. Water Quantity and Quality	4. Flood Risk	5. Climate Change	6. Economic and Social Wellbeing	7. Human Health	8. Waste and Resources	9. Cultural Heritage	10. Landscape
C006a Metering on change of occupancy - existing meter pits	Construction	0	0	0	0	-	0	0	-	0	0
	Operation	0	0	+	0	+	0	0	+	0	0
<p>Construction</p> <p>This option would involve the upgrade of existing metering infrastructure on a change of ownership, although it will still be a 'dumb' meter that would be read once every six months once installed. The option would start in 2020/21 and is assumed to go through to the rest of AMP7. It is estimated that 4,926 meters would be installed. Implementation is assumed to achieve a 15% saving per annum in water use per property. This option has been assessed on this basis, however, effects would be smaller if customer uptake is less than expected. It is therefore anticipated that up to 0.28 Ml/d of lost water would be saved following the implementation of this option.</p> <p>The proposed works would be targeting existing water network infrastructure (meters) and in consequence, implementation would occur within the existing operational footprints of domestic properties which may encompass a wide range of urban, semi-rural, and rural settings. It is unlikely, however, that construction would have any discernible impacts on immediate biodiversity, priority habitats, e.g. European designated conservation areas, SSSIs, local nature reserves, and etc., or protected species due to the minor to negligible scale of construction associated with implementation. Overall, this option has been assessed as having a neutral effect on biodiversity (SEA Objective 1).</p> <p>The upgrading of existing metering infrastructure s would target existing infrastructure contained within the operational footprints of domestic premises; consequently, implementation would not require any new land-take. This option has therefore been assessed as having a neutral effect on the appropriate and efficient use of land (SEA Objective 2).</p> <p>It is not expected that the upgrading of existing metering infrastructure would affect river flows or groundwater levels, or on water quality, provided best practices are employed. This option has therefore been assessed as having a neutral effect in respect of SEA Objective 3.</p> <p>It is assumed that works could be scheduled to avoid periods of flooding should there be a risk. Furthermore, it is considered highly unlikely that implementation of the scheme would result in and/or exacerbate flooding elsewhere now or in the future. This option has therefore been assessed as having a neutral effect on SEA Objective 4.</p> <p>The installation of metering infrastructure is expected to generate carbon emissions throughout the implementation period. It is estimated that there would be 15,763 km/a from vehicle movements which corresponds with site visits and the installation works. It is assumed, however, that vehicle movements could be clustered as appropriate which may help minimise vehicle emissions. Additionally, the</p>											

provision and installation of 4,926 new meters would generate carbon emissions arising from embodied carbon within the new meters (5.05kg CO₂/e) and from vehicle emissions. Consequently, this option would generate up to 174 tCO₂e during construction which has been assessed as having a minor negative effect on climate change (SEA Objective 5).

The option is expected to represent a low capital investment (£0.97m) which is not expected to generate a significant number of jobs in the long-term nor result in a discernible effect on the local economy associated with supply chain benefits (e.g. associated with the supply of raw materials and appointment of contractors to undertake the works). Due to the modest volume of vehicle movement associated with site visits and the installation of meters, it is unlikely that implementation would result in adverse impacts on the road network throughout the Portsmouth Water DMZ. Overall, this option has been assessed as having a neutral effect on local community wellbeing (SEA Objective 6).

The proposed works would be contained within the operational footprints of domestic premises such that the scale of implementation should not disrupt the use or result in the loss of amenity to proximate recreational activity and sport. The impacts of noise/vibration disturbance and nuisance resulting from the installation of new meters is not expected to result in any discernible effects on human health due to the scale and brevity of installation. Overall, implementation of this scheme is not expected to affect drinking water supply, surface water and bathing water quality, or recreation. This option has therefore been assessed as having a neutral effect on health (SEA Objective 7).

The installation of new meters would require a raw materials and energy to implement. Using the estimated carbon emissions associated with the embodied carbon within new meters in addition to vehicle greenhouse gas emissions as a proxy, material use and energy requirements are considered to be notable, and the option has therefore been assessed as having a minor negative effect on this objective. Furthermore, this option would generate construction wastes which may include infrastructural waste (original meter infrastructure) in addition to fuel usage for vehicles. Overall, this option has been assessed as having a minor negative effect on sustainable resource use (SEA Objective 8).

Whilst it is unknown which properties would be affected, it is expected that the installation of new metering infrastructure will be low-impact. Installation will take place within the operational footprint of domestic sites and should have a negligible effect on the structural integrity and visual amenity of historic assets within the general vicinity. Overall, this option has been assessed as having a neutral effect on cultural and historic assets (SEA Objective 9).

The structural scale of the new meters is expected to be minor such that installation should not result in any adverse impacts to the visual or landscape amenity of protected or local settings, e.g. designated national parks, townscapes, seascapes, or AONBs, due to the assumed low-intensity scale of construction in addition to the confined nature of these sites within operational footprints of domestic sites. Overall, this option has been assessed as having a neutral effect on landscape (SEA Objective 10).

Operation

It is assumed that the use of meters by customers would decrease water demand (by on average 15% per property when compared to unmetered properties in the Portsmouth Water DMZ). The effect of increased water efficiency on designated nature conservation sites (e.g. SACs, SPAs, Ramsar and SSSIs) and the ecological quality of habitats and associated groundwater/river water bodies is considered to be slightly positive as the increased efficiency reduces demand for additional water resources and increases resilience of existing network; however, the magnitude of change is assessed as neutral.

The utilisation of metering would not have a discernible effect on the appropriate and efficient use of land (SEA Objective 2).

The utilisation of metering by eligible customers would likely increase/ensure continuity of water supply through a reduction of water demand from previously metered domestic properties, and subsequently, a reduction of leakage within the water distribution network (the option has a design capacity of 0.28Ml/d), generating a minor positive effect in respect of water quantity (SEA Objective 3). Overall, increased water efficiency may protect and slightly enhance the quality and quantity of the surface water environment and the groundwater resource, and/or rates of recharge.

It is considered unlikely that the utilisation of metering would result in and/or exacerbate flooding elsewhere now or in the future. This option has therefore been assessed as having a neutral effect on SEA Objective 4.

Once the installation of new meters is complete, the cumulative effects of reduced leakage and greater water efficiency through lowered water demand by previously metered domestic customers is anticipated to result in a minor reduction of energy required to process and pump water (-142tCO₂e/year). Operational carbon emissions in respect of vehicle movement from up to 19,704 km per annum arising from meter readings are considered to be small. Overall, the reduction of net operational greenhouse gas emissions in respect of energy savings has been assessed as having a minor positive effect on climate change (SEA Objective 5).

It is assumed that the use of metering by customers would assist in decreasing network leakage through lowered water demand which should help reduce water loss in the Portsmouth Water DMZ. Operation is therefore likely to increase/ensure continuity of water supply thus helping ensure that a greater volume of water is available for future populations, commercial increases, and any seasonal

demands. However, an increase of up to 0.28 Ml/d is insufficient to have a substantive effect and overall the option is assessed as having a neutral effect on the local economy and local community wellbeing (SEA Objective 6).

The scheme should not significantly affect human health by increased noise, nuisance or disruption nor would it affect opportunities for recreation. It is assumed that the cumulative effects of lowered water demand would help increase/ensure continuity of water supply through water efficiency. Overall, an increase of up to 0.28 Ml/d would help ensure a continual supply of clean drinking water, however, is insufficient to have a substantive effect and overall the option is assessed as having a neutral effect on health (SEA Objective 7).

No significant amount of resources or energy would be required once the upgrading of prior metering infrastructure to metering is complete. As illustrated by the scale of operational carbon savings associated with reduced treatment and pumping of water (-142tCO₂e/year), operation has been assessed as having minor energy savings. Notwithstanding, a further decrease in water demand from previously metered domestic properties should facilitate greater leakage reduction within the water distribution network. On balance, this option has been assessed as having a minor positive effect on the sustainable use of resources (SEA Objective 8).

There are no discernible risks or clear impact pathways to cultural/historic heritage assets regarding the use of metering. This option has therefore been assessed as having a neutral effect on cultural and historic assets (SEA Objective 9).

There are no discernible risks or clear impact pathways to either the visual amenity or character of proximate local and designated landscapes, townscapes, or seascapes such as AONBs or national parks regarding the use of SMART metering. This option has therefore been assessed as having a neutral effect on landscape (SEA Objective 10).

Option	Stage	1. Biodiversity	2. Geology and Soils	3. Water Quantity and Quality	4. Flood Risk	5. Climate Change	6. Economic and Social Wellbeing	7. Human Health	8. Waste and Resources	9. Cultural Heritage	10. Landscape
C069 Target occupants of new build housing with Smart meters & water efficiency advice	Construction	0	0	0	0	-	0	0	-	0	0
	Operation	0	0	+	0	0	0	0	+	0	0

Construction

This option would involve the installation of SMART meters within the premises of new build residential dwellings (instead of basic metering units) in conjunction with the provision of water efficiency advice over a 5 year implementation period in order to increase consumer awareness and proactive behaviour regarding water usage which would, subsequently, reduce water demand and leakage. It is assumed that 10,000 new build properties will be targeted for SMART meter installation and water efficiency advice. The option has been assessed on this basis, however, effects would be smaller if uptake is less than expected. It is therefore anticipated that up to 0.18 Ml/d of lost water would be saved following the implementation of this option.

Although it is currently unknown which designated sites within the Portsmouth District Metering Zone (DMZ) will be granted planning permission for the estimated 10,000 new build residential dwellings, the installation of SMART Meters is expected to be low-impact. The proposed works would be targeting existing water supply access points and in consequence, implementation would occur within the proposed operational footprints of the new build domestic properties which may encompass a wide range of urban, semi-rural, and rural settings. It is unlikely, however, that construction would have any discernible impacts on immediate biodiversity, priority habitats, e.g. European designated conservation areas, SSSIs, local nature reserves, and etc., or protected species due to the minor, if not negligible, scale of construction associated with implementation. Similarly, neither the provision of water efficiency advice regarding smart and sustainable water consumption nor the installation of any ancillary water efficiency equipment associated with advice uptake by residents would have a discernible effect on biodiversity. Overall, this option has been assessed as having a neutral effect on biodiversity (SEA Objective 1).

The installation of SMART meters and ancillary water efficiency equipment within the premises of new build residential dwellings would target existing water network infrastructure contained within the operational footprints of domestic premises; consequently, implementation would not require any additional land-take. This option has therefore been assessed as having a neutral effect on the appropriate and efficient use of land (SEA Objective 2).

It is not expected that installation of SMART meters and ancillary water efficiency equipment within the premises of new build residential dwellings would affect river flows or groundwater levels, or on water quality, provided best practices are employed. This option has therefore been assessed as having a neutral effect in respect of SEA Objective 3.

Although it is currently unknown where the estimated 10,000 new build residential dwellings would be located within the Portsmouth DMZ, it is assumed that works could be scheduled to avoid periods of flooding should there be a risk. Furthermore, it is considered highly unlikely that implementation of the scheme would result in and/or exacerbate flooding elsewhere now or in the future. This option has therefore been assessed as having a neutral effect on SEA Objective 4.

The installation of SMART meters and ancillary water efficiency equipment is expected to generate carbon emissions throughout the implementation period. It is estimated that there would be up to 2,000 vehicle movements per annum (10,000 over the 5 year implementation period) which corresponds with site visits and the installation of SMART meters/water efficiency equipment. It is assumed, however, that vehicle movements could be clustered as appropriate which may help minimise vehicle emissions. Additionally, the provision and installation of new SMART meters and water efficiency equipment would generate carbon emissions arising from embodied carbon within the new equipment (est. 5.05kg CO₂/e per meter/device). Consequently, this option would generate up to 354 tCO₂e during construction. Overall, it is expected that implementation would result in a minor quantity of carbon emissions (depending on the volume of meters and devices installed and the intensity of movement throughout the DMZ) which has been assessed as having a minor negative effect on climate change (SEA Objective 5).

The option is expected to represent a low capital investment (approximately £0.25m) which is not expected to generate a significant number of jobs in the long-term nor result in a discernible effect on the local economy associated with supply chain benefits (e.g. associated with the supply of raw materials and appointment of contractors to undertake the works). Due to the moderate volume of vehicle movement associated with site visits and the installation SMART meters and ancillary water efficiency devices, it is unlikely that implementation would result in adverse impacts on the road network throughout the Portsmouth DMZ. Overall, this option has been assessed as having a neutral effect on local community wellbeing (SEA Objective 6).

Although it is currently unknown which designated sites within the Portsmouth District Metering Zone (DMZ) will be granted planning permission for the estimated 10,000 new build residential dwellings, the proposed works would be targeting new or existing water network infrastructure within proposed new build operational footprints such that the minor scale of implementation should not disrupt the use or result in the loss of amenity to proximate recreational activity and sport. The impacts of noise/vibration disturbance and nuisance resulting from installation of new meters and ancillary water efficiency devices is not expected to result in any discernible effects on human health due to the scale and brevity of installation. Overall, implementation of this scheme is not expected to affect drinking water supply, surface water and bathing water quality, or recreation. This option has therefore been assessed as having a neutral effect on health (SEA Objective 7).

The installation of new SMART meters and ancillary water efficiency would require a minor volume of raw materials and energy to implement. Using the estimated carbon emissions associated with the embodied carbon within new meters and ancillary devices in addition to HGV greenhouse gas emissions as a proxy, material use and energy requirements are considered to be notable, and the option has therefore been assessed as having a minor negative effect on this objective. Overall, this option has been assessed as having a minor negative effect on sustainable resource use (SEA Objective 8).

Although it is currently unknown which designated sites within the Portsmouth District Metering Zone (DMZ) will be granted planning permission for the estimated 10,000 new build residential dwellings,, the installation of new SMART Meters is expected to be significantly low-impact. Furthermore, the structural scale of the new SMART meters and ancillary water efficiency devices is expected to be minor such that installation within the operational footprints of domestic sites should have a negligible effect on the structural integrity and visual amenity of historic assets within the general vicinity. Overall, this option has been assessed as having a neutral effect on cultural and historic assets (SEA Objective 9).

The structural scale of the SMART meters and ancillary water efficiency devices is expected to be minor such that installation should not result in any adverse impacts to the visual or landscape amenity of protected or local settings, e.g. designated national parks, townscapes, seascapes, or AONBs, due to the assumed low-intensity scale of construction in addition to the confined nature of these sites within operational footprints of domestic sites. Overall, this option has been assessed as having a neutral effect on landscape (SEA Objective 10).

Operation

It is assumed that the utilisation of SMART metering and the uptake of water efficiency advice by new build households would facilitate more engaged behaviour regarding smart and conscientious water consumption. Consequently, operation is expected decrease water demand in the Portsmouth Water DMZ which should facilitate a greater reduction of leakage within the water distribution network. The effect of increased water efficiency on designated nature conservation sites (e.g. SACs, SPAs, Ramsar and SSSIs) and the ecological quality of habitats and associated groundwater/river water bodies is considered to be slightly positive as the increased efficiency reduces demand for additional water resources and increases resilience of existing network; however, the magnitude of change is assessed as neutral.

The utilisation of SMART metering and uptake of water efficiency advice would not have a discernible effect on the appropriate and efficient use of land (SEA Objective 2).

The utilisation of SMART metering and the uptake of water efficiency advice by new build households would likely increase/ensure continuity of water supply through a reduction of water demand due to more engaged behaviour regarding smart and conscientious water consumption, and furthermore, a reduction of leakage within the water distribution network (the option has a design capacity of 0.18 MI/d, generating a minor positive effect in respect of water quantity (SEA Objective 3)). Overall, increased water efficiency may protect and slightly enhance the quality and quantity of the surface water environment and the groundwater resource, and/or rates of recharge.

It is considered unlikely that the utilisation of SMART metering and uptake of water efficiency advice would result in and/or exacerbate flooding elsewhere now or in the future. This option has therefore been assessed as having a neutral effect on SEA Objective 4.

Once installation of SMART meters and ancillary water efficiency devices is complete, the cumulative effects of reduced leakage and greater water efficiency through lowered water demand may result in a minor reduction of energy required to process and pump water (-91 tCO₂e/year). Furthermore, operational emissions to air in respect of vehicle movement are expected to be negligible (up to 2,000 movements per annum in respect of meter readings). Overall, the reduction of net operational greenhouse gas emissions in respect of energy savings is considered a negligible benefit; consequently, this option has been assessed as having a neutral effect on climate change (SEA Objective 5).

It is assumed that the utilisation of SMART metering and the uptake of water efficiency advice by new build households would assist in decreasing network leakage through lowered water demand. Operation is therefore likely to increase/ensure continuity of water supply thus helping ensure that a greater volume of water is available for future populations, commercial increases, and any seasonal demands. However, an increase of up to 0.18 MI/d is insufficient to make a substantive difference and overall the option is assessed as having a neutral effect on the local economy and local community wellbeing (SEA Objective 6).

The scheme should not significantly affect human health by increased noise, nuisance or disruption nor would it affect opportunities for recreation. It is assumed that the cumulative effects of lowered water demand would help increase/ensure continuity of water supply through water efficiency. Overall, an increase of up to 0.18 MI/d would help ensure a continual supply of clean drinking water; how is insufficient to have a substantive effect and overall the option is assessed as having a neutral effect on health (SEA Objective 7).

No significant amount of resources or energy would be required once the installation of SMART metering and ancillary water efficiency devices is complete. As illustrated by the scale of operational carbon savings associated with reduced treatment and pumping of water (-91 tCO₂e/year), operation has been assessed as having negligible energy savings. Notwithstanding, the reduction of water demand by new build households through more engaged behaviour regarding smart and conscientious water consumption is expected to result in leakage reduction. On balance, this option has been assessed as having a positive effect on the sustainable use of resources (SEA Objective 8).

There are no discernible risks or clear impact pathways to cultural/historic heritage assets regarding the use of SMART metering and ancillary water efficiency devices. This option has therefore been assessed as having a neutral effect on cultural and historic assets (SEA Objective 9).

There are no discernible risks or clear impact pathways to either the visual amenity or character of proximate local and designated landscapes, townscapes, or seascapes such as AONBs or national parks regarding the use of SMART metering and ancillary water efficiency devices. This option has therefore been assessed as having a neutral effect on landscape (SEA Objective 10).

Option	Stage	1. Biodiversity	2. Geology and Soils	3. Water Quantity and Quality	4. Flood Risk	5. Climate Change	6. Economic and Social Wellbeing	7. Human Health	8. Waste and Resources	9. Cultural Heritage	10. Landscape
C075 Smart metering - replacing existing household water meters & provide water efficiency audit and advice	Construction	0	0	0	0	--	++/-	0	--	0	0
	Operation	0	0	+	0	+	+	+	+	0	0

Construction

This option would involve the upgrading of existing metering infrastructure to SMART meters within the premises of previously metered domestic customers while simultaneously providing water audits (including water efficiency retrofits) and water efficiency advice. It is expected implementation of the option will improve consumer awareness and proactive behaviour regarding smart and sustainable consumption which would, subsequently, reduce water demand and leakage within the Portsmouth Water District Metering Zone (DMZ). Within the 10 year implementation period, it is predicted that 105,725 customers will be targeted for SMART metering installation, auditing, and the provision of water efficiency advice. This option has been assessed on this basis, however, effects would be smaller if rollout is less than expected. It is therefore anticipated that up to 1.40 MI/d of lost water would be saved following the implementation of this option.

The installation of SMART Meters is expected to be low-impact; furthermore, the proposed works would be targeting existing water supply access points thus implementation would occur within existing operational footprints of domestic properties which may encompass a wide range of urban, semi-rural, and rural settings. It is unlikely, however, that construction would have any discernible impacts on immediate biodiversity, priority habitats, e.g. European designated conservation areas, SSSIs, local nature reserves, and etc., or protected species due to the minor, if not negligible, scale of construction required. Similarly, neither the provision of auditing and water efficiency advice nor the installation of any ancillary water efficiency equipment, e.g. shower timers/tap inserts, would have an effect on biodiversity. Overall, this option has been assessed as having a neutral effect on biodiversity (SEA Objective 1).

The installation of SMART meters and ancillary water efficiency equipment within the premises of previously metered domestic dwellings would target existing water network infrastructure contained within the operational footprints of these sites; consequently, implementation would not require any new land-take. This option has therefore been assessed as having a neutral effect on the appropriate and efficient use of land (SEA Objective 2).

It is not expected that installation of SMART meters and ancillary water efficiency equipment within the premises of targeted domestic dwellings would affect river flows or groundwater levels, or on water quality, provided best practices are employed. This option has therefore been assessed as having a neutral effect in respect of SEA Objective 3.

It is assumed that the installation of SMART metering and ancillary water efficiency equipment could be scheduled to avoid periods of flooding should there be a risk. Furthermore, it is considered highly unlikely that implementation of the scheme, including subsequent actions generated from auditing and advice provision, would result in and/or exacerbate flooding elsewhere now or in the future. This option has therefore been assessed as having a neutral effect on SEA Objective 4.

The installation of SMART meters and ancillary water efficiency equipment in conjunction with auditing/advice provision is expected to generate carbon emissions throughout the implementation period. It is estimated that there would be up to 10,572 vehicle movements per annum (105,720 over the 10 year implementation period) which corresponds with site visits and the simultaneous installation of meters, equipment, auditing, and advice provision. It is assumed, however, that vehicle movements could be clustered as appropriate which may help minimise vehicle emissions. Additionally, the provision and installation of new SMART meters and water efficiency equipment would generate carbon emissions arising from embodied carbon within the new equipment (est. 5.05kg CO₂/e per meter/device). Consequently, this option would generate up to 3,631 tCO₂e during construction. It is expected that implementation would result in a large quantity of carbon emissions (depending on the volume of meters and devices installed and the intensity of movement throughout the DMZ) which has been assessed as having a significant negative effect on climate change (SEA Objective 5).

The construction of the option represents a significant capital investment (£27.6m) which is expected to generate a number of employment opportunities and supply chain benefits (e.g. associated with the supply of raw materials and appointment of contractors to undertake the works). Utilisation of the local road network as transportation corridors regarding vehicle movements (10,572 per annum) during the implementation period may result in minor disruption of mobility within the road network although any effects would be temporary and felt in the short term only. Overall, the option has been assessed as having a mixed significant positive and minor negative effect on economic and social wellbeing (Objective 6).

The proposed works would be targeting existing water network infrastructure within established operational footprints such that the minor scale of implementation should not disrupt the use or result in the loss of amenity to proximate recreational activity and sport. The impacts of noise/vibration disturbance and nuisance resulting from installation of new SMART meters and ancillary water efficiency equipment is not expected to result in any discernible effects on human health due to the scale and brevity of installation. Overall, implementation of this scheme is not expected to affect drinking water supply, surface water and bathing water quality, or recreation. This option has therefore been assessed as having a neutral effect on health (SEA Objective 7).

The installation of new SMART meters and ancillary water efficiency would require a large volume of raw materials and energy to implement. Using the estimated carbon emissions associated with the embodied carbon within new meters and ancillary devices in addition to HGV greenhouse gas emissions as a proxy, material use and energy requirements are considered to be notable, and the option has therefore been assessed as having a significant negative effect on this objective. Furthermore, this option would generate construction wastes which may include infrastructural waste (original metering equipment) in addition to fuel usage for vehicles. Overall, this option has been assessed as having a significant negative effect on sustainable resource use (SEA Objective 8).

The installation of new equipment is expected to be significantly low-impact; specifically, the structural scale of the new SMART meters and ancillary water efficiency devices is expected to be minor, if not indiscernible, such that installation within the operational footprints of domestic sites should have a negligible effect on the structural integrity and visual amenity of historic assets within the general vicinity. Overall, this option has been assessed as having a neutral effect on cultural and historic assets (SEA Objective 9).

The structural scale of the proposed meters and ancillary water efficiency devices is expected to be minor, if not indiscernible, such that installation should not result in any adverse impacts to the visual or landscape amenity of protected or local settings, e.g. designated national parks, townscapes, seascapes, or AONBs in respect of the low-intensity scale of construction and the confined nature of these sites within the operational footprints of domestic sites. Overall, this option has been assessed as having a neutral effect on landscape (SEA Objective 10).

Operation

It is assumed that the combined utilisation of SMART metering, water efficiency equipment, and the uptake of water efficiency advice by previously metered customers should facilitate a greater increase in engaged behaviour regarding smart and conscientious water consumption. Consequently, operation is expected decrease water demand in the Portsmouth Water DMZ which should facilitate a greater reduction of leakage within the water distribution network. The effect of increased water efficiency on designated nature conservation sites (e.g. SACs, SPAs, Ramsar and SSSIs) and the ecological quality of habitats and associated groundwater/river water bodies is considered to be slightly positive as the increased efficiency reduces demand for additional water resources and increases resilience of existing network; however, the magnitude of change is assessed as neutral.

The utilisation of SMART metering/water efficiency equipment and the uptake of water efficiency advice would not have a discernible effect on the appropriate and efficient use of land (SEA Objective 2).

The utilisation of SMART metering/water efficiency equipment and the uptake of water efficiency advice by previously metered customers would likely increase/ensure continuity of water supply through a reduction of water demand, and furthermore, a reduction of leakage within the water distribution network (the option has a design capacity of 1.40 Ml/d, generating a minor positive effect in respect of water quantity (SEA Objective 3)). Overall, increased water efficiency may protect and slightly enhance the quality and quantity of the surface water environment and the groundwater resource, and/or rates of recharge.

It is considered unlikely that the utilisation of SMART metering/water efficiency equipment and the uptake of water efficiency advice would result in and/or exacerbate flooding elsewhere now or in the future. This option has therefore been assessed as having a neutral effect on SEA Objective 4.

Once the installation of SMART meters and ancillary water efficiency equipment is complete, the cumulative effects of reduced leakage and greater water efficiency may result in a large reduction of energy required to process and pump water (-722 tCO₂e/year). Furthermore, operational emissions to air in respect of vehicle movement are expected to be moderate (up to 10,572 movements per annum in respect of meter readings) although vehicle movements could be clustered as appropriate to minimise vehicle emissions. Overall, the reduction of net operational greenhouse gas emissions in respect of energy savings is considered a notable benefit; consequently, this option has been assessed as having a positive effect on climate change (SEA Objective 5).

It is assumed that the utilisation of SMART metering/water efficiency equipment and the uptake of water efficiency advice by previously metered customers would assist in decreasing network leakage through lowered water demand. Operation is therefore likely to increase/ensure continuity of water supply thus helping ensure that a greater volume of water is available for future populations, commercial increases, and any seasonal demands. Overall, an increase of up to 1.40 Ml/d would have a minor positive effect on the local economy and local community wellbeing (SEA Objective 6).

The scheme should not significantly affect human health by increased noise, nuisance or disruption nor would it affect opportunities for recreation. It is assumed that the cumulative effects of lowered water demand would help increase/ensure continuity of water supply through greater water efficiency. Overall, an increase of up to 1.40 Ml/d would help ensure a continual supply of clean drinking water, generating a minor positive effect on health (SEA Objective 7).

No significant amount of resources or energy would be required once the installation of SMART metering and ancillary water efficiency equipment is complete. As illustrated by the scale of operational carbon savings associated with reduced treatment and pumping of water (-722 tCO₂e/year), operation has been assessed as having notable energy savings. Additionally, a further reduction of water demand by previously metered customers through more engaged behaviour regarding smart and conscientious water consumption should facilitate greater leakage reduction (savings up to 1.40 Ml/d). On balance, this option has been assessed as having a positive effect on the sustainable use of resources (SEA Objective 8).

There are no discernible risks or clear impact pathways to cultural/historic heritage assets the use of SMART metering and ancillary water efficiency equipment. This option has therefore been assessed as having a neutral effect on cultural and historic assets (SEA Objective 9).

There are no discernible risks or clear impact pathways to either the visual amenity or character of proximate local and designated landscapes, townscapes, or seascapes such as AONBs or national parks regarding the use of SMART metering and ancillary water efficiency equipment. This option has therefore been assessed as having a neutral effect on landscape (SEA Objective 10).

Option	Stage	1. Biodiversity	2. Geology and Soils	3. Water Quantity and Quality	4. Flood Risk	5. Climate Change	6. Economic and Social Wellbeing	7. Human Health	8. Waste and Resources	9. Cultural Heritage	10. Landscape
C026: Subsidy to customers that purchase water efficient appliances (washing machines and dishwashers, showers and WCs)	Construction	0	0	0	0	0	0	0	0	0	0
	Operation	0	0	+	0	0	0	0	+	0	0
<p>Construction</p> <p>This option promotes the purchase of water efficient appliances by targeting the higher consumptive uses in the home, recognising that many households are still using old stock that use much more water per use than more modern fittings and appliances. A subsidy in the form of a reduced measured bill would incentivise replacement of aging appliances. Customers who register interest in the campaign would be visited to have their appliances inspected, and at the same time would be given support to identify modern available alternatives. A basic water audit would also be carried out and advice given on how to use water wisely in the home. Customers that subsequently replace their inefficient appliances would receive a 10% reduction on their measured bills for 3 years. Capital expenditure is estimated to be £0.41m.</p> <p>It is assumed that the bill reduction would incentivise 20% of household customers to respond initially, within which 20% would agree to an inspection and audit, within which 50% would purchase more efficient appliances (i.e. just over 2000 properties within the 3 year period).</p> <p>Fittings and appliances would be located within the customer's homes and there are no external construction operations associated with this option. Therefore, no construction effects are predicted on biodiversity (SEA Objective 1), efficient use of land, soil quality or geodiversity (SEA Objective 2), water quantity and quality (SEA Objective 3), risk of flooding (SEA Objective 4), cultural and historic assets (SEA Objective 9) or landscape character and protected features (SEA Objective 10).</p> <p>Whilst vehicles would be required to visit homes resulting in emissions of 91tCO₂e over the option period, this is assessed as being very low in annual terms and has therefore been assessed as a neutral effect on climate change (SEA Objective 5).</p> <p>The option has a relatively low capital expenditure and local employment or recreational opportunities would not be effected (SEA Objective 6). Whilst minor disruption/nuisance may occur during installation, this is considered to be negligible (SEA Objective 7).</p> <p>No additional infrastructure is required but the construction phase would lead to additional waste where fixtures and fittings are replaced. However, this is expected to be low leading to a neutral effect against SEA Objective 8 (promoting the wise use of water resources).</p>											



Operation

As there are no operations outside of the home associated with this option, there would be no operational effects predicted against biodiversity (SEA Objective 1), efficient use of land, soil quality or geodiversity (SEA Objective 2), risk of flooding (SEA Objective 4), cultural and historic assets (SEA Objective 9) or landscape character and protected features (SEA Objective 10).

The water efficiency measures are expected to reduce water demand by 0.09 Ml/d and a minor positive effect is recorded against SEA Objective 3, water quantity and quality, and in promoting SEA Objective 8, water efficiency.

This option would result in a reduction in greenhouse emissions of 50tCO₂e, although against the assessment parameters of SEA Objective 5 this is very low and has been assessed a neutral effect on climate change.

While this option would help ensure continuity of supply and would not result in adverse effects on health during operation (no noise, nuisance or disruption expected), the yield figures are low and this option is assessed as having a neutral effect against objectives 6 and 7.

Option	Stage	1. Biodiversity	2. Geology and Soils	3. Water Quantity and Quality	4. Flood Risk	5. Climate Change	6. Economic and Social Wellbeing	7. Human Health	8. Waste and Resources	9. Cultural Heritage	10. Landscape
C034: Water saving devices – Retrofitting existing toilets (with flush >9l)	Construction	0	0	0	0	0	0	0	0	0	0
	Operation	0	0	+	0	0	0	0	+	0	0

Construction

Toilets in household properties would be retrofitted to replace existing higher flush volume mechanisms, reducing demand for water. The assumption is that this option would reduce the flush per use rate from 9l to 5l. Households would be offered a free WRAS approved dual flush retrofit installation and would be provided with information on the potential benefits to water bills and on the performance of the retrofit. The device would be installed by Portsmouth Water. It is assumed that 15% of the 105,725 households Portsmouth Water supplies have larger size cisterns (>9l per flush). These would be targeted and the assumption is that 10% would response with successful installations in 60% of those. This equates to a maximum water saving of 0.11MI/d.

As all installation works would be undertaken within customers properties, no construction effects are predicted on biodiversity (SEA Objective 1), efficient use of land, soil quality or geodiversity (SEA Objective 2), water quantity and quality (SEA Objective 3), risk of flooding (SEA Objective 4), cultural and historic assets (SEA Objective 9) or landscape character and protected features (SEA Objective 10).

Emissions from embodied carbon associated with the water saving flushes are predicted to be 3tCO₂e over the assessment period which is assessed as having a neutral effect on SEA Objective 5, climate change.

The capital expenditure (estimated to be £0.09m) and maximum annual yield 0.11MI/d are relatively low and are not expected to have a discernible effect on local employment opportunities or the local economy (SEA Objective 6).

Implementation of this option is not expected to affect human health (no increase in nuisance or disruption are predicted). There would be an increase in vehicular movements associated with the option, however, any noise and air quality impacts are likely to be minimal and would result in a negligible effect on human health (SEA Objective 7).

No additional infrastructure is required but the construction phase would lead to additional waste where fixtures and fittings are replaced. However, this is expected to be low leading to a neutral effect against SEA Objective 8 (promoting the wise use of water resources).



Operation

As with the construction phase of this option, all installation works would be undertaken within customers properties, so no operational effects are predicted on biodiversity (SEA Objective 1), efficient use of land, soil quality or geodiversity (SEA Objective 2), risk of flooding (SEA Objective 4), cultural and historic assets (SEA Objective 9) or landscape character and protected features (SEA Objective 10).

Although this option reduces demand for water, the effects on climate change would be limited and would have a negligible impact against SEA Objective 5. However, the promotion of reduced water use and thus demand with a maximum annual yield 0.11MI/d, would have a minor positive effect on water quality and quantity and would have been assessed as having a minor positive effect on SEA Objective 3 and in promoting water efficiency, SEA Objective 8.

While this option would help ensure continuity of supply, the yield figures are relatively low and the impact on the economic and social wellbeing of the community and human health (SEA Objectives 6 and 7) would be negligible.

Option	Stage	1. Biodiversity	2. Geology and Soils	3. Water Quantity and Quality	4. Flood Risk	5. Climate Change	6. Economic and Social Wellbeing	7. Human Health	8. Waste and Resources	9. Cultural Heritage	10. Landscape
C040: Water Saving Devices – Spray Taps	Construction	0	0	0	0	0	0	0	0	0	0
	Operation	0	0	+	0	0	0	0	+	0	0
<p>Construction</p> <p>This option would retrofit 17,000 sets of spray taps in household properties replacing inefficient higher flow non spray taps. Replacement taps (not inserts) would be used and would also include hot water basin taps. A campaign would inform customers of the benefits to their water and energy bills and performance of the taps. Customers would be asked to confirm they have non spray taps and agree to a short water consumption questionnaire. The taps would be installed by a training plumber/technician to ensure that they are installed correctly. It is assumed that 5% of measured, and 2% of unmeasured households respond, within which 50% and 20% of respondents would have taps installed. It expected that 3,400 spray taps would be installed per year totalling 17,000. The anticipated saving based on the estimated uptake figures is a maximum water saving of 0.07Ml/d.</p> <p>Installation of the spray taps will take place within domestic customer's properties and construction effects will be limited. There would be no effects on biodiversity (SEA Objective 1) or efficient use of land, soil quality or geodiversity (SEA Objective 2).</p> <p>The installation of the spray taps would not affect river flows or groundwater levels and would not exacerbate or cause flooding, assessed at having a neutral effect on SEA Objectives 3 and 4.</p> <p>Carbon emissions will be associated with the installation of the spray taps. It is predicted that there will be 54,460km van movements travelled per year but that these can be managed and area focused to minimise emissions, and an estimated 26 tCO₂e would be generated during construction. These figures are very low and are assessed as having a neutral effect under SEA Objective 5, climate change.</p> <p>The initial capital investment is estimated to be £2.3m. This is not considered sufficiently great to generate a significant number of jobs in the area. Combined with moderate numbers of vehicle movements from installation and visiting properties, there would be no discernible effect on the social wellbeing of the local community (SEA Objective 6).</p> <p>Works for the provision of spray taps would be localised, taking place within domestic dwellings. Consequently, there is not predicted to be a negative impact on noise or effects on air quality, and drinking water and surface water will not be effected (SEA Objective 7).</p>											

Raw materials would be used in the fitting of the new spray taps but levels of this and energy to implement the installation would be small. The carbon emissions are very low at 26 tCO₂e and it is assessed that there would be a neutral effect on sustainable resource use (SEA Objective 8).

While some of these may be designated heritage assets or within a designated area, installation of the new spray taps will be limited to the existing fittings in domestic properties and would have no impact on designated heritage assets (SEA Objective 9). Equally, the installations will be limited to the external envelope of dwellings and would therefore not impact on landscape character and protected features (SEA Objective 10).

Operation

As there are no operations outside of the home associated with this option, there would be no operational effects predicted against biodiversity (SEA Objective 1), efficient use of land, soil quality or geodiversity (SEA Objective 2), risk of flooding (SEA Objective 4), cultural and historic assets (SEA Objective 9) or landscape character and protected features (SEA Objective 10).

The installation of spray taps would lead to more efficient use of water within households and would help ensure the continuity of supply, with a predicted maximum water saving of 0.07Ml/d and is therefore assessed as having a minor positive effect on SEA Objective 3, water quality and quantity.

The increase in water efficiency is predicted to result in a variable operational reduction of 39tCO₂e in carbon emissions but this is considered to be a relatively low figure and would have no discernible effect and is assessed as having a neutral effect on climate change (SEA Objective 5).

While this option would help ensure continuity of supply and would not result in adverse effects on health during operation (no noise, nuisance or disruption expected), the yield figures are relatively low and this option is assessed as having a neutral effect against objectives 6 and 7.

Option	Stage	1. Biodiversity	2. Geology and Soils	3. Water Quantity and Quality	4. Flood Risk	5. Climate Change	6. Economic and Social Wellbeing	7. Human Health	8. Waste and Resources	9. Cultural Heritage	10. Landscape
C043 Water saving devices - Trigger nozzles & water butts	Construction	0	0	0	0	0	0	0	0	0	0
	Operation	0	0	+	0	0	0	0	+	0	0

Construction

This option would involve the provision of hosepipe trigger nozzles and water butts in conjunction with regular annual messages about long-term sustainable garden care for metered customers owning garden space whom do not already own this equipment. It is expected that implementation of this option would reduce the need for customers to connect to water mains in respect of garden care thus decreasing water demand and 'freeing-up' resources for other customers. Improved consumer awareness and proactive behaviour regarding smart and sustainable consumption would additionally assist in leakage reduction within the DMZ. Within the 3 year implementation period, it is predicted that 40% of eligible customers will receive a free hose nozzle and 30% would receive a free water butt of the 35% of customers who agree to take the mandatory pre-questionnaire which will total approx. 4,440 nozzles and 3,330 water butts. This option has been assessed on this basis, however, effects would be smaller if customer uptake is less than expected. It is therefore anticipated that up to 0.06 Ml/d of lost water would be saved following the implementation of this option.

The installation of water efficiency equipment is expected to be low-impact; specifically, the provision of hosepipe trigger nozzles and water butts would be targeting household water appliances within the operational footprints of domestic properties which is assumed to have no direct impact pathways to the natural environment. Consequently, installation is expected to have no discernible impact on immediate biodiversity, priority habitats, e.g. European designated conservation areas, SSSIs, local nature reserves, and etc., or protected species due to the negligible scale of construction required. Overall, this option has been assessed as having a neutral effect on biodiversity (SEA Objective 1).

The installation of hosepipe trigger nozzles and water butts on household water appliances within the operational footprint of domestic dwellings would not require any new land-take. This option has therefore been assessed as having a neutral effect on the appropriate and efficient use of land (SEA Objective 2).

It is not expected that the installation of hosepipe trigger nozzles and water butts would affect river flows or groundwater levels, or on water quality, provided best practices are employed. This option has therefore been assessed as having a neutral effect in respect of SEA Objective 3.

The provision and installation of hosepipe trigger nozzles and water butts by Portsmouth Water (or partners) has been assessed as having a neutral effect on SEA Objective 4.

The installation of hosepipe trigger nozzles and water butts water is expected to generate carbon emissions throughout the implementation period. It is estimated that there would be up to 23,682km travelled per annum in respect to site visits and the installation of equipment. It is assumed, however, that vehicle movements could be geographically clustered as appropriate which may help minimise vehicle emissions. Additionally, the provision and installation of new water efficiency equipment (4,440 nozzles and 3,330 water butts) would generate carbon emissions arising from embodied carbon within the new equipment (est. 17.72kg CO₂/e). Cumulatively, this option would generate up to 60 tCO₂e during the construction and installation. It is expected that implementation would result in a minor quantity of carbon emissions (depending on the volume of devices installed and the intensity of movement throughout the DMZ) which has been assessed as having a neutral effect on climate change (SEA Objective 5).

Implementation of the option represents a minor capital investment (£0.38m) which is not expected to generate a significant number of jobs in the long-term nor result in a discernible effect on the local economy associated with supply chain benefits (e.g. associated with the supply of raw materials and appointment of contractors to undertake the works). Due to the minor volume of vehicle movement associated with site visits and the installation of equipment, it is unlikely that implementation would result in adverse impacts on the road network throughout the Portsmouth DMZ. Overall, this option has been assessed as having a neutral effect on local community wellbeing (SEA Objective 6).

The proposed works would be targeting household water appliances within the operational footprints of domestic properties such that the scale of implementation should not disrupt the use or result in the loss of amenity to proximate recreational activity and sport. The impacts of noise/vibration disturbance and nuisance resulting from installation of new water efficiency equipment is not expected to result in any discernible effects on human health due to the scale and brevity of installation. Overall, implementation of this scheme is not expected to affect drinking water supply, surface water and bathing water quality, or recreation. This option has therefore been assessed as having a neutral effect on health (SEA Objective 7).

The installation of hosepipe trigger nozzles and water butts would require a large volume of raw materials and energy to implement. Using the estimated carbon emissions associated with embodied carbon within the new water efficiency equipment in addition to HGV greenhouse gas emissions as a proxy, material use and energy requirements are considered to be minor, and the option has therefore been assessed as having a negligible effect on this objective. Furthermore, this option would generate construction wastes which would include fuel usage for vehicles. Overall, this option has been assessed as having a neutral effect on sustainable resource use (SEA Objective 8).

The installation of hosepipe trigger nozzles and water butts is expected to be significantly low-impact; specifically, the structural scale of the new devices is expected to be minor, if not indiscernible, such that installation within the operational footprints of domestic properties should have a negligible effect on the visual amenity of historic assets within the general vicinity. Overall, this option has been assessed as having a neutral effect on cultural and historic assets (SEA Objective 9).

The structural scale of hosepipe trigger nozzles and water butts is expected to be minor, if not indiscernible, such that installation should not result in any adverse impacts to the visual or landscape amenity of protected or local settings, e.g. designated national parks, townscapes, seascapes, or AONBs in respect of the negligible scale of construction and the confined nature of these sites within the operational footprints of domestic properties. Overall, this option has been assessed as having a neutral effect on landscape (SEA Objective 10).

Operation

It is assumed that the cumulative effects from installation of hosepipe trigger nozzles/water butts and the provision of annual messages about long-term sustainable garden care to metered Portsmouth Water customers would help further reduce water demand (in respect of gardening) thus 'freeing-up' resources for other customers in addition to improving consumer awareness and proactive behaviour regarding smart and sustainable consumption which would additionally assist in decreasing leakage within the water distribution network. The effect of increased water efficiency on designated nature conservation sites (e.g. SACs, SPAs, Ramsar and SSSIs) and the ecological quality of habitats and associated groundwater/river water bodies is considered to be slightly positive as the increased efficiency reduces demand for additional water resources and increases resilience of existing network; however, the magnitude of change is assessed as neutral.

The utilisation of hosepipe trigger nozzles/water butts and the uptake of water efficiency advice would not have a discernible effect on the appropriate and efficient use of land (SEA Objective 2).

The utilisation of hosepipe trigger nozzles/water butts and the uptake of water efficiency advice by metered customers would likely increase/ensure continuity of water supply through a further reduction of water demand, and subsequently, a reduction of leakage within the water distribution network (the option has a design capacity of 0.06 Ml/d, generating a minor positive effect in respect of water quantity (SEA Objective 3)). Overall, increased water efficiency may protect and slightly enhance the quality and quantity of the surface water environment and the groundwater resource, and/or rates of recharge.

It is considered unlikely that the utilisation of hosepipe trigger nozzles/water butts and the uptake of water efficiency advice would result in and/or exacerbate flooding elsewhere now or in the future. This option has therefore been assessed as having a neutral effect on SEA Objective 4.

As there are no effects on energy consumption and no carbon emissions (0 tCO₂e/year), it is assessed as neutral against SEA Objective 5.

It is assumed that the utilisation of hosepipe trigger nozzles/water butts and the uptake of water efficiency advice by metered customers would assist in further decreasing network leakage through lowered water demand. Operation is therefore likely to increase/ensure continuity of water supply thus helping ensure that a greater volume of water is available for future populations, commercial increases, and any seasonal demands. Notwithstanding, a minor increase of up to 0.06 Ml/d has been assessed as having a neutral effect on the local economy and local community wellbeing (SEA Objective 6).

The scheme should not significantly affect human health by increased noise, nuisance or disruption nor would it affect opportunities for recreation. It is assumed that the cumulative effects of lowered water demand would help increase/ensure continuity of water supply through greater water efficiency. Overall, a minor increase of up to 0.06 Ml/d would help ensure a continual supply of clean drinking water; however, is insufficient to have a substantive effect and overall the option is assessed as having a neutral effect on health (SEA Objective 7).

As there are no effects on energy consumption and no carbon emissions, operation has been assessed as having neutral energy savings. Notwithstanding, a further reduction of water demand by metered customers through more engaged behaviour regarding smart and conscientious water consumption in respect of gardening should facilitate greater leakage reduction (savings up to 0.06 Ml/d). On balance, this option has been assessed as having a minor positive effect on the sustainable use of resources (SEA Objective 8).

There are no discernible risks or clear impact pathways to cultural/historic heritage assets regarding the use of hosepipe trigger nozzles and water butts. This option has therefore been assessed as having a neutral effect on cultural and historic assets (SEA Objective 9).

There are no discernible risks or clear impact pathways to either the visual amenity or character of proximate local and designated landscapes, townscapes, or seascapes such as AONBs or national parks regarding the use of hosepipe trigger nozzles and water butts. This option has therefore been assessed as having a neutral effect on landscape (SEA Objective 10).

Option	Stage	1. Biodiversity	2. Geology and Soils	3. Water Quantity and Quality	4. Flood Risk	5. Climate Change	6. Economic and Social Wellbeing	7. Human Health	8. Waste and Resources	9. Cultural Heritage	10. Landscape
C046 Household water efficiency programme (Partnering approach, home visit)	Construction	0	0	0	0	0	0	0	0	0	0
	Operation	0	0	+	0	+	+	+	+	0	0

Construction

This option would involve the provision of water audits and the installation of water efficiency equipment, e.g. dual flush retrofits, low flow showerheads, shower timers, pair of spray tap inserts, and a hose trigger nozzle (if applicable), for all existing Portsmouth Water customers, metered or unmetered, through a partnership-based implementation programme involving Portsmouth Water and public organisations (Local Authorities, Housing Associations, Energy Saving Trust, etc.). It is expected implementation of the option will improve consumer awareness and proactive behaviour regarding smart and sustainable consumption which would, subsequently, reduce water demand and leakage within the Portsmouth Water District Metering Zone (DMZ). Within the 5 year implementation period, it is predicted that 16,500 social housing units will be eligible for auditing and provision of water efficiency equipment whereas 50% of metered private dwellings and 20% of unmetered properties will agree to participate in the scheme. This option has been assessed on this basis, however, effects would be smaller if customer uptake is less than expected. It is therefore anticipated that up to 1.23 Ml/d of lost water would be saved following the implementation of this option.

The installation of water efficiency equipment is expected to be low-impact; specifically, the proposed works would be targeting water supply infrastructure within the structural footprints of domestic properties, e.g. taps, showers, toilets, etc., which is not expected to have any direct impact pathways to the natural environment. Consequently, installation is expected to have an indiscernible impact on immediate biodiversity, priority habitats, e.g. European designated conservation areas, SSSIs, local nature reserves, and etc., or protected species due to the minor, if not negligible, scale of construction required. Overall, this option has been assessed as having a neutral effect on biodiversity (SEA Objective 1).

The installation of water efficiency equipment within the internal premises of domestic dwellings would target existing water supply infrastructure; consequently, implementation would not require any new land-take. This option has therefore been assessed as having a neutral effect on the appropriate and efficient use of land (SEA Objective 2).

It is not expected that the provision of auditing/verbal water efficiency advice nor the installation of water efficiency equipment within the internal premises of domestic dwellings would affect river flows or groundwater levels, or on water quality, provided best practices are employed. This option has therefore been assessed as having a neutral effect in respect of SEA Objective 3.

The site visits (auditing/provision of verbal water efficiency advice) and the installation of water efficiency equipment have been assessed as having a neutral effect on SEA Objective 4.

The installation of water efficiency equipment in conjunction with auditing/advice provision is expected to generate carbon emissions throughout the implementation period. It is estimated that there would be up to 67,685km travelled per annum in respect of site visits and the installation of water efficiency equipment. It is assumed, however, that vehicle movements could be geographically clustered as appropriate which may help minimise vehicle emissions. Additionally, the provision and installation of new water efficiency equipment would generate carbon emissions arising from embodied carbon within the new equipment (est. 3.38kg CO₂/e). Consequently, this option would generate up to 35 tCO₂e during construction. It is expected that implementation would result in a minor quantity of carbon emissions (depending on the volume of devices installed and the intensity of movement throughout the DMZ) and this has been assessed as having a neutral effect on climate change (SEA Objective 5).

The implementation of the option represents a minor capital investment (£1.14m) which is not expected to generate a significant number of jobs in the long-term nor result in a discernible effect on the local economy associated with supply chain benefits (e.g. associated with the supply of raw materials and appointment of contractors to undertake the works). Due to the moderate volume of vehicle movement associated with site visits and the installation of water efficiency equipment, it is unlikely that implementation would result in adverse impacts on the road network throughout the Portsmouth DMZ. Overall, this option has been assessed as having a neutral effect on local community wellbeing (SEA Objective 6).

The proposed works would be targeting water supply infrastructure within the structural footprints of domestic properties such that the scale of implementation should not disrupt the use or result in the loss of amenity to proximate recreational activity and sport. The impacts of noise/vibration disturbance and nuisance resulting from installation of new water efficiency equipment is not expected to result in any discernible effects on human health due to the scale and brevity of installation. Overall, implementation of this scheme is not expected to affect drinking water supply, surface water and bathing water quality, or recreation. This option has therefore been assessed as having a neutral effect on health (SEA Objective 7).

The provision of auditing/water efficiency advice in conjunction with the installation of new water efficiency equipment would require a minor volume of raw materials and energy to implement. Using the estimated carbon emissions associated with the embodied carbon within new equipment in addition to HGV greenhouse gas emissions as a proxy, material use and energy requirements are considered to be negligible, and the option has therefore been assessed as having a neutral effect on this objective. Furthermore, this option would generate construction wastes which would include fuel usage for vehicles. Overall, this option has been assessed as having a neutral effect on sustainable resource use (SEA Objective 8).

The installation of new water efficiency equipment is expected to be significantly low-impact; specifically, the structural scale of the new devices is expected to be minor, if not indiscernible, such that installation within the structural footprints of domestic properties should have a negligible effect on the visual amenity of historic assets within the general vicinity. In respect of devices installed within Listed Buildings, equipment would be installed on modern elements such as washrooms, and would not adversely affect the fabric of the building. Overall, this option has been assessed as having a neutral effect on cultural and historic assets (SEA Objective 9).

The structural scale of the water efficiency equipment is expected to be minor, if not indiscernible, such that installation should not result in any adverse impacts to the visual or landscape amenity of protected or local settings, e.g. designated national parks, townscapes, seascapes, or AONBs in respect to the confined nature of these sites within the structural footprints of domestic dwellings. Overall, this option has been assessed as having a neutral effect on landscape (SEA Objective 10).

Operation

It is assumed that the combined effect from water auditing, installation of water efficiency equipment, and the uptake of water efficiency advice by eligible Portsmouth Water customers should either increase engaged behaviour regarding smart and conscientious water consumption for non-metered customers or further reinforce such behaviour for those previously metered. Consequently, operation is expected decrease water demand in the Portsmouth Water DMZ which should facilitate a greater reduction of leakage within the water distribution network. The effect of increased water efficiency on designated nature conservation sites (e.g. SACs, SPAs, Ramsar and SSSIs) and the ecological quality of habitats and associated groundwater/river water bodies is considered to be slightly positive as the increased efficiency reduces demand for additional water resources and increases resilience of existing network; however, the magnitude of change is assessed as neutral.

The utilisation of water efficiency equipment and the uptake of water efficiency advice would not have a discernible effect on the appropriate and efficient use of land (SEA Objective 2).

The utilisation of water efficiency equipment and the uptake of water efficiency advice by customers would likely increase/ensure continuity of water supply through a reduction of water demand, and furthermore, a reduction of leakage within the water distribution network (the option has a design capacity of 1.23 Ml/d, generating a minor positive effect in respect of water quantity (SEA Objective 3)). Overall, increased water efficiency may protect and slightly enhance the quality and quantity of the surface water environment and the groundwater resource, and/or rates of recharge.

It is considered unlikely that the utilisation of water efficiency equipment and the uptake of water efficiency advice would result in and/or exacerbate flooding elsewhere now or in the future. This option has therefore been assessed as having a neutral effect on SEA Objective 4.

Once the installation of water efficiency equipment is complete, the cumulative effects of reduced leakage and greater water efficiency may result in a large reduction of energy required to process and pump water (-648 tCO₂e/year). Overall, the reduction of net operational greenhouse gas emissions in respect of energy savings is considered a notable benefit; consequently, this option has been assessed as having a positive effect on climate change (SEA Objective 5).

It is assumed that the utilisation of water efficiency equipment and the uptake of water efficiency advice by eligible customers would assist in decreasing network leakage through lowered water demand. Operation is therefore likely to increase/ensure continuity of water supply thus helping ensure that a greater volume of water is available for future populations, commercial increases, and any seasonal demands. Overall, an increase of up to 1.23 Ml/d would have a minor positive effect on the local economy and local community wellbeing (SEA Objective 6).

The scheme should not significantly affect human health by increased noise, nuisance or disruption nor would it affect opportunities for recreation. It is assumed that the cumulative effects of lowered water demand would help increase/ensure continuity of water supply through greater water efficiency. Overall, an increase of up to 1.23 Ml/d would help ensure a continual supply of clean drinking water, generating a minor positive effect on health (SEA Objective 7).

No significant amount of resources or energy would be required once the installation of the water efficiency equipment is complete. As illustrated by the scale of operational carbon savings associated with reduced treatment and pumping of water (-648 tCO₂e/year), operation has been assessed as having notable energy savings. Additionally, a reduction of water demand by eligible customers through more engaged behaviour regarding smart and conscientious water consumption should facilitate leakage reduction (savings up to 1.23 Ml/d). On balance, this option has been assessed as having a positive effect on the sustainable use of resources (SEA Objective 8).

There are no discernible risks or clear impact pathways to cultural/historic heritage assets regarding the use of water efficiency equipment. This option has therefore been assessed as having a neutral effect on cultural and historic assets (SEA Objective 9).

There are no discernible risks or clear impact pathways to either the visual amenity or character of proximate local and designated landscapes, townscapes, or seascapes such as AONBs or national parks regarding the use of water efficiency equipment. This option has therefore been assessed as having a neutral effect on landscape (SEA Objective 10).

Option	Stage	1. Biodiversity	2. Geology and Soils	3. Water Quantity and Quality	4. Flood Risk	5. Climate Change	6. Economic and Social Wellbeing	7. Human Health	8. Waste and Resources	9. Cultural Heritage	10. Landscape
C084 Void metering	Construction	0	0	0	0	-	0	0	-	0	0
	Operation	0	0	+	0	+	0	0	+	0	0

Construction

This option involves the installation of external meters (and assumes that there is no access to properties with no occupant). Metering voids enables better assessments of leakage and estimates of illegal use from void properties. The option would start in 2020/21 and runs through to 2044/45 and is estimated that 5,672 meters would be installed. It is anticipated that up to 0.28 MI/d of lost water would be saved following the implementation of this option.

The proposed works would involve the installation of meters, and whilst it is assumed no access to the property will be gained, implementation would occur within the existing operational footprints of domestic properties which may encompass a wide range of urban, semi-rural, and rural settings. It is unlikely, however, that construction would have any discernible impacts on immediate biodiversity, priority habitats, e.g. European designated conservation areas, SSSIs, local nature reserves, and etc., or protected species due to the minor to negligible scale of construction associated with implementation. Overall, this option has been assessed as having a neutral effect on biodiversity (SEA Objective 1).

The installation of meter infrastructure would take place within the operational footprints of domestic premises; consequently, implementation would not require any new land-take. This option has therefore been assessed as having a neutral effect on the appropriate and efficient use of land (SEA Objective 2).

It is not expected that the upgrading of existing metering infrastructure would affect river flows or groundwater levels, or on water quality, provided best practices are employed. This option has therefore been assessed as having a neutral effect in respect of SEA Objective 3.

It is assumed that works could be scheduled to avoid periods of flooding should there be a risk. Furthermore, it is considered highly unlikely that implementation of the scheme would result in and/or exacerbate flooding elsewhere now or in the future. This option has therefore been assessed as having a neutral effect on SEA Objective 4.

The installation of metering infrastructure is expected to generate carbon emissions throughout the implementation period. It is estimated that there would be 3,600 km/a from vehicle movements which corresponds with site visits and the installation works. It is assumed, however, that vehicle movements could be clustered as appropriate which may help minimise vehicle emissions. Additionally, the provision and installation of 5,672 new meters would generate carbon emissions arising from embodied carbon within the new meters (5.05kg CO₂/e) and from vehicle emissions. Consequently, this option would generate up to 176 tCO₂e during construction which has been assessed as having a minor negative effect on climate change (SEA Objective 5).

The option is expected to represent a low capital investment (£1.4m) which is not expected to generate a significant number of jobs in the long-term nor result in a discernible effect on the local economy associated with supply chain benefits (e.g. associated with the supply of raw materials and appointment of contractors to undertake the works). Due to the modest volume of vehicle movement associated with site visits and the installation of meters, it is unlikely that implementation would result in adverse impacts on the road network throughout the Portsmouth Water DMZ. Overall, this option has been assessed as having a neutral effect on local community wellbeing (SEA Objective 6).

The proposed works would be contained within the operational footprints of domestic premises such that the scale of implementation should not disrupt the use or result in the loss of amenity to proximate recreational activity and sport. The impacts of noise/vibration disturbance and nuisance resulting from the installation of new meters is not expected to result in any discernible effects on human health due to the scale and brevity of installation. Overall, implementation of this scheme is not expected to affect drinking water supply, surface water and bathing water quality, or recreation. This option has therefore been assessed as having a neutral effect on health (SEA Objective 7).

The installation of new meters would require a raw materials and energy to implement. Using the estimated carbon emissions associated with the embodied carbon within new meters in addition to vehicle greenhouse gas emissions as a proxy, material use and energy requirements are considered to be notable, and the option has therefore been assessed as having a minor negative effect on this objective. Furthermore, this option would generate construction wastes which may include infrastructural waste (original meter infrastructure) in addition to fuel usage for vehicles. Overall, this option has been assessed as having a minor negative effect on sustainable resource use (SEA Objective 8).

Whilst it is unknown which properties would be affected, it is expected that the installation of new metering infrastructure will be low-impact. Installation will take place within the operational footprint of domestic sites and should have a negligible effect on the structural integrity and visual amenity of historic assets within the general vicinity. Overall, this option has been assessed as having a neutral effect on cultural and historic assets (SEA Objective 9).

The structural scale of the new meters is expected to be minor such that installation should not result in any adverse impacts to the visual or landscape amenity of protected or local settings, e.g. designated national parks, townscapes, seascapes, or AONBs, due to the assumed low-intensity scale of construction in addition to the confined nature of these sites within operational footprints of domestic sites. Overall, this option has been assessed as having a neutral effect on landscape (SEA Objective 10).

Operation

It is assumed that the use of meters by customers would decrease water demand (by improving assessments of leakage and estimates of illegal use from void properties). The effect of increased water efficiency on designated nature conservation sites (e.g. SACs, SPAs, Ramsar and SSSIs) and the ecological quality of habitats and associated groundwater/river water bodies is considered to be slightly positive as the increased efficiency reduces demand for additional water resources and increases resilience of existing network; however, the magnitude of change is assessed as neutral.

The utilisation of metering would not have a discernible effect on the appropriate and efficient use of land (SEA Objective 2).

The utilisation of void metering would likely increase/ensure continuity of water supply, and a reduction of leakage within the water distribution network (the option has a design capacity of 0.28MI/d), generating a minor positive effect in respect of water quantity (SEA Objective 3). Overall, increased water efficiency may protect and slightly enhance the quality and quantity of the surface water environment and the groundwater resource, and/or rates of recharge.

It is considered unlikely that the utilisation of metering would result in and/or exacerbate flooding elsewhere now or in the future. This option has therefore been assessed as having a neutral effect on SEA Objective 4.

Once the installation of new meters is complete, the cumulative effects of reduced leakage and greater water efficiency through lowered water demand by previously metered domestic customers is anticipated to result in a minor reduction of energy required to process and pump water (-151tCO₂e/year). Operational carbon emissions from vehicle movement will be small (arising from movements that start in 2020/21 at 974km rising to 22,668km/ per annum in 2044/45) in respect of meter readings. Overall, the reduction of net operational greenhouse gas emissions in respect of energy savings is assessed as having a minor positive effect on climate change (SEA Objective 5).

It is assumed that the use of metering of void properties would assist in decreasing network leakage through lowered water demand which should help reduce water loss in the Portsmouth Water DMZ. Operation is therefore likely to increase/ensure continuity of water supply thus helping ensure that a greater volume of water is available for future populations, commercial increases, and any seasonal demands. However, an increase of up to 0.28 MI/d is insufficient to have a substantive effect and overall the option is assessed as having a neutral effect on the local economy and local community wellbeing (SEA Objective 6).

The scheme should not significantly affect human health by increased noise, nuisance or disruption nor would it affect opportunities for recreation. It is assumed that the cumulative effects of lowered water demand would help increase/ensure continuity of water supply through water efficiency. Overall, an increase of up to 0.28 MI/d would help ensure a continual supply of clean drinking water, however, is insufficient to have a substantive effect and overall the option is assessed as having a neutral effect on health (SEA Objective 7).

No significant amount of resources or energy would be required once the upgrading of prior metering infrastructure to metering is complete. As illustrated by the scale of operational carbon savings associated with reduced treatment and pumping of water (-151tCO₂e/year), operation has been assessed as having minor energy savings. Notwithstanding, a further decrease in water demand from previously metered domestic properties should facilitate greater leakage reduction within the water distribution network. On balance, this option has been assessed as having a minor positive effect on the sustainable use of resources (SEA Objective 8).

There are no discernible risks or clear impact pathways to cultural/historic heritage assets regarding the use of metering. This option has therefore been assessed as having a neutral effect on cultural and historic assets (SEA Objective 9).

There are no discernible risks or clear impact pathways to either the visual amenity or character of proximate local and designated landscapes, townscapes, or seascapes such as AONBs or national parks regarding the use of SMART metering. This option has therefore been assessed as having a neutral effect on landscape (SEA Objective 10).

Option	Stage	1. Biodiversity	2. Geology and Soils	3. Water Quantity and Quality	4. Flood Risk	5. Climate Change	6. Economic and Social Wellbeing	7. Human Health	8. Waste and Resources	9. Cultural Heritage	10. Landscape
D004a Leak detection - Deploy permanent noise loggers (25% coverage)	Construction	0/?	0	0	0	0/?	0	0/?	0	0	0
	Operation	0	0	+	0	+	+	+	+	0	0
Construction <p>This option would involve the installation of magnetic acoustic loggers within the water network which would, following a period of calibration, detect and pinpoint any emerging leakages within the network in order to reduce detection costs, leak run times and safety hazards for personnel. This would cover approximately 25% of the network, located in leakage 'hotspot' areas. Access for the installation of magnetic acoustic loggers would be via existing mains access and it is assumed that no excavation works would be required. There would be a fortnightly collection of data from data loggers leading to approximately 10,600km per annum of distance travelled. The scope and extent of leakage reduction is currently unknown at this stage; however, it is assumed that leakage identification and pipeline repair work would be localised, although potential dispersed across the Portsmouth Water operational area.</p> <p>The installation of the magnetic acoustic logger would have no effects on biodiversity. It is possible that works would be undertaken within or in close proximity to locations important for biodiversity (including designated sites) which may impact on priority habitats and protected species (through short term, temporary disturbance caused by excavation) in these instances. However, areas affected will have been previously disturbed and it would be expected that adverse effects would be reduced where possible using best practice construction techniques. Overall, given that the location of leaks to be repaired is unknown, an uncertain effect on biodiversity is identified at this stage (SEA Objective 1).</p> <p>There would be no new land take associated with this option and therefore effects on soils/land use (SEA Objective 2) are expected to be negligible with any soil displaced through excavation returned following the completion of works.</p> <p>Water quantity and quality are unlikely to be affected by the process of logger installation, monitoring and subsequent leakage repair and in consequence there would be no effects (SEA Objective 3).</p> <p>The installation of the magnetic acoustic logger would have no effects on flood risk. The exact location of leakage repairs is not yet known and therefore it cannot be determined whether repair work would be located in areas at risk of flooding. However, it is assumed that works could be scheduled to avoid periods of flooding and construction work is not expected to cause or exacerbate flooding elsewhere (SEA Objective 4).</p> <p>The implementation of this option would result in an increase in greenhouse gas emissions arising from embodied carbon associated with new pipeline and emissions from plant and vehicle movements to find and repair leaking mains. Embodied and construction carbon emissions are estimated at 9 tonnes CO₂e for the loggers, with a further emissions associated with the 10,600km of vehicle</p>											

movements. The embodied carbon associated with repairs and any mains replacement have not been quantified at this stage. Due to the scale of the quantified emissions, overall the effects have been assessed as a neutral, although some uncertainty remains (SEA Objective 5).

The implementation of the option represents a minor capital investment (£2.38m, which includes costs for an assumed 5,495 loggers but excludes any subsequent leakage repairs) which is not expected to generate a significant number of jobs in the long-term nor result in a discernible effect on the local economy associated with supply chain benefits (e.g. associated with the supply of raw materials and appointment of contractors to undertake the works). Due to the limited number of vehicle movement associated with installation, it is unlikely that implementation would result in adverse impacts on the road network. Overall, this option has been assessed as having a neutral effect on local community wellbeing (SEA Objective 6).

Vehicle movements associated with monitoring and the operation of plant associated with leak detection and repair may affect local air quality and generate noise/vibration disturbance. There may also be localised disruption to supply as leakage repairs are completed. However, such impacts would be temporary and are likely to be managed such that effect on human health (SEA Objective 7) has been assessed as neutral (with some residual uncertainty to reflect the unknown locations where activities could take place).

The provision of data loggers would require a minor volume of raw materials and energy to implement. Using the estimated embodied carbon within the data loggers in addition to HGV greenhouse gas emissions as a proxy, material use and energy requirements are considered to be negligible, and the option has therefore been assessed as having a neutral effect on this objective. Furthermore, this option would generate small quantities of wastes associated with leakage repair. Overall, this option has been assessed as having a neutral effect on sustainable resource use (SEA Objective 8).

The installation of data loggers is not expected to have any effects on historic assets. The repair of pipes may involve carrying out works in the curtilage or grounds of heritage assets but this would be temporary and managed through appropriate mitigation. Overall, this option has been assessed as having a neutral effect on cultural and historic assets (SEA Objective 9).

The installation of data loggers is not expected to have any effects on historic assets. The repair of pipes should not result in any adverse impacts to the visual or landscape amenity of protected or local settings, e.g. designated national parks, townscapes, seascapes, or AONBs in respect to the confined nature of these sites within the structural footprints of domestic dwellings. Overall, this option has been assessed as having a neutral effect on landscape (SEA Objective 10).

Operation

Once a leak has been repaired, the option is not expected to have any effects on biodiversity or on soils and land use (SEA Objectives 1 and 2).

Operation of this option will result in a reduction in demand for water (4.9 MI/d) as a result of reduced leakage. This has been assessed as having a positive effect on water quantity and quality (SEA Objective 3).

The operation of the option will not cause, exacerbate or mitigate flood risk (SEA Objective 4).

The operation of this option would result in a decrease in demand for water abstraction and may therefore help reduce greenhouse gas emissions associated with reduced treatment and pumping of water. The reduction in greenhouse gas emissions associated with this option estimated at 26 tonnes CO₂e/a once fully implemented. The predicted effects of climate change (including drier summers) mean that this option would also positively contribute to climate change adaptation by increasing water supply. Overall, this has been assessed as having a positive effect on climate change (SEA Objective 5).

This option would involve 'low' operational expenditure (estimated at £0.21m per year) which has been assessed against the definitions of significance as being of insufficient scale to have an effect on the local economy (through job creation). However, a water saving of up to 4.9MI/d would have a positive effect on the local economy and local community wellbeing (SEA Objective 6).

No noise, nuisance or disruption are expected during operation of the option. Water savings of up to 4.9 MI/d would have a positive effect on human health by helping to secure drinking water supply (SEA Objective 7).

The option would result in lower energy use during operation and lead to a reduction in leakage (savings up to 4.9 MI/d). On balance, this option has been assessed as having a positive effect on the sustainable use of resources (SEA Objective 8).

No effects on built or natural heritage assets are expected during the operation of this option (SEA Objective 9).

No effect on landscape character is expected during the operation of this option as no above-ground additional infrastructure is required (SEA Objective 10).

Option	Stage	1. Biodiversity	2. Geology and Soils	3. Water Quantity and Quality	4. Flood Risk	5. Climate Change	6. Economic and Social Wellbeing	7. Human Health	8. Waste and Resources	9. Cultural Heritage	10. Landscape
D004b Leak detection - Deploy permanent noise loggers (75% coverage)	Construction	0/?	0	0	0	0/?	+	-/?	0	0	0
	Operation	0	0	+	0	+	+	+	++	0	0

Construction

This option would involve the installation of magnetic acoustic loggers within the water network which would, following a period of calibration, detect and pinpoint any emerging leakages within the network in order to reduce detection costs, leak run times and safety hazards for personnel. This would cover approximately 75% of the network, located across the network. Access for the installation of magnetic acoustic loggers would be via existing mains access and it is assumed that no excavation works would be required. There would be a fortnightly collection of data from data loggers leading to approximately 29,400km per annum of distance travelled. The scope and extent of leakage reduction is currently unknown at this stage; however, it is assumed that leakage identification and pipeline repair work would be localised, although potential extensive across the Portsmouth Water operational area.

The installation of the magnetic acoustic logger would have no effects on biodiversity. It is possible that works would be undertaken within or in close proximity to locations important for biodiversity (including designated sites) which may impact on priority habitats and protected species (through short term, temporary disturbance caused by excavation) in these instances. However, areas affected will have been previously disturbed and it would be expected that adverse effects would be reduced where possible using best practice construction techniques. Overall, given that the location of leaks to be repaired is unknown, a neutral/uncertain effect on biodiversity is identified at this stage (SEA Objective 1).

There would be no new land take associated with this option and therefore effects on soils/land use (SEA Objective 2) are expected to be negligible with any soil displaced through excavation returned following the completion of works.

Water quantity and quality are unlikely to be affected by the process of logger installation, monitoring and subsequent leakage repair and in consequence there would be no effects (SEA Objective 3).

The installation of the magnetic acoustic logger would have no effects on flood risk. The exact location of leakage repairs is not yet known and therefore it cannot be determined whether repair work would be located in areas at risk of flooding. However, it is assumed that works could be scheduled to avoid periods of flooding and construction work is not expected to cause or exacerbate flooding elsewhere (SEA Objective 4).

The implementation of this option would result in an increase in greenhouse gas emissions arising from embodied carbon associated with new pipeline and emissions from plant and vehicle movements to find and repair leaking mains. Embodied and construction carbon emissions are estimated at 27 tonnes CO₂e for the loggers, with a further emissions associated with the 29,400km of vehicle movements. The embodied carbon associated with repairs and any mains replacement have not been quantified at this stage. Due to the scale of the quantified emissions, overall the effects have been assessed as a neutral, although some uncertainty remains (SEA Objective 5).

The implementation of the option represents a medium capital investment (£9.2m, which includes costs for an assumed 16,485 loggers but excludes any subsequent leakage repairs) which is expected to generate a number of jobs and have a positive effect on the local economy associated with supply chain benefits. Due to the number of vehicle movement associated with installation, it is unlikely that implementation would result in adverse impacts on the road network. Overall, this option has been assessed as having a positive effect on local community wellbeing (SEA Objective 6).

Vehicle movements associated with monitoring and the operation of plant associated with leak detection and repair may affect local air quality and generate noise/vibration disturbance. There may also be localised disruption to supply as leakage repairs are completed. Whilst such impacts would be temporary and are likely to be managed, the potential scale of interventions is such that effect on human health (SEA Objective 7) has been assessed as negative with some uncertainty.

The provision of data loggers would require a minor volume of raw materials and energy to implement. Using the estimated embodied carbon within the data loggers in addition to HGV greenhouse gas emissions as a proxy, material use and energy requirements are considered to be negligible, and the option has therefore been assessed as having a neutral effect on this objective. Furthermore, this option would generate small quantities of wastes associated with leakage repair. Overall, this option has been assessed as having a neutral effect on sustainable resource use (SEA Objective 8).

The installation of data loggers is not expected to have any effects on historic assets. The repair of pipes may involve carrying out works in the curtilage or grounds of heritage assets but this would be temporary and managed through appropriate mitigation. Overall, this option has been assessed as having a neutral effect on cultural and historic assets (SEA Objective 9).

The installation of data loggers is not expected to have any effects on historic assets. The repair of pipes should not result in any adverse impacts to the visual or landscape amenity of protected or local settings, e.g. designated national parks, townscape, seascapes, or AONBs in respect to the confined nature of these sites within the structural footprints of domestic dwellings. Overall, this option has been assessed as having a neutral effect on landscape (SEA Objective 10).

Operation

Once a leak has been repaired, the option is not expected to have any effects on biodiversity or on soils and land use (SEA Objectives 1 and 2).

Operation of this option will result in a reduction in demand for water (9.8 MI/d) as a result of reduced leakage. Using the definitions of significance, this has been assessed as having a positive effect on water quantity and quality (SEA Objective 3).

The operation of the option will not cause, exacerbate or mitigate flood risk (SEA Objective 4).

The operation of this option would result in a decrease in demand for water abstraction and may therefore help reduce greenhouse gas emissions associated with reduced treatment and pumping of water. The reduction in greenhouse gas emissions associated with this option estimated at 48 tonnes CO₂e/a once fully implemented. The predicted effects of climate change (including drier summers) mean that this option would also positively contribute to climate change adaptation by increasing water supply. Overall, this has been assessed as having a positive effect on climate change (SEA Objective 5).

This option would involve 'low' operational expenditure (estimated at £0.62m per year) which has been assessed against the definitions of significance as being of insufficient scale to have an effect on the local economy (through job creation). However, a water saving of up to 9.8MI/d would have a positive effect on the local economy and local community wellbeing (SEA Objective 6).

No noise, nuisance or disruption are expected during operation of the option. Water savings of up to 9.8 MI/d would have a positive effect on human health by helping to secure drinking water supply (SEA Objective 7).

The option would result in lower energy use during operation and lead to a reduction in leakage (savings up to 9.8 MI/d). This option has been assessed as having a significant positive effect on the sustainable use of resources (SEA Objective 8).

No effects on built or natural heritage assets are expected during the operation of this option (SEA Objective 9).

No effect on landscape character is expected during the operation of this option as no above-ground additional infrastructure is required (SEA Objective 10).

Option	Stage	1. Biodiversity	2. Geology and Soils	3. Water Quantity and Quality	4. Flood Risk	5. Climate Change	6. Economic and Social Wellbeing	7. Human Health	8. Waste and Resources	9. Cultural Heritage	10. Landscape
D005 Leak detection – Partial district metering	Construction	0/?	0	0	0	-	0	-/?	-	0	0/?
	Operation	0	0	+	0	+	+	+	+	0	0

Construction

The option would involve the installation of additional district meters throughout the distribution network leading to partial coverage over a 4 year implementation. The partial expansion of district metering would enable an increased detection rate of leakage within Portsmouth Water's distribution network via improved flow monitoring. Active leakage control (ALC) operations would subsequently follow the installation of the additional meters in respect of identifying, reducing, and maintaining network leakages. It is anticipated that up to 5 Ml/d of lost water would be saved following the implementation of this option.

Construction activity associated with the installation/replacement of metering infrastructure is not expected to have any significant impacts on biodiversity, priority habitats, and/or protected species. Because meters require access to water supply points, installation would occur within the operational footprints of existing water infrastructure thus reducing potential impact pathways. Although targeted sites may encompass a wide range of urban, semi-rural, and rural settings, it is unlikely construction would have any discernible impacts on immediate ecological receptors due to the minor scale of required construction. Similarly, leakage surveying and repairs would occur across the Portsmouth Water District Metering Zone (DMZ) which may contain designated and protected habitats. It is assumed, however, that repair works are likely to focus on areas where the distribution network is most dense (under roads, tracks, and/or footpaths), and will be in locations where ground has been disturbed in the past which should also limit impact pathways to sensitive ecological receptors. Furthermore, ALC operation would require excavation, repair work, and land reinstatement within a fixed period of time which suggests the scale of work would be minor and of short duration. Overall, leakage repair may result in temporary localised nuisance such as noise disturbance but it is expected that site-specific mitigation procedures and established best practice would prevent any adverse effects. Overall, this option has been assessed as having a neutral effect on Objective 1 though uncertainty remains.

The installation/replacement of meters would be confined within the operational footprints of existing water infrastructure whereas ALC operation would target existing pipeline infrastructure; consequently, neither would require any new land intake. Furthermore, all excavated land would be reinstated following the construction period such that any disruption would be temporary. This option has therefore been assessed as having a neutral effect on the appropriate and efficient use of land (SEA Objective 2).

It is not expected that the installation of metering infrastructure nor leakage identification and repair would affect river flows or groundwater levels, or on water quality, provided best practices are adhered to and mitigation implemented (such as dust suppression, soil containment and emergency response procedures). This option has therefore been assessed as having a neutral effect in respect of SEA Objective 3.

Although the potential locations of new meters and compromised pipelines requiring repair are currently unknown, it is assumed that works could be scheduled to avoid periods of flooding should there be a risk. Furthermore, it is considered highly unlikely that application of the scheme would result in and/or exacerbate flooding elsewhere now or in the future. This option has therefore been assessed as having a neutral effect on SEA Objective 4.

The installation of district meters and subsequent ALC operations are expected to generate minor carbon emissions throughout the implementation period. It is estimated that there would be up to 702km per annum travelled in respect of meter and ancillary valve installation, 1600km per annum travelled for ALC leakage surveys, and 1800km per annum travelled for trans repairs over the 4 year implementation period. It is assumed, however, that vehicle movements could be clustered as appropriate which may help minimise vehicle emissions. Additionally, it is assumed that the installation of new infrastructure and cumulative leakage surveys/repairs would result in residual increases of carbon emission in respect to the operation of plant machinery and embodied carbon within new meters (5.05kg CO₂e), valves (6.44kg CO₂e), and pipelines. Consequently, this option would generate up to 156 tCO₂e during construction. Overall, it is expected that implementation would result in a minor quantity of carbon emissions (depending on the volume of meters/valves installed and/or replaced, length of pipeline targeted for leakage repair, and the intensity of movement throughout the DMZ) which has been assessed as having a minor negative effect on climate change (SEA Objective 5).

The option is expected to represent a low capital investment (£0.97m) which is not expected to generate a significant number of jobs in the long-term nor result in a discernible effect on the local economy associated with supply chain benefits (e.g. associated with the supply of raw materials and appointment of contractors to undertake the works). Due to the minor volume of vehicle movement associated with the installation/replacement of meters and ALC operation, e.g. leakage surveying, it is unlikely that implementation would result in adverse impacts on the road network throughout the Portsmouth DMZ. Overall, this option has been assessed as having a neutral effect on local community wellbeing (SEA Objective 6).

The assumed scale of construction regarding the installation/replacement of meters is expected to be very minor / low-impact such that works within the operational footprints of existing water infrastructure should not disrupt the use or result in the loss of amenity to proximate recreational activity and sport. Furthermore, associated noise disturbance and nuisance resulting from installation of meters is not expected to result in any discernible effect on human health due to the scale and brevity of installation. The identification and repair of network leakages may result in minor localised adverse effects on human health regarding noise disturbance and adverse air quality impacts (dust) depending on the scale, duration, and proximity of the works to sensitive receptors. Overall, implementation of this scheme is not expected to affect drinking water supply, surface water and bathing water quality, or recreation. This option has therefore been assessed as having an uncertain though potentially minor negative effect on health (SEA Objective 7).

This option comprises several infrastructural components including new meters and ancillary valves and water pipes which would require a notable volume of raw materials and energy to implement. Using the estimated carbon emissions associated with the embodied carbon within the new devices and pipes as a proxy (156 tCO₂e), material use and energy requirements are considered to be minor, and the option has therefore been assessed as having a negative effect on this objective. Furthermore, this option would generate construction wastes which may include excavation waste and infrastructural waste (original piping and meters) in addition to fuel usage for vehicles and plant. Overall, this option has been assessed as having a negative effect on sustainable resource use (SEA Objective 8).

It is not expected that the installation/replacement of meters nor ALC operation would adversely affect cultural and historic heritage assets. Specifically, meter installation is expected to be significantly low-impact, and furthermore, the structural scale of these devices is expected to be minor such that installation should have negligible effect on the structural integrity and visual amenity of historic assets within their general vicinity. Pipelines targeted for investigation and subsequent repair could be within or immediately adjacent to the curtilage of scheduled monuments or Listed Buildings which could result in the temporary loss of visual amenity to their settings though it is assumed that the process of fixing a leak is relatively minor and of short duration. Furthermore, these sites would have been previously disturbed regarding the initial installation of pipelines thus it is assumed site-specific mitigation procedures have already been established. Overall, this option has been assessed as having a neutral effect on Objective 11.

It is not expected that the installation/replacement of meters nor ALC operation would adversely affect the visual amenity and accessibility of protected/designated landscapes, townscapes or seascapes such as AONBs or Conservation Areas. The installation of meters is expected to be significantly low-impact, and furthermore, the structural scale of these devices is expected to be minor such that installation should have a negligible effect on the visual amenity of protected and/or proximate local settings. Pipelines targeted for investigation and subsequent repair/replacement could be within a combination of urban, semi-rural, and rural settings; however, it is assumed that leakage repair would primarily target areas where the distribution network is densest which suggests minor impact pathways to the visual amenity and accessibility of proximate landscapes and settings. Furthermore, leakage reduction sites within designated landscapes would have been previously disturbed during the initial installation of the pipelines thus it is assumed site-specific mitigation procedures have already been established. This option has therefore been assessed as having a neutral effect with some uncertainty on SEA Objective 10.

Operation

It is assumed that the increased rate of leakage detection and reduction through the combined utilisation of flow monitoring and ALC operation would reduce water loss within the Portsmouth Water DMZ, and furthermore, improve the overall efficiency of the water distribution network. The effect of increased water efficiency on designated nature conservation sites (e.g. SACs, SPAs, Ramsar and SSSIs)

and the ecological quality of habitats is considered to be slightly positive as the increased efficiency reduces demand for additional water resources and increases resilience of existing network; however, the magnitude of change is very slight and overall the effect is assessed as neutral.

The increased utilisation of district metering together with the identification and reduction/maintenance of network leakages would not have a discernible effect on the appropriate and efficient use of land (SEA Objective 2).

Operation of the option is likely to increase/ensure continuity of water supply through the detection and reduction/maintenance of network leakage (the option has a design capacity of 5 MI/d, generating a positive effect in respect of water quantity (SEA Objective 3)). In general, increased water efficiency may protect and slightly enhance the quality and quantity of the surface water environment and the groundwater resource, and/or rates of recharge.

It is considered unlikely that the utilisation of district metering together with the identification and reduction/maintenance of network leakages would result in and/or exacerbate flooding elsewhere now or in the future. This option has therefore been assessed as having a neutral effect on SEA Objective 4.

Once the installation of additional district meters is complete, the cumulative effects of increased flow monitoring in conjunction with the continuous reduction and maintenance of network leakages should result in a significant reduction of energy required to process and pump water (43.8m kWh/a). Although continuous ALC operation, e.g. surveys and pipeline repairs, throughout the operation period will generate carbon emissions in respect of vehicle movement (3,400km travelled per annum), potential effects are expected to be minor. Overall, the reduction of net operational greenhouse gas emissions (25 tCO₂e/a) in respect of energy savings due to the reduction of network water loss is considered to be a benefit. The predicted effects of climate change (including drier summers) mean that this option would also positively contribute to climate change adaptation by increasing water supply. This option has therefore been assessed as having a positive effect on climate change (SEA Objective 5).

It is assumed that the increased rate of leakage detection and reduction through the combined utilisation of flow monitoring and ALC operation would reduce water loss within the Portsmouth Water DMZ, and furthermore, improve the overall efficiency of the water distribution network. Operation is therefore likely to increase continuity of water supply thus helping ensure that a greater volume of water is available for future populations, commercial increases, and any seasonal demands. Overall, a water saving of up to 5MI/d would have a positive effect on the local economy and local community wellbeing (SEA Objective 6).

The operation of the scheme should not significantly affect human health by increased noise, nuisance or disruption nor would it affect opportunities for recreation. Continued ALC operation, e.g. leakage identification and repair/maintenance, on targeted pipelines could result in temporary disturbance and/or nuisance to sensitive receptors though this is expected to be minor if not negligible. It is assumed that the cumulative effects of lowered network leakage would help increase/ensure continuity of water supply through improved efficiency of the water distribution network. Overall, a saving of up to 5MI/d would help ensure a continual supply of clean drinking water, generating a positive effect on health (SEA Objective 7).

No significant amount of resources or energy would be required following the implementation of the scheme. Resource/energy use associated with the continued reduction/maintenance of network leakage via periodic identification and repairing of former and/or new leaks is expected to be minor, if not negligible. As illustrated by the scale of operational carbon savings associated with reduced treatment and pumping of water (25 tCO₂e/year), benefits have been assessed as notable. Additionally, the saving of up to 5 MI/d would help increase/ensure continuity of water supply through increased efficiency of the distribution network. This option has therefore been assessed as having a positive effect on the sustainable use of resources (SEA Objective 8).

There are no discernible risks or clear impact pathways to cultural/historic heritage assets in respect to leakage detection and reduction through the combined utilisation of flow monitoring and ALC operation. Although periodic leakage surveying and maintenance work would occur throughout the operational period, the scale of construction is expected to be minor, if not negligible. This option has therefore been assessed as having a neutral effect on cultural and historic assets (SEA Objective 9).

There are no discernible risks or clear impact pathways to either the visual amenity or character of proximate local and designated landscapes, townscapes, or seascapes such as AONBs or national parks in respect to leakage detection and reduction through the combined utilisation of flow monitoring and ALC operation. Although periodic leakage surveying and maintenance work would occur throughout the operational period, the scale of construction during this stage is expected to be negligible in comparison to initial ALC operation. This option has therefore been assessed as having a neutral effect on landscape (SEA Objective 10).

Option	Stage	1. Biodiversity	2. Geology and Soils	3. Water Quantity and Quality	4. Flood Risk	5. Climate Change	6. Economic and Social Wellbeing	7. Human Health	8. Waste and Resources	9. Cultural Heritage	10. Landscape
D011 Leak detection – Full district metering	Construction	0/?	0	0	0	--	+/?	-/?	--	0	0/?
	Operation	0	0	+	0	+	+	+	++	0	0

Construction

The option would involve the installation of additional district meters throughout the distribution network leading to full coverage over a 10 year implementation period. The full expansion of district metering would enable an increased detection rate of leakage within Portsmouth Water's distribution network via improved flow monitoring. Active leakage control (ALC) operations would subsequently follow the installation of the additional meters in respect of identifying, reducing, and maintaining network leakages. It is anticipated that up to 10 Ml/d of lost water would be saved following the implementation of this option.

Construction activity associated with the installation/replacement of metering infrastructure is not expected to have any significant impacts on biodiversity, priority habitats, and/or protected species. Because meters require access to water supply points, installation would occur within the operational footprints of existing water infrastructure thus reducing potential impact pathways. Although targeted sites may encompass a wide range of urban, semi-rural, and rural settings, it is unlikely construction would have any discernible impacts on immediate ecological receptors due to the minor scale of required construction. Similarly, leakage surveying and repairs would occur across the Portsmouth Water District Metering Zone (DMZ) which may contain designated and protected habitats. It is assumed, however, that repair works are likely to focus on areas where the distribution network is most dense (under roads, tracks, and/or footpaths), and will be in locations where ground has been disturbed in the past which should also limit impact pathways to sensitive ecological receptors. Furthermore, ALC operation would require excavation, repair work, and land reinstatement within a fixed period of time which suggests the scale of work would be minor and of short duration. Overall, leakage repair may result in temporary localised nuisance such as noise disturbance but it is expected that site-specific mitigation procedures and established best practice would prevent any adverse effects. Overall, this option has been assessed as having a neutral effect on Objective 1 though uncertainty remains.

The installation/replacement of meters would be confined within the operational footprints of existing water infrastructure whereas ALC operation would target existing pipeline infrastructure; consequently, neither would require any new land intake. Furthermore, all excavated land would be reinstated following the construction period such that any disruption would be temporary. This option has therefore been assessed as having a neutral effect on the appropriate and efficient use of land (SEA Objective 2).

It is not expected that the installation of metering infrastructure nor leakage identification and repair would affect river flows or groundwater levels, or on water quality, provided best practices are adhered to and mitigation implemented (such as dust suppression, soil containment and emergency response procedures). This option has therefore been assessed as having a neutral effect in respect of SEA Objective 3.

Although the potential locations of new meters and compromised pipelines requiring repair are currently unknown, it is assumed that works could be scheduled to avoid periods of flooding should there be a risk. Furthermore, it is considered highly unlikely that application of the scheme would result in and/or exacerbate flooding elsewhere now or in the future. This option has therefore been assessed as having a neutral effect on SEA Objective 4.

The installation of district meters and subsequent ALC operations are expected to generate substantial carbon emissions throughout the implementation period. It is estimated that there would be up to 1,123km per annum travelled in respect of meter and ancillary valve installation, 4,800km per annum travelled for ALC leakage surveys, and 3,600km per annum travelled for trans repairs over the 10 year implementation period. It is assumed, however, that vehicle movements could be clustered as appropriate which may help minimise vehicle emissions. Additionally, it is assumed that the installation of new infrastructure and cumulative leakage surveys/repairs would result in residual increases of carbon emission in respect to the operation of plant machinery and embodied carbon within new meters (5.05kg CO₂e), valves (6.44kg CO₂e), and pipelines. Overall, it is expected that implementation would result in a large quantity of carbon emissions (depending on the volume of meters/valves installed and/or replaced, length of pipeline targeted for leakage repair, and the intensity of movement throughout the DMZ) which has been assessed as having a significant negative effect on climate change (SEA Objective 5).

The option is expected to represent a large capital investment (£6.5m) which could generate a number of employment opportunities and supply chain benefits (e.g. associated with the supply of raw materials and appointment of contractors to undertake the works). Due to the moderate volume of vehicle movement associated with the installation/replacement of meters and ALC operation, e.g. leakage surveying and pipeline repair, implementation may result in temporary adverse impacts on the road network throughout the Portsmouth Water DMZ depending on the distribution of movement and ALC activity. Overall, this option has been assessed as having a positive effect on local economic and social wellbeing (SEA Objective 6) though uncertainty remains regarding residual effects on mobility and road access.

The assumed scale of construction regarding the installation/replacement of meters is expected to be very minor / low-impact such that works within the operational footprints of existing water infrastructure should not disrupt the use or result in the loss of amenity to proximate recreational activity and sport. Furthermore, associated noise disturbance and nuisance resulting from installation of meters is not expected to result in any discernible effect on human health due to the scale and brevity of installation. The identification and repair of network leakages may result in minor localised adverse effects on human health regarding noise disturbance and adverse air quality impacts (dust) depending on the scale, duration, and proximity of the works to sensitive receptors. Overall, implementation of this scheme is not expected to affect drinking water supply, surface water and bathing water quality, or recreation. This option has therefore been assessed as having an uncertain though potentially minor negative effect on health (SEA Objective 7).

This option comprises several infrastructural components including new meters, ancillary valves, and piping which would require a substantial volume of raw materials and energy to implement. Material use and energy requirements are considered to be large, and the option has therefore been assessed as having a significant effect on this objective. Furthermore, this option would generate construction wastes which may include excavation waste and infrastructural waste (original piping and meters) in addition to fuel usage for vehicles and plant. Overall, this option has been assessed as having a significant negative effect on sustainable resource use (SEA Objective 8).

It is not expected that the installation/replacement of meters nor ALC operation would adversely affect cultural and historic heritage assets. Specifically, meter installation is expected to be significantly low-impact, and furthermore, the structural scale of these devices is expected to be minor such that installation should have negligible effect on the visual amenity of historic assets within their general vicinity. Pipelines targeted for investigation and subsequent repair could be within or immediately adjacent to the curtilage of scheduled monuments or Listed Buildings which could result in the temporary loss of visual amenity to their settings though it is assumed that the process of fixing a leak is relatively minor and of short duration. Furthermore, these sites would have been previously disturbed regarding the initial installation of pipelines thus it is assumed site-specific mitigation procedures have already been established. Overall, this option has been assessed as having a neutral effect on Objective 11.

It is not expected that the installation/replacement of meters nor ALC operation would adversely affect the visual amenity and accessibility of protected/designated landscapes, townscapes or seascapes such as AONBs or Conservation Areas. The installation of meters is expected to be significantly low-impact, and furthermore, the structural scale of these devices is expected to be minor such that installation should have a negligible effect on the visual amenity of protected and/or proximate local settings. Pipelines targeted for investigation and subsequent repair/replacement could be within a combination of urban, semi-rural, and rural settings; however, it is assumed that leakage repair would primarily target areas where the distribution network is densest which suggests minor impact pathways to the visual amenity of proximate landscapes and settings. Furthermore, leakage reduction sites within designated landscapes would have been previously disturbed during the initial installation of the pipelines thus it is assumed site-specific mitigation procedures have already been established. This option has therefore been assessed as having a neutral effect with some uncertainty on SEA Objective 10.

Operation

It is assumed that the increased rate of leakage detection and reduction through the combined utilisation of flow monitoring and ALC operation would reduce water loss within the Portsmouth Water DMZ, and furthermore, improve the overall efficiency of the water distribution network. The effect of increased water efficiency on designated nature conservation sites (e.g. SACs, SPAs, Ramsar and SSSIs)

and the ecological quality of habitats is considered to be slightly positive as the increased efficiency reduces demand for additional water resources and increases resilience of existing network; however, the magnitude of change is very slight and overall the effect is assessed as neutral.

The increased utilisation of district metering together with the identification and reduction/maintenance of network leakages would not have a discernible effect on the appropriate and efficient use of land (SEA Objective 2).

Operation of the option is likely to increase/ensure continuity of water supply through the detection and reduction/maintenance of network leakage (the option has a design capacity of 10 Ml/d, generating a positive effect in respect of water quantity (SEA Objective 3)). In general, increased water efficiency may protect and slightly enhance the quality and quantity of the surface water environment and the groundwater resource, and/or rates of recharge.

It is considered unlikely that the utilisation of district metering together with the identification and reduction/maintenance of network leakages would result in and/or exacerbate flooding elsewhere now or in the future. This option has therefore been assessed as having a neutral effect on SEA Objective 4.

Once the installation of additional district meters is complete, the cumulative effects of increased flow monitoring in conjunction with the continuous reduction and maintenance of network leakages should result in a significant reduction of energy required to process and pump water (82.7m kWh/a). Although continuous ALC operation, e.g. surveys and pipeline repairs, throughout the operation period will generate carbon emissions in respect of vehicle movement (9,400km travelled per annum), potential effects are expected to be minor to moderate depending on the intensity of movement. Overall, the reduction of net operational greenhouse gas emissions (795 tCO₂e/a) in respect of energy savings due to the reduction of network water loss is considered to be of notable benefit. The predicted effects of climate change (including drier summers) mean that this option would also positively contribute to climate change adaptation by increasing water supply. This option has therefore been assessed as having a positive effect on climate change (SEA Objective 5).

It is assumed that the increased rate of leakage detection and reduction through the combined utilisation of flow monitoring and ALC operation would decrease water loss within the Portsmouth Water DMZ, and furthermore, improve the overall efficiency of the water distribution network. Operation is therefore likely to increase continuity of water supply thus helping ensure that a greater volume of water is available for future populations, commercial increases, and any seasonal demands. Overall, a water saving of up to 10 Ml/d would have a positive effect on the local economy and local community wellbeing (SEA Objective 6).

The operation of the scheme should not significantly affect human health by increased noise, nuisance or disruption nor would it affect opportunities for recreation. Continued ALC operation, e.g. leakage identification and repair/maintenance, on targeted pipelines could result in temporary disturbance and/or nuisance to sensitive receptors though this is expected to be minor if not negligible. It is assumed that the cumulative effects of lowered network leakage would help increase/ensure continuity of water supply through improved efficiency of the water distribution network. Overall, a saving of up to 10 Ml/d would help ensure a continual supply of clean drinking water, generating a positive effect on health (SEA Objective 7).

No significant amount of resources or energy would be required following the implementation of the scheme. Resource/energy use associated with the continued reduction/maintenance of network leakage via periodic identification and repairing of former and/or new leaks is expected to be minor to moderate depending on the range of work. As illustrated by the scale of operational carbon savings associated with reduced treatment and pumping of water (795 tCO₂e/year), benefits have been assessed as notable. Additionally, the saving of up to 10 Ml/d would help increase/ensure continuity of water supply through increased efficiency of the distribution network. This option has therefore been assessed as having a significant positive effect on the sustainable use of resources (SEA Objective 8).

There are no discernible risks or clear impact pathways to cultural/historic heritage assets in respect to leakage detection and reduction/maintenance through the combined utilisation of flow monitoring and ALC operation. Although periodic leakage surveying and maintenance work would occur throughout the operational period, the scale of construction is expected to be minor. This option has therefore been assessed as having a neutral effect on cultural and historic assets (SEA Objective 9).

There are no discernible risks or clear impact pathways to either the visual amenity or character of proximate local and designated landscapes, townscapes, or seascapes such as AONBs or national parks in respect to leakage detection and reduction/maintenance through the combined utilisation of flow monitoring and ALC operation. Although periodic leakage surveying and maintenance work would occur throughout the operational period, the scale of construction during this stage is expected to be increasingly minor in comparison to initial ALC operation. This option has therefore been assessed as having a neutral effect on landscape (SEA Objective 10).

Option	Stage	1. Biodiversity	2. Geology and Soils	3. Water Quantity and Quality	4. Flood Risk	5. Climate Change	6. Economic and Social Wellbeing	7. Human Health	8. Waste and Resources	9. Cultural Heritage	10. Landscape
C078 Drought: Voluntary restraint & leakage action	Construction	0/?	0	0	0	0	0	-/?	0	0	0/?
	Operation	0	0	+	0	+	+	+	+	0	0

Construction

This option would involve enhanced public awareness campaigns aimed at domestic and commercial customers (e.g. tourism sector) during periods of drought concerning the benefits of water use restraint on supply as well as the natural environment. Specifically, public awareness campaigns would be provided through a partnership-based implementation programme involving relevant water retailers (in respect of commercial customers) and Portsmouth Water, who would provide information to all customers on water supplies, water statuses, and the risks associated with unmitigated demand. It is expected that public awareness campaigns would improve proactive behaviour regarding smart and sustainable consumption: reducing the use of water appliances (toilet flushes, shower durations, washing machines, etc.), reducing and/or eliminating non-essential water use (vehicle washing, window washing, garden watering, hot tubs, etc.), and prioritising the identification/repair of leakages within private properties. Simultaneously, Portsmouth Water would expand active leakage control (ALC) operations in order to enhance find and fix rates, accelerate response time, and increase leak volume threshold. The combined impact of voluntary restraint adoption and augmented ALC procedures is expected to save up to 4.3 Ml/d of lost water during times of drought.

The development and delivery of public awareness campaigns would not have a discernible effect on biodiversity, e.g. designated nature conservation sites and the ecological quality of habitats due to the utilisation of knowledge transference rather than physical construction. As neither the locations of the affected pipelines requiring repair/replacement nor the scale of the proposed works are currently known, leakage investigation and reduction activity may encompass a wide combination of urban, semi-rural, and rural settings. Consequently, works may have a range of effects on biodiversity, priority habitats or protected species in respect of localised noise disturbance, and adverse air quality impacts (dust). However, repair/replacement works are likely to focus on areas where the distribution network is most dense (under roads, tracks, and/or footpaths), and will be in locations where ground has been disturbed in the past which should limit impact pathways to sensitive ecological receptors. Furthermore, the accelerated process of identifying and repairing leaks within a fixed period of time suggests the scale of work would be of short duration with any periodic maintenance work assessed as negligible. Overall, this option has been assessed as having a neutral effect on SEA Objective 1 though uncertainty remains.

The development and delivery of public awareness campaigns would not require any new land-take as implementation would be dependent on knowledge transference rather than physical construction. Construction activity such as pressure optimisation - detection repairs and infrastructural rehabilitation schemes would target existing infrastructure, e.g. the water distribution network, and would not require any new land intake. Furthermore, all excavated land would be reinstated following the construction period such that any disruption would be temporary. This option has therefore been assessed as having a neutral effect on the appropriate and efficient use of land (SEA Objective 2).

Neither the development and delivery of public awareness campaigns nor leakage investigation and leakage reduction activity would affect river flows and/or groundwater levels, or on water quality, provided best practices are adhered to and mitigation implemented (such as dust suppression, soil containment and emergency response procedures). This option has therefore been assessed as having a neutral effect in respect of SEA Objective 3.

Although the locations of the compromised pipelines requiring repair/replacement are currently unknown, it is assumed that implementation could be scheduled to avoid periods of flooding should there be a risk. Furthermore, it is considered highly unlikely that application of the scheme would result in and/or exacerbate flooding elsewhere now or in the future. This option has therefore been assessed as having a neutral effect on SEA Objective 4.

The development and delivery of public awareness campaigns and accelerated ALC operation is expected to generate minor carbon emissions throughout the implementation period. The presentation of public awareness campaigns and leakage investigation/reduction activity would require vehicle movement from Portsmouth Water and partners (water retailers) in respect to the transportation of material, equipment, and personnel. It is estimated that vehicle movement per annum (5 year implementation period) would include up to 819,200km for ALC operation whereas up to 307,200km would be accumulated for mains repairs in addition to movements required for campaign organisation and delivery which would contribute to greenhouse gas emissions. Additionally, it is assumed that the cumulative leakage surveys/repairs would result in residual increases of carbon emission in respect to the operation of plant machinery in addition to embodied carbon within new pipelines (3.37 tCO₂e). Consequently, this option would generate up to 35 tCO₂e during construction. Overall, it is expected that implementation would result in a minor quantity of carbon emissions (depending on the volume of campaigns delivered, length of pipeline targeted for leakage repair, and the intensity of movement throughout the DMZ as dictated by drought conditions) which has been assessed as having a neutral effect on climate change.

The option is expected to represent a low capital investment (£191,645) which is not expected to generate a significant number of jobs in the long-term nor result in a discernible effect on the local economy associated with supply chain benefits (e.g. associated with the supply of raw materials and appointment of contractors to undertake the works). Due to the moderate volume of vehicle movement associated with ALC operation, mains repairs, and the organisation and delivery of public awareness campaigns in conjunction with the likely targeting of areas where the distribution network is densest (under roads, tracks, and/or footpaths), implementation may result in temporary impacts on the local road network although it is assumed impacts would likely to be lessened by the adoption of mitigation measures at the project level. Overall, this option has been assessed as having a neutral effect on local community wellbeing (SEA Objective 6).

It is highly unlikely that the development and delivery of public awareness campaigns to domestic and commercial customers would have any affect on drinking water supply, surface water and bathing water quality, or recreation. The assumed scale of construction regarding leakage investigation and reduction activity is expected to be minor; consequently, works could result in temporary disruptions of use or loss of amenity to proximate recreational and sport grounds. The cumulative impacts of noise/vibration disturbance and air quality impacts (dust) resulting from excavation and the transportation of equipment/material may adversely affect human health depending on the scale, duration, and proximity of the works to sensitive receptors. Consequently, this option has been assessed as having an uncertain though potentially minor negative effect on health (SEA Objective 7).

The delivery of public awareness campaigns and accelerated ALC operations would require a minor volume of raw materials and energy to implement. Using the estimated carbon emissions associated with the embodied carbon within new piping in addition to HGV greenhouse gas emissions as a proxy, material use and energy requirements are considered to be minor. Furthermore, this option would generate construction wastes which may include excavation waste and infrastructural waste (damaged piping) including fuel usage for vehicles and plant. Overall, this option has been assessed as having a neutral effect on sustainable resource use (SEA Objective 8).

The development and delivery of public awareness campaigns to domestic and commercial customers would not have any discernible impact pathways to the structural integrity or visual amenity of cultural and historic assets. Pipelines targeted for investigation and subsequent repair could be within or immediately adjacent to the curtilage of scheduled monuments or Listed Buildings which may result in the temporary loss of visual amenity to their settings though it is expected that the process of fixing a leak is relatively minor and very short term. Notwithstanding, these sites would have been previously disturbed during the initial installation of the pipelines thus it is assumed site-specific mitigative procedures have already been established. Overall, this option has been assessed as having a neutral effect on SEA Objective 9.

The development and delivery of public awareness campaigns would not have any visual impacts or affect protected/designated landscapes, townscapes or seascapes such as AONBs or Conservation Areas. As the locations of the compromised pipelines requiring repair are currently unknown, leakage investigation and reduction works may temporarily effect local and wider landscape character. It is assumed, however, that leakage reduction would primarily target areas where the distribution network is densest which suggests minor impact pathways to the visual amenity and accessibility of proximate landscapes and settings. Targeted sites within designated landscapes would have been previously disturbed during the initial installation of the pipelines such that it is assumed site-specific mitigative procedures have already been established. This option has been assessed as having a neutral effect with some uncertainty on Objective 10.

Operation

It is assumed that the adoption of 'water restraint' would facilitate more proactive behaviour regarding smart and conscientious water consumption by domestic and commercial customers. Additionally, the reduction and maintenance of network leakages would decrease the volume of lost water within the Portsmouth Water District Metering Zone. Collectively, operation is expected to increase water efficiency within times of drought through this bilateral reduction of water demand/loss. The effect of increased water efficiency on designated nature conservation sites (e.g. SACs, SPAs, Ramsar and SSSIs) and the ecological quality of habitats is considered to be slightly positive as the increased efficiency reduces demand for additional water resources and increases resilience of existing network; however, the magnitude of change is very slight and overall the effect is assessed as neutral.

The adoption of proactive 'water restraint' behaviour by domestic and commercial customers together with the reduction and maintenance of network leakages during times of drought would not have a discernible effect on the appropriate and efficient use of land (SEA Objective 2).

The adoption of proactive 'water restraint' behaviour by domestic and commercial customers together with the reduction and maintenance of network leakages would likely increase/ensure continuity of water supply during times of drought through the reduction of water demand/loss (the option has a design capacity of 4.3 Ml/d, generating a positive effect in respect of water quantity (SEA Objective 3)).

It is considered unlikely that the adoption of proactive 'water restraint' behaviour by domestic and commercial customers together with the reduction and maintenance of network leakages would result in and/or exacerbate flooding elsewhere now or in the future. This option has therefore been assessed as having a neutral effect on SEA Objective 4.

Following the adoption of proactive 'water restraint' behaviour by domestic and commercial customers together with the continuous reduction and maintenance of network leakages, the cumulative effects of lowered water demand should result in a moderate reduction of energy required to process and pump water (384,918 kWh/a). Furthermore, operational emissions to air in respect of vehicle movement are expected to be minor. Overall, the reduction of net operational greenhouse gas emissions (38.4 tCO₂e/a) in respect of energy savings is considered to be a minor benefit whereas the option may also generate benefits in respect of climate change adaptation (drought resilience). This option has therefore been assessed as having a minor positive effect on climate change (SEA Objective 5).

It is assumed that the adoption of proactive 'water restraint' behaviour by domestic and commercial customers together with the reduction and maintenance of network leakages would reduce water demand during times of drought. Operation is therefore likely to increase/ensure continuity of water supply through increased water efficiency thus helping ensure that a greater volume of water is available for citizens, commercial increases, and any seasonal demands. Overall, an increase of up to 4.3 Ml/d would have a minor positive effect on the local economy and local community wellbeing (SEA Objective 6).

Following the adoption of proactive 'water restraint' behaviour by domestic and commercial customers together with the continuous reduction and maintenance of network leakage, the scheme should not significantly affect human health by increased noise, nuisance or disruption nor would it affect opportunities for recreation. Continued maintenance on targeted pipelines could result in temporary disturbance and/or nuisance to sensitive receptors though this is expected to be minor if not negligible. Overall, an increase of up to 4.3 Ml/d would help ensure a continual supply of clean drinking water during times of drought, generating a minor positive effect on health (SEA Objective 7).

No significant amount of resources or energy would be required following the adoption of proactive 'water restraint' behaviour by domestic and commercial customers. Resource/energy use associated with maintaining leakage levels via periodic identification and repairing of former and/or new leaks is expected to be minor if not negligible. As illustrated by the scale of operational carbon savings associated with reduced treatment and pumping of water (38.4 tCO₂e/year), benefits have been assessed as minor. Additionally, a reduction of water demand by customers through adopted restraint behaviour of up to 4.3 Ml/d which could be utilised elsewhere during times of drought. On balance, this option has been assessed as having a positive effect on the sustainable use of resources (SEA Objective 8).

There are no discernible risks or clear impact pathways to cultural/historic heritage assets regarding the adoption of proactive 'water restraint' behaviour by domestic and commercial customers together with the reduction network leakage. Periodic leakage maintenance work has also been assessed as negligible in respect to conserving cultural/historic heritage assets. This option has therefore been assessed as having a neutral effect on cultural and historic assets (SEA Objective 9).

There are no discernible risks or clear impact pathways to either the visual amenity or character of proximate local and designated landscapes, townscapes, or seascapes such as AONBs or national parks regarding the adoption of proactive 'water restraint' behaviour by domestic and commercial customers together with the reduction network leakage. Periodic leakage maintenance work is not expected to occur at a scale which would adversely impact the visual amenity and character of local and designated landscapes. This option has therefore been assessed as having a neutral effect on landscape (SEA Objective 10).

Option	Stage	1. Biodiversity	2. Geology and Soils	3. Water Quantity and Quality	4. Flood Risk	5. Climate Change	6. Economic and Social Wellbeing	7. Human Health	8. Waste and Resources	9. Cultural Heritage	10. Landscape
C079 Drought: Mandatory restraint	Construction	0	0	0	0	0	0	0	0	0	0
	Operation	0	0	+	0	+	+	+	++	0	0
<p>Construction</p> <p>This option would involve the provision of a significant media campaign aimed at non-domestic commercial customers during periods of drought concerning the justification of mandatory restraint actions and how customers can achieve compliance. By permission of Drought Directions, implementation of this option would simultaneously prohibit: garden watering on commercial property, maintenance of commercial swimming pools and ponds, vehicle cleaning, washing of commercial premises, windows, and industrial plant, suppressing dust, and operating unoccupied cisterns. The delivery of this option would require a partnership with relevant retail suppliers in order to ensure communication and monitoring processes are up to date. The impact of mandatory restraint adoption is expected to save up to 8.3 Ml/d of lost water during times of drought.</p> <p>The development and delivery of the media awareness campaign would not have a discernible effect on biodiversity, e.g. designated nature conservation sites and the ecological quality of habitats due to the utilisation of knowledge transference rather than physical construction. Similarly, the prohibition of targeted commercial water uses during times of drought would not have a clear impact pathway to any ecological features beyond the micro-ecosystems potentially supported by gardens within the premises of commercial property though effects, under drought conditions, would be minor if not negligible. Overall, this option has been assessed as having a neutral effect on SEA Objective 1.</p> <p>Neither the development and delivery of the media awareness campaign nor the prohibition of targeted commercial water uses would require any new land-take as implementation would be dependent on knowledge transference and activity cessation rather than physical construction. This option has therefore been assessed as having a neutral effect on the appropriate and efficient use of land (SEA Objective 2).</p> <p>Provision of the media awareness campaign and prohibition of targeted commercial water uses would not affect river flows and/or groundwater levels, or on water quality. This option has therefore been assessed as having a neutral effect in respect of SEA Objective 3.</p> <p>Provision of the media awareness campaign and prohibition of targeted commercial water uses would not affect flood risk now or in the future. This option has therefore been assessed as having a neutral effect on SEA Objective 4.</p> <p>The implementation of this option is not expected to generate significant carbon emissions throughout the implementation period. The provision of the media awareness campaign would require vehicle movement from Portsmouth Water and partners (water retailers) in respect to the transportation of personnel over the 3 year implementation period which would generate a minor, if not negligible</p>											

greenhouse gas emissions. Overall, it is not expected that implementation would result in an adverse quantity of carbon emissions; consequently, this option has been assessed as having a neutral effect on climate change (SEA Objective 5).

The option is expected to represent a low capital investment (approximately £575,000) which is not expected to generate a significant number of jobs in the long-term nor result in a discernible effect on the local economy associated with supply chain benefits (e.g. associated with the supply of raw materials and appointment of contractors to undertake the works). It is considered unlikely that vehicle movement regarding the transportation of personnel would result in temporary impacts on the local road network. Overall, this option has been assessed as having a neutral effect on local community wellbeing (SEA Objective 6).

It is highly unlikely that the development and delivery of the media awareness campaign together with the prohibition of targeted commercial water uses would have any effect on drinking water supply, surface water and bathing water quality, and or recreation. It is considered unlikely that implementation would result in any discernible effects on human health in respect of noise/vibration disturbance and/or air quality impacts (dust). Consequently, this option has been assessed as having a neutral effect on health (SEA Objective 7).

The delivery of the media awareness campaign meters would not require a significant volume of raw materials and energy to implement. Using the estimated carbon emissions associated with vehicle movement as a proxy, material use and energy requirements are considered to be minor. Furthermore, this option would generate construction wastes which would include fuel usage for vehicles. Overall, this option has been assessed as having a neutral effect on sustainable resource use (SEA Objective 8).

Neither the development and delivery of the media awareness campaigns nor the prohibition of targeted commercial water uses would have any discernible impact pathways to the structural integrity or visual amenity of cultural and historic assets. Overall, this option has been assessed as having a neutral effect on SEA Objective 9.

The implementation of the option would not have any visual impacts or affect protected/designated landscapes, townscape or seascapes such as AONBs or Conservation Areas. Consequently, this option has been assessed as having a neutral effect on Objective 10.

Operation

It is assumed that the prohibition of targeted commercial water uses would reduce non-critical water consumption during times of drought. The reduction of water demand would additionally provide the residual benefit of decreasing the risk of leakage within the water distribution network, and furthermore, the wider Portsmouth Water operational area. The effect of increased water efficiency on designated nature conservation sites (e.g. SACs, SPAs, Ramsar and SSSIs), the ecological quality of habitats is considered to be slightly positive as the increased efficiency reduces demand for additional water resources and increases resilience of existing network; however, the magnitude of change is very slight and overall the effect is assessed as neutral.

The restriction of non-critical commercial water usage would not have a discernible effect on the appropriate and efficient use of land (SEA Objective 2).

The continued compliance with mandatory water restrictions by commercial customers together with the residual reduction of network leakages would likely increase/ensure continuity of water supply during times of drought through decreased water demand/loss (the option has a design capacity of 8.3 Ml/d, generating a positive effect in respect of water quantity (SEA Objective 3)).

The restriction of non-critical water uses by commercial customers together with the residual reduction of network leakages would not result in and/or exacerbate flooding elsewhere now or in the future. This option has therefore been assessed as having a neutral effect on SEA Objective 4.

Following the implementation of the mandatory ban on targeted commercial water uses, the cumulative effects of lowered water demand should result in a moderate reduction of energy required to process and pump water (128,306 Wkh/a). Furthermore, operational emissions to air in respect of vehicle movement are expected to be neutral. Overall, the reduction of net operational greenhouse gas emissions (10.7tCO₂e/year) in respect of energy savings is considered to be a minor benefit whereas the option would generate benefits in respect of climate change adaptation (drought resilience). This option has therefore been assessed as having a minor positive effect on climate change (SEA Objective 5).

It is assumed that the prohibition of targeted commercial water uses would reduce non-critical water consumption during times of drought. Operation is therefore likely to increase/ensure continuity of water supply through increased water efficiency thus helping ensure that a greater volume of water is available for citizens and any seasonal demands. Overall, an increase of up to 8.3 Ml/d would have a minor positive effect on the local economy and local community wellbeing (SEA Objective 6).

Following the implementation of the mandatory ban on targeted commercial water uses, the scheme should not significantly affect human health by increased noise, nuisance, and/or disruption. The restriction of filling/maintaining commercial swimming pools/paddle pools may temporarily impact the availability of recreational swimming though this would be dependent on the duration of the drought. Overall, an increase of up to 8.3 Ml/d would help ensure a continual supply of clean drinking water during times of drought, generating a minor positive effect on health (SEA Objective 7).

No significant amount of resources or energy would be required following the implementation of this option. As illustrated by the scale of operational carbon savings associated with reduced treatment and pumping of water (10.7 tCO₂e/year), benefits have been assessed as minor. Additionally, a reduction of water demand by commercial customers through the restriction of non-critical water uses should facilitate a water saving of up to 8.3 Ml/d which could be utilised elsewhere during times of drought. On balance, this option has been assessed as having a significant positive effect on the sustainable use of resources (SEA Objective 8).



There are no discernible risks or clear impact pathways to cultural/historic heritage assets regarding the mandatory restriction of non-critical commercial water use. This option has therefore been assessed as having a neutral effect on cultural and historic assets (SEA Objective 9).

There are no discernible risks or clear impact pathways to either the visual amenity or character of proximate local and designated landscapes, townscapes, or seascapes such as AONBs or national parks regarding the operation and compliance of the mandatory restrictions of non-critical commercial water use. This option has therefore been assessed as having a neutral effect on landscape (SEA Objective 10).

Option	Stage	1. Biodiversity	2. Geology and Soils	3. Water Quantity and Quality	4. Flood Risk	5. Climate Change	6. Economic and Social Wellbeing	7. Human Health	8. Waste and Resources	9. Cultural Heritage	10. Landscape
C080 Imposition of Drought Direction Restrictions (mandatory commercial restraint)	Construction	0	0	0	0	0	0	0	0	0	0
	Operation	0	0	+	0	+	+	+	++	0	0
<p>Construction</p> <p>This option would involve the implementation of a mandatory restriction of non-critical water uses (as listed in the Drought Direction 2011) aimed at domestic and commercial customers during periods of severe drought (1 in 50 year occurrence). Specifically, public awareness campaigns would be provided through a partnership-based implementation programme involving relevant water retailers (in respect of commercial customers) and Portsmouth Water, who would provide information to all domestic customers. In order to facilitate compliance with the water restrictions, telephone hotlines would be organised for customers to report banned usages in conjunction with active site monitoring by operational teams whilst undertaking ongoing business. The impact of mandatory restraint adoption is expected to save up to 8.1 Ml/d of lost water during times of drought.</p> <p>The prohibition and enforcement/compliance of non-critical water use by domestic and commercial customers would not have a discernible effect on biodiversity, e.g. designated nature conservation sites and the ecological quality of habitats, due to the utilisation of knowledge transference rather than physical construction. Notwithstanding, the restriction of garden watering and general landscape maintenance may temporarily affect the micro-ecosystems supported by these green spaces; however, adverse impacts are expected to be indiscernible within the context of severe drought conditions. Overall, this option has been assessed as having a neutral effect on SEA Objective 1.</p> <p>The mandatory restriction of non-critical water use by domestic and commercial customers would not require any new land-take as implementation and enforcement/compliance would be dependent on knowledge transference and activity cessation rather than physical construction. This option has therefore been assessed as having a neutral effect on the appropriate and efficient use of land (SEA Objective 2).</p> <p>Neither the implementation of the mandatory water usage ban nor the enforcement/compliance of targeted restrictions would affect river flows and/or groundwater levels, or on water quality. This option has therefore been assessed as having a neutral effect in respect of SEA Objective 3.</p> <p>The application of the scheme under severe drought conditions would not affect flood risk now or in the future. This option has therefore been assessed as having a neutral effect on SEA Objective 4.</p> <p>The implementation of this option is not expected to generate significant carbon emissions throughout the implementation period. The enforcement of mandatory bans via site monitoring by operational teams would require vehicle movement from Portsmouth Water in respect to the transportation of personnel which would generate a minor, if not negligible, volume of greenhouse gas emissions. Overall, it is not expected that implementation would result in an adverse quantity of carbon emissions; consequently, this option has been assessed as having a neutral effect on climate change (SEA Objective 5).</p>											

The option is expected to represent a low capital investment (approximately £180,000) which is not expected to generate a significant number of jobs in the long-term nor result in a discernible effect on the local economy associated with supply chain benefits (e.g. associated with the supply of raw materials and appointment of contractors to undertake the works). It is considered unlikely that vehicle movement regarding the transportation of personnel would result in temporary impacts on the local road network. Overall, this option has been assessed as having a neutral effect on local community wellbeing (SEA Objective 6).

It is highly unlikely that the implementation and enforcement/compliance of mandatory water restrictions would have any effect on drinking water supply, surface water and bathing water quality, or recreation. It is considered unlikely that implementation would result in any discernible effects on human health in respect of noise/vibration disturbance and/or air quality impacts (dust). Consequently, this option has been assessed as having a neutral effect on health (SEA Objective 7).

The enforcement of mandatory restrictions on non-critical water usage by domestic and commercial customers would not require a significant volume of raw materials and energy to implement. Using the estimated carbon emissions associated with vehicle movement as a proxy, material use and energy requirements are considered to be minor. Furthermore, this option would generate construction wastes which would include fuel usage for vehicles. Overall, this option has been assessed as having a neutral effect on sustainable resource use (SEA Objective 8).

Neither the implementation of the mandatory water usage bans nor the enforcement/compliance of such restrictions would have any discernible impact pathways to the structural integrity or visual amenity of cultural and historic assets. Overall, this option has been assessed as having a neutral effect on SEA Objective 9.

The implementation of the option would not have any visual impacts or affect protected/designated landscapes, townscapes or seascapes such as AONBs or Conservation Areas. Consequently, this option has been assessed as having a neutral effect on Objective 10.

Operation

It is assumed that the prohibition of non-critical domestic and commercial water uses would reduce water consumption during times of severe drought (1 in 50 year occurrence). The reduction of water demand would additionally provide the residual benefit of decreasing the risk of leakage within the water distribution network, and furthermore, the wider the Portsmouth Water operational area. The effect of increased water efficiency on designated nature conservation sites (e.g. SACs, SPAs, Ramsar and SSSIs) and the ecological quality of habitats is considered to be slightly positive as the increased efficiency reduces demand for additional water resources and increases resilience of existing network; however, the magnitude of change is very slight and overall the effect is assessed as neutral.

The restriction of non-critical domestic and commercial water usage would not have a discernible effect on the appropriate and efficient use of land (SEA Objective 2).

The continued compliance with mandatory water restrictions by customers together with the residual reduction of network leakages would likely increase/ensure continuity of water supply during times of drought through decreased water demand/loss (the option has a design capacity of 8.1 Ml/d, generating a positive effect in respect of water quantity (SEA Objective 3)).

The restriction of non-critical water uses by customers together with the residual reduction of network leakages would not affect flood risk now or in the future. This option has therefore been assessed as having a neutral effect on SEA Objective 4.

Following the implementation of the mandatory ban on targeted domestic and commercial water uses, the cumulative effects of lowered water demand should result in a moderate reduction of energy required to process and pump water (128,644Wkh/a). Furthermore, operational emissions to air in respect of vehicle movement are expected to be neutral. Overall, the reduction of net operational greenhouse gas emissions (15.9 tCO₂e/year) in respect of energy savings is considered to be a minor benefit whereas the option would generate benefits in respect of climate change adaptation (drought resilience). This option has therefore been assessed as having a minor positive effect on climate change (SEA Objective 5).

It is assumed that the prohibition of targeted domestic and commercial water uses would reduce non-critical water consumption during times of drought. Operation is therefore likely to increase/ensure continuity of water supply through increased water efficiency thus helping ensure that a greater volume of water is available for citizens and any seasonal demands. Overall, an increase of up to 8.1 Ml/d would have a minor positive effect on the local economy and local community wellbeing (SEA Objective 6).

Following the implementation of the mandatory ban on targeted domestic and commercial water uses, the scheme should not significantly affect human health by increased noise, nuisance, and/or disruption. The restriction of filling/maintaining commercial swimming pools/paddle pools as well as the maintenance of green areas (e.g. parks) may temporarily impact the availability and amenity of recreational activities though this would be dependent on the duration and severity of the drought. Overall, an increase of up to 8.1 Ml/d would help ensure a continual supply of clean drinking water during times of drought, generating a minor positive effect on health (SEA Objective 7).

No significant amount of resources or energy would be required following the implementation of this option. As illustrated by the scale of operational carbon savings associated with reduced treatment and pumping of water (15.9 tCO₂e/year), benefits have been assessed as minor. Additionally, a reduction of water demand by customers through the restriction of non-critical water uses should facilitate a water saving of up to 8.1 Ml/d which could be utilised elsewhere during times of drought. On balance, this option has been assessed as having a significant positive effect on the sustainable use of resources (SEA Objective 8).



There are no discernible risks or clear impact pathways to cultural/historic heritage assets regarding the mandatory restriction of non-critical domestic and commercial water use. This option has therefore been assessed as having a neutral effect on cultural and historic assets (SEA Objective 9).

There are no discernible risks or clear impact pathways to either the visual amenity or character of proximate local and designated landscapes, townscapes, or seascapes such as AONBs or national parks regarding the operation and compliance of the mandatory restrictions of non-critical domestic and commercial water use. This option has therefore been assessed as having a neutral effect on landscape (SEA Objective 10).



Appendix F

Revised Preferred Options

Revised Preferred Supply Options

Option R013: Havant Thicket Winter Storage Reservoir (23 MI/d)

Option Summary

This option would involve the development of a new pumped storage reservoir with a capacity of 8,800 MI on Portsmouth Water's land holding at Havant Thicket (170 ha.). Water would be sourced from the Source B spring source during the winter period and pumped to Havant Thicket Reservoir for use in the summer within the existing annual average licence of 98MI/d. The new reservoir would deliver 23 MI/d with a peak deployable output of 50 MI/d, although this would be subject to the hands-off flows of Lake A and Stream A. Implementation of the scheme would also require a new c.8.4km single raw water main consisting of two parts: an oversized 1,600mm main to Hermitage Stream to allow rapid gravity drawdown; and an 800mm main to Source B Pumping Stations and WTW. It should be noted that both pumping stations and WTW at Source B would require minor refurbishments to increase peak output from 40 MI/d to 50 MI/d which would include new pumps, a large external standby generator, and a new Dissolved Air Flotation (AF plant for the WTW. Treated output would then flow to Works A WTW which would direct water to Reservoir A via a new c.8.4km main and Reservoir B via a new c.4km main. In order to facilitate these secondary transfers to the service reservoirs, Works A WTW would require minor refurbishment/reinforcement to its suction main.

Assessment

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
1. To ensure the protection and enhancement of biodiversity, priority habitats and species	<p>Will the option protect and enhance priority species, habitats and sites designated for their nature conservation value?</p> <p>Will the option protect and enhance non-designated sites and local biodiversity?</p> <p>Will the option provide opportunities for new habitat creation or restoration and link existing habitats as part of the development process?</p> <p>Will the option protect and enhance coastal and marine habitats and species?</p> <p>Will the option result in a change in the quality of habitats due to changes in groundwater/river water quality or quantity?</p>	-	+/?	<p>Effects of Construction</p> <p>The proposed reservoir site, new pipelines and ancillary infrastructure modifications are not situated within or immediately adjacent to any European designated conservation sites; however, there are several SACs/SPAs/Ramsars within 5km of the scheme: Chichester and Langstone Harbours Ramsar/SPA/SSSIs (c.3.5km from the proposed reservoir site and c.650m from the Works A – Reservoir B pipeline); Solent Maritime SAC (3.5km from the proposed reservoir site and 650m from the Works A – Reservoir B pipeline); Solent and Isle of Wight Lagoons SAC (2km from the Works A pipelines); and Portsmouth Harbour Ramsar/SPA/SSSI (307m from a section of the Works A – Reservoir A pipeline). Portsmouth, Chichester, and Langstone Harbours are large, sheltered estuarine basins comprised of extensive sand and mud-flats rich in invertebrates as well as beds of algae and eelgrasses. These sites also support nationally significant wetland bird populations: Little Tern; Ringed Plover; Redshank; Dark-bellied Brent Goose; and Dunlin. Langstone and Chichester harbours are part of the Solent Maritime SAC (11,325 ha.), a national exemplar for estuaries which supports a range of protected habitats and vegetation</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
	Will the option affect riparian vegetation structure?			<p>including Atlantic salt meadows and shifting dunes. It is considered unlikely that construction works and pipeline excavation would have any significant effects on the priority interest features of these sites (ecological habitats and flora) due to a lack of clear impact pathways, although minor temporary noise disturbance could affect avifauna traveling within proximity of the works. For example, the construction of the Works A – Reservoir A pipeline may disturb wildfowl and waders at Portsmouth Harbour due to proximity, although timing of the works (avoiding known times of population surges) should prevent significant impacts occurring.</p> <p>Three small ephemeral water courses drain across the proposed reservoir site and join to form Riders Lane Stream which in-turn flows into the Hermitage Stream, and subsequently, Langstone Harbour and the Solent Maritime SAC. Consequently, construction of the reservoir in addition to excavation across Hermitage Stream may indirectly introduce pollution/debris within the stream and may affect ecological features such as in-river habitats, mobile aquatic species, and designated biota. However, site specific mitigation and established best practice should prevent significant effects to both local ecosystems. Construction could temporarily alter water processes associated with these streams, although the implementation of mitigation (compensation flows) should prevent adverse effects on downstream water flow/in-river habitats.</p> <p>Warblington Meadows SSSI would be 2.1km from the Works A – Reservoir B pipeline whilst three other SSSIs would be within the general vicinity of the Works A – Reservoir A pipeline: Portsdown (489m); Hook Heath Meadows (2.1km); and Lye Heath Marsh (2.7km). These sites are characterised by their nationally significant environmental features and designated flora species; however, the proposed pipelines would primarily be routed along the urban road network which, in conjunction with scheme specific mitigation and established best practice, means that works do not present any clear impact pathways to these protected ecological features or the local wildlife utilising the sites.</p> <p>Pipeline works between Hermitage Stream – Source B water works would utilise urban grassland which may result in minor temporary disturbance to proximate habitats and wildlife. The construction/refurbishment of ancillary infrastructure, meanwhile, would be situated on existing operational sites within an urban setting such that effects to proximate habitats and/or wildlife would be minor if not negligible.</p> <p>In general, implementation of the scheme would predominantly entail construction of the new Havant Thicket reservoir which would result in a significant loss of semi-rural greenfield land and woodland/a BAP site (currently under review regarding its status</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<p>as Ancient Woodland); specifically, the Avenue (7.93 ha) Upper Lake, Middle Clearing (2.53 ha), Round Wood (2.48 ha), and a Corsican Pine plantation (3.66 ha). Construction could therefore result in direct habitat loss, in addition to temporary localised effects on protected species within the vicinity (reptiles, dormice, and bats); however, substantial efforts are being made by Portsmouth Water to develop appropriate mitigation measures in partnership with Natural England and guided by an agreed set of mitigation principles. Given these mitigation measures (and assuming that they are effectively implemented), and taking into account the licensing requirement for protected species, adverse effects in this regard are expected to be managed/mitigated as appropriate.</p> <p>Overall, this option has been assessed as having a minor negative effect on biodiversity (SEA Objective 1).</p> <p>Effects of Operation</p> <p>The operation of the new reservoir would deliver 23 Ml/d with a peak deployable output of 50 Ml/d (subject to the hands-off flows of Lake A and Stream A) which would remain within the existing annual average licence of 98 Ml/d. Although water discharge from Source B spring source currently feed into Langstone and Chichester Harbours through the Hermitage Stream and an unnamed watercourse, the current licence requires maintenance of a minimum residual flow to the Hermitage Stream. Other potential effects (water quality; effects of emergency drawdown; effects on birds) have previously been investigated and are unlikely to be significant. Overall, it is assumed that the current licence would have been reviewed by the EA under the Habitats Regulations Review of Consents process thus operation is not expected to have any significant effects alone or in combination on any European conservation sites (e.g. Chichester and Langstone Harbours Ramsar/SPA/SSSIs, Solent Maritime SAC, Solent and Isle of Wight Lagoons SAC, and Portsmouth Harbour Ramsar/SPA/SSSI).</p> <p>The new reservoir might help contribute to the creation of a new habitat, although this would depend on its design and management. The integration of additional habitat creation measures could include retained wetland with islands along the reservoir's northern shore where there is no requirement for embankments. The creation of the new wetland could benefit birds using Chichester, Langstone, and Portsmouth harbours (e.g. to provide a safe roost for birds displaced by human activity) as well as diverting recreational activity away from the harbour, especially during winter/roosting season.</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<p>Overall, the operation of this option has been assessed as having a minor positive effect on biodiversity, although uncertainty remains regarding the magnitude of benefit resulting from habitat creation.</p> <p>Mitigation</p> <ul style="list-style-type: none"> The utilisation of scheme specific mitigation measures and established best practice throughout the implementation period is expected to minimise and/or prevent significant and/or adverse construction effects on both local wildlife features and designated conservation areas. Operational mitigation (compensation flows) should be considered and employed to prevent adverse effects on downstream water flow/in-river habitats regarding Hermitage Stream. A new woodland corridor would be planted to link the Forestry Commission woodland in the north to the Staunton Country Park woodland in the south. Non-native trees (conifer plantations) would be replaced with native deciduous species together with creating more open heathland areas within the woodland blocks to the north. The new native species (oak and hazel) would be coppiced to improve the habitat for protected species. The reservoir scheme design includes some new habitat creation measures (new water body and retained wetlands with islands) which would assist in the protection and enhancement of local biodiversity, once new habitats were established. The works programme and requirements should be determined at the earliest opportunity to allow investigation schemes, protected species surveys and mitigation to be appropriately scheduled and to continue to provide sufficient time for consultations with Natural England. Bio-security measures should be implemented during construction and operational phases. <p>Assumptions</p> <ul style="list-style-type: none"> It is assumed that the current licence would have been reviewed by the EA under the Habitats Regulations Review of Consents process thus operation is not expected to have any significant effects alone or in combination on any European conservation sites. It is assumed that the proposed phasing of the construction works to enable appropriate environmental mitigation and preparatory work, as agreed upon by

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<p>Natural England, would safeguard protected species present on the site although the detailed mitigation strategy is yet to be agreed.</p> <p>Uncertainty</p> <ul style="list-style-type: none"> The new reservoir might help contribute to the creation of a new habitat though this would depend on its design and management.
<p>2. To ensure the appropriate and efficient use of land and protect soil quality and geodiversity</p>	<p>Will the option minimise the loss of best and most versatile agricultural land?</p> <p>Will the option protect and enhance soil health?</p> <p>Will the option minimise conflict with existing land use patterns?</p> <p>Will the option minimise land contamination?</p> <p>Will the option utilise previously developed (brownfield) land?</p> <p>Will the option protect and enhance protected sites designated for their geological interest and wider geodiversity?</p>	-	0	<p>Effects of Construction</p> <p>Construction of the reservoir would involve a significant loss of semi-rural greenfield land; however, land take would consist of Grade 4 and non-agricultural land only, although the site is currently used for grazing.</p> <p>A new access road would be constructed to allow construction and operational traffic to join the reservoir site from the B2149 along an existing Forestry Commission gravel track. The construction/refurbishment of ancillary infrastructure, meanwhile, would be situated on previously developed land which should have a neutral effect on land use/soil quality.</p> <p>The proposed pipeline routes primarily underlie the road network (urban classified land) or non-agricultural land with minor sections of pipeline situated on Grade 3 agricultural land (Works A – Reservoir A pipeline). Excavated land would, however, be reinstated following the completion of construction.</p> <p>On balance, this option has been assessed as having a negative effect on SEA Objective 2.</p> <p>Effects of Operation</p> <p>There would be no operational effects on soils/land use resulting from the new reservoir (discounting the initial land take during the construction stage) or the new pipelines. There would be a 10m easement on the pipeline to protect it from future development which is likely to lead to some land sterilisation but this would be negligible since the majority of the pipeline underlays the urban road network.</p> <p>Overall, this option has been assessed as having a neutral effect on SEA Objective 2.</p> <p>Mitigation</p> <ul style="list-style-type: none"> Appropriate construction methods should be employed to minimise the risk of contamination.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<ul style="list-style-type: none"> Where possible, soil will be retained and reused on site. Clay from the footprint would be used to construct the embankments of the reservoir, whilst lower quality clay from the site may be used to construct the wetland retaining structure. Other soils from the site would be largely retained for landscaping. <p>Assumptions</p> <ul style="list-style-type: none"> It is expected that soils displaced during excavation associated with pipeline works would be replaced following the completion of construction activity. It has been assumed that development sites are not contaminated. It is assumed that Policy CS18 of the adopted Havant Core Strategy (2011) will continue to be upheld in future plans in respect to providing statutory assurance that land allocated under the policy remains the most appropriate location for a proposed reservoir thus preventing conflict with land use patterns in the area. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
3. To protect and enhance water quality and surface and groundwater resources and the ecological status of water bodies	<p>Will the option minimise the demand for water resources?</p> <p>Will the option protect and improve surface water, groundwater and coastal water quality?</p> <p>Will the option result in changes to river flows?</p> <p>Will the option result in changes to groundwater levels?</p> <p>Will the option prevent the deterioration of Water Framework Directive (WFD) waterbody status (or potential)?</p>	0	0	<p>Effects of Construction</p> <p>The new Havant Thicket reservoir would require a significant scale of excavation and construction which poses a high risk of soils and silt entering the three drainage streams on-site, and subsequently, Hermitage Stream and Langstone Harbour. Extraction works for the reservoir footprint could also disturb or pollute groundwater resources. Notwithstanding this, it is anticipated that best practices will be adhered to and mitigation implemented (such as dust suppression, soil containment and emergency response procedures) such that construction of the overall scheme would not affect water quality.</p> <p>Implementation of compensation/maintenance flows in conjunction with cited mitigation measures should further assist in preventing the diversion and/or obstruction of water flow from the three ephemeral drainage streams on-site.</p> <p>Overall, this option has been assessed as having a neutral effect on water (SEA Objective 3).</p> <p>Effects of Operation</p> <p>The operation of this option would reduce the flows of water entering Hermitage Stream via Riders Lane Stream, and subsequently, Chichester and Langstone Harbours; however, abstraction would operate during periods when Stream A and</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<p>Source B springs flows are sufficient to support drawdown. Furthermore, operation would remain within the current abstraction licence therefore it is assumed compensation releases to Riders Lane Stream and Hermitage Stream would be required under the terms of consents at the site. Regular discharges from the reservoir may consequently improve flows in the Riders Lane Stream and the Hermitage Stream throughout operation.</p> <p>Prior water quality modelling work has demonstrated that the operation of this option is not expected to cause deterioration in the Water Framework Directive status of the Chichester and Langstone Harbours. Modelling has also indicated that there may be some benefit in reducing nitrate concentrations entering Langstone Harbour in addition to moderating peaks in iron and manganese that are currently experienced in the streams. The modelling has also found that phosphate, ammonium, suspended soils and most metal concentrations will also be reduced.</p> <p>Overall, this option has been assessed as having a neutral effect on SEA Objective 3.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> It is assumed that construction activities would be undertaken in accordance with relevant best practice pollution prevention guidance and that appropriate mitigation would be implemented (such as dust suppression, soil containment and emergency response procedures). It is assumed that once operational, compensation discharges will be a requirement to ensure sufficient flows are maintained in the Hermitage Stream. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
4. To reduce the risk of flooding	<p>Will the option have the potential to cause or exacerbate flooding in the catchment area?</p> <p>Will the option have the potential to help alleviate flooding in the catchment area?</p> <p>Will the option enhance water infiltration and retention?</p>	0	+	<p>Effects of Construction</p> <p>The proposed reservoir would not be situated within Flood Zones 2 or 3 nor is it anticipated that construction would result in or exacerbate flooding elsewhere. The proposed Havant Thicket – Source B pipeline route would traverse and/or be immediately adjacent to Flood Zones 2/3 originating from Riders Lane Stream and Hermitage Stream whereas the Works A – Reservoir B pipeline would traverse Flood</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
	Will the option be at risk of flooding or be affected by flooding, if it occurred?			<p>Zone 3 emerging from Hermitage Stream. However, pipeline works could be scheduled to avoid periods of flooding.</p> <p>Overall, this option has been assessed as having a neutral effect on SEA Objective 4.</p> <p>Effects of Operation</p> <p>The new reservoir would provide flood storage which may assist in managing storm inflows within the Riders Lane Stream and Hermitage Stream catchment area. This operational benefit, however, would be minor if not negligible as Flood Zones 2/3 emerging from Hermitage Stream are downstream of the reservoir and are relatively small in area. Notwithstanding this, the increased uncertainty over future weather patterns suggests that the greater resilience to flooding would have a minor positive effect.</p> <p>Overall, this option has been assessed as having a minor positive effect on SEA Objective 4.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> It is assumed that an appropriate Flood Risk Assessment (FRA) would be undertaken prior to the implementation of this option with appropriate mitigation measures identified to ensure that flood risk is minimised. It is assumed that the releases from the reservoir would be adequately managed to ensure that there would be no additional flood risk following construction of the reservoir. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
5. To limit the causes and effects of climate change and increase resilience to the consequences of climate change	<p>Will the option reduce vulnerability to the effects of climate change by appropriate adaptation?</p> <p>Will the option increase environmental resilience to the effects of climate change?</p> <p>Will the option reduce or minimise greenhouse gas emissions?</p>	--	+	<p>Effects of Construction</p> <p>There would be c.44k vehicle movements over the 8 year implementation period (c. 5.5k per annum / 15 HGV movements per day) which could result in minor traffic congestion along the A3, A2030, B2149, B2177, and sections of the local road network which are utilised within pipeline routing or lead to targeted/proposed infrastructure. Vehicle movements and associated congestion would result in increased greenhouse gas emissions. It should be noted, however, that the majority</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
	Will the option deliver new infrastructure that is energy efficient or makes use of renewable energy sources?			<p>of material used in the construction of the reservoir embankments would be sourced on-site which would help reduce adverse effects resulting from transportation.</p> <p>During the construction phase, the use of plant machinery on-site would result in increased emissions of greenhouse gases whilst the materials used for construction would contain embodied carbon.</p> <p>Overall, the construction of this option would generate up to 20.4k tCO₂e (principally embodied carbon in construction materials) which has been assessed as having a significant negative effect on SEA Objective 5.</p> <p>Effects of Operation</p> <p>There would be increased operational energy demand associated with this option (259,500 kWh/year) as water would need to be pumped from Stream A and Source B springs to the reservoir in addition to pumping treated output from Works A WTW to Reservoir A and Reservoir B. This would result in emissions of 91 tonnes CO₂e/a.</p> <p>It may be possible to use the gravity flow from Havant Thicket Reservoir to Source B Water Works to generate small scale hydro-electricity.</p> <p>Once operational, the reservoir will create a conjunctive use system that will capitalise on forecasted wetter winters by enabling greater storage of water that would otherwise be discharged to the harbour during winter for use in the summer. The reservoir could therefore increase resilience to climatic and environmentally driven supply restrictions in the region.</p> <p>Overall, this option has been assessed as having a minor positive effect on SEA Objective 5.</p> <p>Mitigation</p> <ul style="list-style-type: none"> Measures to reduce greenhouse gas emissions during construction should be considered including, for example, the use of low emission plant. Where appropriate, the design of new infrastructure should incorporate the use of energy efficient materials and building techniques and, if appropriate, renewable energy provision. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<ul style="list-style-type: none"> None identified.
6. To maintain and enhance the economic and social wellbeing of the local community	<p>Will the option ensure sufficient infrastructure is in place for predicted population increases?</p> <p>Will the option create local employment opportunities?</p> <p>Will the option support the local and regional economy?</p> <p>Will the option ensure that an affordable supply of water is maintained and vulnerable customers protected?</p> <p>Will the option avoid disruption through effects on the transport network?</p>	<p>++/-</p>	<p>++</p>	<p>Effects of Construction</p> <p>The construction of this option would represent a substantial capital investment (£81m) that could have a significant positive effect on the local economy associated with employment opportunities and supply chain benefits generated by the development together with spend by construction workers and contractors.</p> <p>Utilisation of the road network for the majority of pipeline routing in conjunction with an increase in HGV movements is expected to cause congestion/driver delay within central and south-west Havant and northern Portsmouth. The temporary disruption of movement may also result in residual impacts on ease of access to Portsmouth and Langstone Harbours which could affect local/tourist economies (depending on the timing of the works), although such effects would be minor.</p> <p>Overall, the option has been assessed as having a mixed significant positive and minor negative effects on economic and social wellbeing (SEA Objective 6).</p> <p>Effects of Operation</p> <p>The new reservoir could potentially provide new social and recreational facilities and activities such as walking paths, fishing, boating, birdwatching hides, nature interpretation, community space, and picnic areas. In-turn, operation of the new reservoir may increase foot traffic within Portsmouth (estimated up to 125k visitors a year) which could provide a minor economic boost to local businesses.</p> <p>The increased capacity of 23 MI/d (50 MI/d Peak DO) would help ensure a continual supply of clean drinking water in cases of pollution incidents at the springs and during drought thus helping to ensure a greater volume of water is available for future populations, commercial increases, and any seasonal demands.</p> <p>Overall, the scheme would support economic/population growth which could result in a significant positive effect on the local economy and social-wellbeing.</p> <p>Mitigation</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<ul style="list-style-type: none"> Where possible, Portsmouth Water and any contractors should seek to utilise local labour. Where possible, Portsmouth Water and any contractors should seek to appoint local contractors/sub-contractors and utilise locally sourced materials. A detailed transport assessment should be undertaken as part of the EIA process <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> The extent to which the construction of this option would benefit the local economy/local labour market is uncertain.
7. To ensure the protection and enhancement of human health	<p>Will the option ensure the continuity of a safe and secure drinking water supply?</p> <p>Will the option ensure that surface water and bathing water quality are maintained within statutory standards?</p> <p>Will the option adversely affect human health by resulting in increased noise and/or adverse effects on air quality?</p> <p>Will the option affect opportunities for recreation and physical activity?</p>	-	++	<p>Effects of Construction</p> <p>Construction of Havant Thicket reservoir is not expected to significantly affect opportunities for recreation and physical activity as the majority of the site is not accessible for recreational purposes due to its current use as grazing land. There may, however, be minor adverse effects on adjacent sites used for recreation (Forestry Commission Havant Thicket, Rowland's Castle, Staunton Country Park). A public bridleway crosses the proposed reservoir site, although the Forestry Commission has previously indicated that this path can be permanently diverted around the boundary of the reservoir to the north using existing tracks before construction commences.</p> <p>Construction of the reservoir may temporarily affect water flow within Hermitage Stream during the construction period which could adversely affect angling on the stream and further downstream sites, although this is currently uncertain. Furthermore, excavation could result in a temporary disruption of use, or loss of amenity to, proximate grounds which host recreational walking and sport such as Hermitage Stream walking paths, St. Thomas More's rugby and recreational grounds, Bidbury Mead recreational grounds, Paulsgrove Park, and Watersedge Park.</p> <p>Construction of the reservoir may affect human health due to temporary noise disturbance and air quality impacts (dust); specifically, residential receptors west of Swanmore Road, east of B2149, and receptors further to the south beyond Staunton Country Park could be affected. However, significant effects are not</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<p>expected as the majority of these residential properties are set back from the site boundary and screened by existing trees.</p> <p>Pipeline works and HGV movements would primarily be routed through residential neighbourhoods including Leigh Park, Havant, Bedhampton, Works A, Drayton, Cosham, and Paulsgrove which would result in adverse but temporary noise disturbance and potential adverse air quality impacts. The construction/refurbishment of ancillary infrastructure, particularly within Source B water works, may also result in additional disturbance for proximate residential receptors.</p> <p>Overall, this option has been assessed as having a negative effect on human health (SEA Objective 7).</p> <p>Effects of Operation</p> <p>The scheme would not adversely affect human health due to increased noise, nuisance or disruption. The new reservoir could potentially provide new social and recreational facilities and activities such as walking paths, fishing, boating, birdwatching hides, nature interpretation, community space, and picnic areas which could promote healthy lifestyles.</p> <p>The increased capacity of 23 MI/d (50 MI/d PDO) would help ensure a continual supply of clean drinking water in cases of pollution incidents at the springs and during periods of drought thus generating a significant positive effect on health.</p> <p>Mitigation</p> <ul style="list-style-type: none"> Standard construction mitigation measures such as bunding, phasing of works, dust suppression and noise abatement could be adopted to help manage impacts on residential receptors. In addition to ensuring site access from north, the effects from any construction traffic would be minimised, with consideration on timings, frequency and variation of routing to minimise disruption. The public bridleway which crosses the proposed reservoir site would be permanently diverted around the boundary of the reservoir to the north using existing tracks before construction commences. <p>Assumptions</p> <ul style="list-style-type: none"> It is assumed that construction would adopt practices which seek to reduce noise/air quality impacts (such as those practices outlined under the Considerate Constructors' Scheme).

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				Uncertainty <ul style="list-style-type: none"> Construction of the reservoir may temporarily affect water flow within Hermitage Stream during the construction period which could adversely affect angling on the stream and further downstream sites, although this is currently uncertain.
8. To promote the wise use of resources	<p>Will the option minimise the demand for raw materials?</p> <p>Will the option lead to reduced leakage from the supply network?</p> <p>Will the option improve efficiency in water consumption?</p> <p>Will the option seek to minimise the demand for raw materials?</p> <p>Will the option reduce or minimise energy use?</p> <p>Will the option promote the re-use and recycling of waste materials and reduce the proportion of waste sent to landfill?</p> <p>Will the option promote the use of sustainable design and materials?</p>	-	-	Effects of Construction <p>Implementation of the proposed scheme would require a significant scale of new infrastructure and energy requirements; however, a majority of material used in the construction of the embankments would be sourced on-site, e.g. the reuse clay excavated from the footprint of the reservoir void, which would help reduce adverse effects resulting from resource use. Additionally, it is not envisaged that construction of the reservoir nor any other components within the scheme would result in significant waste streams.</p> <p>Overall, this option has been assessed as having a minor negative effect on SEA Objective 8.</p> Effects of Operation <p>There would be increased operational energy demand for this option (259,500 kWh/year) as water would need to be pumped from Stream A and Source B springs to the reservoir in addition to pumping treated output from Works A WTW to Reservoir A and Reservoir B. This would result in emissions of 91 tonnes CO₂e/a.</p> <p>It may be possible to use the gravity flow from Havant Thicket Reservoir to Source B Water Works to generate small scale hydro-electricity.</p> <p>Overall, this option has been assessed as having a negative effect on waste and resources (SEA Objective 8).</p> Mitigation <ul style="list-style-type: none"> The re-use of clay and soils from the site will significantly reduce waste streams and material imports. Construction and operational wastes should be reused/recycled where possible. Measures to reduce energy usage during construction should be considered including, for example, the use of low energy usage plant. Where appropriate, the design of new infrastructure should incorporate the use of energy efficient materials and building techniques and, if appropriate, renewable energy provision.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				Assumptions <ul style="list-style-type: none"> None identified. Uncertainty <ul style="list-style-type: none"> Opportunities to reduce waste, reuse materials and use recycled materials for construction are unknown at this stage. The exact resource requirements (e.g. volumes of specific materials) associated with the construction/operation of this option are unknown at this stage. The volume of waste generated under operation of this option is uncertain at this stage
9. To conserve and enhance cultural and historic assets	<p>Will the option conserve or enhance the historic environment, including heritage assets such as historic buildings, conservation areas, features, places and spaces, and their settings?</p> <p>Will the option avoid or minimise damage to archaeologically important sites?</p> <p>Will the option affect public access to, or enjoyment of, features of cultural heritage?</p>	-	0	Effects of Construction <p>The proposed reservoir site does not contain any designated heritage assets within its boundaries. Castle Scheduled Monument is c. 1.3km from the proposed site whereas nine Grade II Listed Buildings range from 250m to 450m. Due to the significant woodland buffer around the site, it is unlikely that construction would significantly affect the settings of these assets, although minor temporary impacts on setting may occur due to the scale of the works and intervening vantage points within the woodland screening.</p> <p>It should be noted that a southern section of the site is designated as part of the Sir George Staunton Registered Park and Gardens (Grade II listed) which would be directly affected by construction (e.g. loss of the Avenue woodland). It is expected, however, that site-specific mitigation and best practice (additional features and landscaping complementary to the historic landscape) would minimise negative effects on the setting of the historical assets.</p> <p>There are a number of Scheduled Monuments situated along the proposed pipeline routes ranging from 884m to 144m such that works may result in minor temporary effects on their settings. There are also approximately 28 Grade II / II* Listed Buildings situated along the proposed pipeline routes with 14 assets under 50m: the Golden Lion (10m); Bedhampton Arts Centre (12m); Manor Cottage (10m); New Inn (15m); and Nelson Monument (5m). Consequently, works could result in temporary adverse impacts on their settings, although no significant effects are expected to their structural integrity.</p> <p>Overall, this option has been assessed as having a negative effect on Objective 9.</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<p>Effects of Operation</p> <p>There would be no operational effects on designated cultural heritage assets.</p> <p>Mitigation</p> <ul style="list-style-type: none"> • Full Historic Assessment and documentation of Leigh Park Gardens before construction works begin should be undertaken. • All new features and landscaping will be of high quality design, sympathetic to the original concept of Staunton Park being 'pleasure' gardens. • Pipelines should be routed as to avoid direct impacts on cultural heritage assets. <p>Assumptions</p> <ul style="list-style-type: none"> • It is assumed that construction would adopt practices which seek to reduce potentially adverse impacts to cultural and historic assets if redesign and/or rerouting is not possible in the context of the given setting. <p>Uncertainty</p> <ul style="list-style-type: none"> • None identified.
<p>10. To conserve and enhance landscape character and other protected features</p>	<p>Will the option avoid adverse effects on, and enhance where possible, protected/designated landscapes (including woodlands), townscapes or seascapes such as National Parks or AONBs be avoided?</p> <p>Will the option affect public access to existing landscape features?</p> <p>Will the option minimise adverse visual impacts?</p>	--	+/?	<p>Effects of Construction</p> <p>The proposed reservoir is c. 1.1km from the South Downs National Park and c. 3.5km from Chichester Harbour AONB. As the site is visible from the South Downs National Park from a distance (to the east of Rowlands Castle), recreational receptors may perceive the works (plant, machinery, excavations and other related activities) as impacting the special qualities of the National Park.</p> <p>Proximate residential receptors may perceive construction as altering the local greenfield setting, and more so, the wider landscape character of the area. It should be noted, however, that effects would be mitigated by screening.</p> <p>Pipeline works would range from 1.3km to 1.5km from Chichester Harbour AONB, although it is unlikely that works would result in a significant effect on the AONB due to the urban setting of the pipeline route. Similarly, construction/refurbishment of ancillary infrastructure would be situated on existing operational sites such that works are expected to have a negligible landscape/visual impact.</p> <p>Overall, the magnitude of change resulting from the scheme would be large and the works relatively long term (up to 8 years). In consequence, the option has been assessed as having a significant negative effect on Objective 10.</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<p>Effects of Operation</p> <p>The proposed reservoir is c. 1.1km from the South Downs National Park and c. 3.5km from Chichester Harbour AONB. Although the reservoir would be visible from the South Downs National Park from a distance (to the east of Rowlands Castle), the maturation of landscaping/planting is expected to minimise any adverse effects perceived by recreational receptors in addition to potentially benefitting the amenity of the National Park's setting. Similarly, mitigation measures are expected to help assimilate the new landscape changes within the local setting such that proximate residential receptors will not perceive operation as adversely altering the wider landscape character of the area.</p> <p>Overall, the operation of the scheme would significantly change the local landscape character; however, the implementation of appropriate mitigation measures during the construction phase is expected to prevent any long-lasting adverse effects to landscape character and visual amenity while potentially providing minor benefits. In consequence, the option has been assessed as having a minor positive effect on Objective 10, although uncertainty remains.</p> <p>Mitigation</p> <ul style="list-style-type: none"> • Construction activity should be screened where possible as to avoid/minimise adverse landscape/visual impacts. • Use of planting and landscaping to create a more integrated and cohesive recreational feature. • New buildings could be designed to be sympathetic to their surroundings and the landscape design of the site in general could be designed to take account of the historic features close to the site. <p>Assumptions</p> <ul style="list-style-type: none"> • None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> • The exact design and scale of new infrastructure required under this option is unknown at this stage.

Option R021a: Source O DO Recovery

Option Summary

This option would increase deployable output from three boreholes at Source O. The existing boreholes are connected with by horizontal adits which are at a relatively high shallow level; as the water level is drawn down in dry conditions the adit is exposed and sediment causes water quality problems. The proposed solution is to extend the casing at the top of Borehole No 2 to block off the adits, and then to deepen the borehole by 24 m so that it matches the depth of Borehole No 1. The borehole pump would then be re-installed at a lower level to give greater drought resilience. The ADO would increase from 3.7 MI/d to the recent actual figure of 5.5 MI/d and would remain within existing licence.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
1. To ensure the protection and enhancement of biodiversity, priority habitats and species	<p>Will the option protect and enhance priority species, habitats and sites designated for their nature conservation value?</p> <p>Will the option protect and enhance non-designated sites and local biodiversity?</p> <p>Will the option provide opportunities for new habitat creation or restoration and link existing habitats as part of the development process?</p> <p>Will the option protect and enhance coastal and marine habitats and species?</p> <p>Will the option result in a change in the quality of habitats due to changes in groundwater/river water quality or quantity?</p> <p>Will the option affect riparian vegetation structure?</p>	0	0	<p>Effects of Construction</p> <p>This option involves small-scale construction works (extending the borehole and blocking adits) around the existing source boreholes. The boreholes are located over 2 km from designated sites (Kingley Vale SSSI, Chichester and Langstone Harbours SPA / Ramsar and Solent Maritime SAC). Although the boreholes are within a SSSI Impact Risk Zone the option is not listed as a development which could potentially have adverse impacts on Kingley Vale SSSI. The HRA has concluded no effects on designated sites during the construction phase assuming that any risks from contamination of surface waters by site-derived pollutants is adequately managed through the normal project planning process and standard best-practice measures. On this basis it is considered that construction work would not disturb or result in any detrimental impacts on designated sites (SEA Objective 1).</p> <p>Effects of Operation</p> <p>Operation of this option would not have any significant and/or adverse effects on designated sites due to the increased abstraction remaining within the current licence. This option has been assessed as having neutral effect on biodiversity (SEA Objective 1).</p> <p>Mitigation</p> <ul style="list-style-type: none"> Standard construction best practices pollution prevention guidance would be adopted and appropriate mitigation would be implemented (e.g. dust suppression, soil containment and emergency response procedures). <p>Assumptions</p> <ul style="list-style-type: none"> None identified <p>Uncertainty</p> <ul style="list-style-type: none"> None identified

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
2. To ensure the appropriate and efficient use of land and protect soil quality and geodiversity	<p>Will the option minimise the loss of best and most versatile agricultural land?</p> <p>Will the option protect and enhance soil health?</p> <p>Will the option minimise conflict with existing land use patterns?</p> <p>Will the option minimise land contamination?</p> <p>Will the option utilise previously developed (brownfield) land?</p> <p>Will the option protect and enhance protected sites designated for their geological interest and wider geodiversity?</p>	0	0	<p>Effects of Construction</p> <p>This options involves small scale construction works which would be carried out in the vicinity of the existing source boreholes. Overall, this option has been assessed as having a neutral effect on geology and soils (SEA Objective 2).</p> <p>Effects of Operation</p> <p>No impacts on land use or soils (SEA Objective 2) are anticipated during operational phase.</p> <p>Mitigation</p> <ul style="list-style-type: none"> • None identified <p>Assumptions</p> <ul style="list-style-type: none"> • None identified <p>Uncertainty</p> <ul style="list-style-type: none"> • None identified
3. To protect and enhance water quality and surface and groundwater resources and the ecological status of water bodies	<p>Will the option minimise the demand for water resources?</p> <p>Will the option protect and improve surface water, groundwater and coastal water quality?</p> <p>Will the option result in changes to river flows?</p> <p>Will the option result in changes to groundwater levels?</p> <p>Will the option prevent the deterioration of Water Framework Directive (WFD) waterbody status (or potential)?</p>	0	0	<p>Effects of Construction</p> <p>Construction works are not expected to affect water quality or quantity, provided best practices are adhered to and mitigation implemented. Overall, this option has been assessed as having a neutral effect on water quality and quantity (SEA Objective 3).</p> <p>Effects of Operation</p> <p>No additional abstraction outside current licence would occur as a result of this option. This has been assessed as having a neutral effect on water quality and quantity (SEA Objective 3).</p> <p>Mitigation</p> <ul style="list-style-type: none"> • Standard construction best practices pollution prevention guidance would be adopted and appropriate mitigation would be implemented (e.g. dust suppression, soil containment and emergency response procedures). <p>Assumptions</p> <ul style="list-style-type: none"> • None identified <p>Uncertainty</p> <ul style="list-style-type: none"> • None identified

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
4. To reduce the risk of flooding	<p>Will the option have the potential to cause or exacerbate flooding in the catchment area?</p> <p>Will the option have the potential to help alleviate flooding in the catchment area?</p> <p>Will the option enhance water infiltration and retention?</p> <p>Will the option be at risk of flooding or be affected by flooding, if it occurred?</p>	0	0	<p>Effects of Construction</p> <p>Construction works would be undertaken around the existing source boreholes which are located in Flood Zone 1. The nearest Flood Zone 3 is approximately 650 m southwest originating from Bosham Stream. On this basis, the construction works are not expected to be liable to flooding or to cause or exacerbate flooding elsewhere. Consequently, this option has been assessed as having a neutral effect on flood risk (SEA Objective 4).</p> <p>Effects of Operation</p> <p>Operation of this option is not expected to cause or exacerbate flooding elsewhere and has been assessed as having a neutral effect on flood risk (SEA Objective 4).</p> <p>Mitigation</p> <ul style="list-style-type: none"> • None identified <p>Assumptions</p> <ul style="list-style-type: none"> • None identified <p>Uncertainty</p> <ul style="list-style-type: none"> • None identified
5. To limit the causes and effects of climate change and increase resilience to the consequences of climate change	<p>Will the option reduce vulnerability to the effects of climate change by appropriate adaptation?</p> <p>Will the option increase environmental resilience to the effects of climate change?</p> <p>Will the option reduce or minimise greenhouse gas emissions?</p> <p>Will the option deliver new infrastructure that is energy efficient or makes use of renewable energy sources?</p>	?/-	0	<p>Effects of Construction</p> <p>Emissions of embodied carbon during the construction phase have not been quantified but are estimated to be low given the small scale of the construction works. Consistent with the definitions of significance, this option would have a minor negative effect on greenhouse gas emissions with some uncertainty remaining (SEA Objective 5).</p> <p>Effects of Operation</p> <p>Operation of this option will result in a minor increase in energy consumption from pumping and additional water treatment (yield 1.8 Ml/d). The total operational carbon emissions for this option have been estimated to be 45tCO₂e/a and are in consequence below that for the thresholds identified in the definitions of significance. It is considered that this option would have a neutral effect on greenhouse gas emissions (SEA Objective 5).</p> <p>Mitigation</p> <ul style="list-style-type: none"> • None identified <p>Assumptions</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<ul style="list-style-type: none"> Emissions of embodied carbon during the construction phase are likely to be low given the small scale of the construction works and assumed to have a minor negative effect on SEA Objective 5. The total operational carbon emissions for this option are likely to be very low (yield 1.8 MI/d) and assumed to have a neutral effect on SEA Objective 5. <p>Uncertainty</p> <ul style="list-style-type: none"> Emissions of embodied carbon during the construction phase and total operational carbon emissions for this option have not been quantified
6. To maintain and enhance the economic and social wellbeing of the local community	<p>Will the option ensure sufficient infrastructure is in place for predicted population increases?</p> <p>Will the option create local employment opportunities?</p> <p>Will the option support the local and regional economy?</p> <p>Will the option ensure that an affordable supply of water is maintained and vulnerable customers protected?</p> <p>Will the option avoid disruption through effects on the transport network?</p>	0	+	<p>Effects of Construction</p> <p>Given the small scale of the construction works expenditure is expected to be of insufficient scale to have a discernible positive effect on the local economy (through job creation). Disruption to the local traffic network as a result of construction activities it is not considered significant. This option is therefore considered to have a neutral impact on economic and social wellbeing (SEA Objective 6).</p> <p>Effects of Operation</p> <p>This option would contribute towards ensuring the continual supply of safe and secure drinking water (yield 1.8 MI/d). No nuisance effects are anticipated during operation of this option. Overall this option would support economic/population growth which could result in a minor positive effect on the local economy and social-wellbeing (SEA Objective 6).</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified <p>Assumptions</p> <ul style="list-style-type: none"> None identified <p>Uncertainty</p> <ul style="list-style-type: none"> None identified
7. To ensure the protection and enhancement of human health	<p>Will the option ensure the continuity of a safe and secure drinking water supply?</p> <p>Will the option ensure that surface water and bathing water quality are maintained within statutory standards?</p>	0	+	<p>Effects of Construction</p> <p>The scale of construction is expected to be minor / low-impact such that it is unlikely the works in the vicinity of the source boreholes would result in the disruption of use or loss of amenity. The cumulative impacts of noise/vibration disturbance and nuisance resulting from construction works is not expected to result in any discernible effect on human health. Consequently, this option has been assessed as having a neutral effect on SEA Objective 7.</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
	<p>Will the option adversely affect human health by resulting in increased noise and/or adverse effects on air quality?</p> <p>Will the option affect opportunities for recreation and physical activity?</p>			<p>Effects of Operation</p> <p>No nuisance effects are anticipated during operation of this option. This option would contribute towards ensuring the continual supply of safe and secure drinking water (yield 1.8 MI/d) generating a minor positive effect on human health (SEA Objective 7).</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified <p>Assumptions</p> <ul style="list-style-type: none"> None identified <p>Uncertainty</p> <ul style="list-style-type: none"> None identified
8. To promote the wise use of resources	<p>Will the option minimise the demand for raw materials?</p> <p>Will the option lead to reduced leakage from the supply network?</p> <p>Will the option improve efficiency in water consumption?</p> <p>Will the option seek to minimise the demand for raw materials?</p> <p>Will the option reduce or minimise energy use?</p> <p>Will the option promote the re-use and recycling of waste materials and reduce the proportion of waste sent to landfill?</p> <p>Will the option promote the use of sustainable design and materials?</p>	-	0	<p>Effects of Construction</p> <p>The construction works comprising borehole extension and blocking out of adits would require the use of raw materials and associated energy, with limited options to use sustainable materials or recycled product. Given the small scale of the construction works this has been assessed as having a minor negative effect on waste and resources (SEA Objective 8).</p> <p>Effects of Operation</p> <p>The operation of this option would not involve additional infrastructure but would result in additional energy consumption from pumping and additional water treatment (yield 1.8 MI/d). However, as it a very low additional amount (45tCO₂e/a), the option has been assessed as having a neutral effect on waste and resource use (SEA Objective 8).</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified <p>Assumptions</p> <ul style="list-style-type: none"> Energy consumption from operation of this option is assumed to be very low given the low additional abstraction (yield 1.8 MI/d) <p>Uncertainty</p> <ul style="list-style-type: none"> Energy consumption from operation of this option has not been quantified.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
9. To conserve and enhance cultural and historic assets	<p>Will the option conserve or enhance the historic environment, including heritage assets such as historic buildings, conservation areas, features, places and spaces, and their settings?</p> <p>Will the option avoid or minimise damage to archaeologically important sites?</p> <p>Will the option affect public access to, or enjoyment of, features of cultural heritage?</p>	0	0	<p>Effects of Construction</p> <p>The source boreholes are not located within or adjacent to designated heritage sites. The closest designated sites include the Funtington Scout Hall (Grade II Listed Building) and a Roman settlement site (Scheduled Monument) approximately 270 m southeast of the boreholes. On this basis it is considered that construction would have a neutral effect on the amenity or structural integrity of the designated heritage sites (SEA Objective 9).</p> <p>Effects of Operation</p> <p>Operation of this option would have no impact on designated heritage sites (SEA Objective 9).</p> <p>Mitigation</p> <ul style="list-style-type: none"> • None identified <p>Assumptions</p> <ul style="list-style-type: none"> • None identified <p>Uncertainty</p> <ul style="list-style-type: none"> • None identified
10. To conserve and enhance landscape character and other protected features	<p>Will the option avoid adverse effects on, and enhance where possible, protected/designated landscapes (including woodlands), townscapes or seascapes such as National Parks or AONBs be avoided?</p> <p>Will the option affect public access to existing landscape features?</p> <p>Will the option minimise adverse visual impacts?</p>	0	0	<p>Effects of Construction</p> <p>The source boreholes are located within the South Downs National Park. Construction works would be carried out in the vicinity of the existing source boreholes and the scale of the works is expected to be minor / low-impact such that any adverse impacts on local landscape features would be minor and over a short timescale. Overall, this option has been assessed as having a neutral effect on landscape (SEA Objective 10).</p> <p>Effects of Operation</p> <p>This option does not require new or changes to existing above ground infrastructure. Therefore operation of this option would have no impact on landscape features (SEA Objective 10).</p> <p>Mitigation</p> <ul style="list-style-type: none"> • None identified <p>Assumptions</p> <ul style="list-style-type: none"> • None identified



Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				Uncertainty <ul style="list-style-type: none">• None identified

Option R022a: Source J Group – Maximising DO

Option Summary

This option would involve the development of two new boreholes at the existing Source J WTW site which includes a pumping station and three operational boreholes (16 MI/d). The approximate locations of the two new boreholes would be within a 300m radius of the existing WTW and pumping station; specifically, borehole #4 would be within the vicinity of Meadows Farm whereas borehole #5 would be situated outside of Yew Tree Cottage. The boreholes would be 140 m deep with additional pumps and new raw water mains (300m) connecting the boreholes to the existing raw water network. Implementation of the scheme would also require modifications to the WTW's treatment processes regarding additional chlorine and orthophosphoric acid treatment. Once operational, the new boreholes will abstract a cumulative 12.5 MI/d thus increasing the facility's overall abstraction volume from the existing DO of 10.2 MI/d to 22.7 MI/d which would remain within the peak existing licence (25.20 MI/d). It should be noted that the new boreholes, pipeline mains, and treatment processes would require periodic maintenance over their lifetime.

Assessment

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
1. To ensure the protection and enhancement of biodiversity, priority habitats and species	<p>Will the option protect and enhance priority species, habitats and sites designated for their nature conservation value?</p> <p>Will the option protect and enhance non-designated sites and local biodiversity?</p> <p>Will the option provide opportunities for new habitat creation or restoration and link existing habitats as part of the development process?</p> <p>Will the option protect and enhance coastal and marine habitats and species?</p> <p>Will the option result in a change in the quality of habitats due to changes in groundwater/river water quality or quantity?</p> <p>Will the option affect riparian vegetation structure?</p>	0	0/?	<p>Effects of Construction</p> <p>The development site is not within any statutory or non-statutory biodiversity designations. Butser Hill SAC is c.12km from the site whereas Portsmouth Harbour (SPA/Ramsar/SSSI), and its subsequent linkages to Solent Maritime SAC, Chichester and Langstone Harbours (SPA/Ramsar/SSSIs), and Solent and Isle of Wight Lagoons SAC are c.15km downstream via an unnamed drainage stream on-site feeding into Wallington River. HRA Screening has concluded that there are no clear impact pathways associated with construction to Butser Hill (which has been designated due to its yew dominated woodland). Similarly, construction would not be within the immediate proximity of the unnamed drainage stream on-site which suggests that the risk of introducing pollution/debris within the local water network, and subsequently, Portsmouth Harbour and the other sites, is negligible.</p> <p>Lye Heath Marsh SSSI and Hook Heath Meadows SSSI are c. 3.7km from the proposed site; however, it is assumed that the development of the new boreholes and pipelines would be low intensity work such that impacts on these SSSI are not expected. Furthermore, construction activity would take place within an existing operational site which should further moderate any adverse effects on proximate</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<p>habitats and wildlife situated within the surrounding greenfield land and the Forest of Bere.</p> <p>Overall, this option has been assessed as having a neutral effect on SEA Objective 1.</p> <p>Effects of Operation</p> <p>The scheme would abstract a cumulative 12.5 Ml/d thus increasing the facility's overall abstraction volume to 22.7 Ml/d; however, this would remain within the peak existing licence (25.20 Ml/d). It is assumed that the existing abstraction licence would have been subject to review under the EA Habitats Regulations Review of Consents process thus significant effects on European designated conservation sites are unlikely. In this context, HRA Screening has concluded that there would be no likely significant effects on Butser Hill SAC due to a lack of clear impact pathways whereas Solent Maritime SAC does not contain any interest features sensitive to water resource permissions. Effects on Portsmouth Harbour (SPA/Ramsar/SSSI), Chichester and Langstone Harbours (SPA/Ramsar/SSSIs), and Solent and Isle of Wight Lagoons SAC would be negligible due to intervening water inputs.</p> <p>Prior WFD studies have concluded that the Source J source has little impact on the River Wallington such that it is unlikely that abstraction would significantly affect in-river habitats and aquatic wildlife. Notwithstanding this, it is currently unknown whether increased abstraction would affect designated conservation sites such as Lye Heath Marsh whose interest features depend on groundwater resources. Consequently, this option has been assessed as having a neutral effect on SEA Objective 1, although uncertainty remains</p> <p>Mitigation</p> <ul style="list-style-type: none"> • Undertake further assessment to confirm that there are no effects on Lye Heath Marsh SSSI. • The utilisation of scheme specific mitigation measures and established best practice throughout the implementation period is expected to minimise and/or prevent significant and/or adverse construction effects on both local wildlife features and designated conservation areas. • The works programme and requirements should be determined at the earliest opportunity to allow investigation schemes, protected species surveys and mitigation to be appropriately scheduled and to provide sufficient time for consultations with Natural England.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<ul style="list-style-type: none"> Bio-security measures should be implemented during construction and operational phases. <p>Assumptions</p> <ul style="list-style-type: none"> It is assumed that the current licence would have been reviewed by the EA under the Habitats Regulations Review of Consents process thus operation is not expected to have any significant effects alone or in combination on any European conservation sites. Assumes that as abstraction is within the confined chalk, impacts on surface watercourses (River Wallington) will be negligible. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
2. To ensure the appropriate and efficient use of land and protect soil quality and geodiversity	<p>Will the option minimise the loss of best and most versatile agricultural land?</p> <p>Will the option protect and enhance soil health?</p> <p>Will the option minimise conflict with existing land use patterns?</p> <p>Will the option minimise land contamination?</p> <p>Will the option utilise previously developed (brownfield) land?</p> <p>Will the option protect and enhance protected sites designated for their geological interest and wider geodiversity?</p>	0	0	<p>Effects of Construction</p> <p>There would be a temporary loss of greenfield land during the construction period as the proposed works would involve drilling two new boreholes (requiring a temporary drilling rig) and pipeline excavation, although disturbed land would be reinstated following the completion of the works. Notwithstanding this, implementation of the scheme would require permanent land take (Grade 4 agricultural land) in order to develop the new boreholes, although this would be minor and situated within Source J WTW's operational footprint which should minimise conflict within existing land-use patterns.</p> <p>No significant construction activity is required at the existing works as it is considered that the additional treatment capacity can be accommodated within the existing facility.</p> <p>It is not expected that geologically protected sites would be adversely affected by the construction of this scheme.</p> <p>Overall, this option has been assessed as having a neutral effect on Objective 2.</p> <p>Effects of Operation</p> <p>Once construction activity is complete, no ongoing impact on land use/soils is expected; consequently, operational effects on land use/soil have been assessed as neutral.</p> <p>Mitigation</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<ul style="list-style-type: none"> Standard construction best practices could be adopted to reduce the risk of construction derived pollutants (oils, etc) escaping to soils on or off the site. <p>Assumptions</p> <ul style="list-style-type: none"> It is expected that soils displaced during excavation associated with pipeline works would be replaced following the completion of construction activity. It is assumed that there is no land contamination on the site of the new boreholes. <p>Uncertainty</p> <ul style="list-style-type: none"> The exact location of the new boreholes and the route of transfer pipelines to the existing treatment works are to be determined.
3. To protect and enhance water quality and surface and groundwater resources and the ecological status of water bodies	<p>Will the option minimise the demand for water resources?</p> <p>Will the option protect and improve surface water, groundwater and coastal water quality?</p> <p>Will the option result in changes to river flows?</p> <p>Will the option result in changes to groundwater levels?</p> <p>Will the option prevent the deterioration of Water Framework Directive (WFD) waterbody status (or potential)?</p>	0	0	<p>Effects of Construction</p> <p>It is assumed that construction activities would be undertaken in accordance with relevant best practice pollution prevention guidance and that appropriate mitigation would be implemented (such as dust suppression, soil containment and emergency response procedures). In consequence, the option has been assessed as having a neutral effect on this objective during construction.</p> <p>Effects of Operation</p> <p>The option would result in the overall abstraction of up to 22.7 Ml/d which is within the existing abstraction licence. Abstraction would be from a confined chalk aquifer thus effects on river flows are expected to be negligible as there is no direct hydraulic link between groundwater abstraction and surface water flows. Prior WFD assessment further corroborates this assumption as it concluded the Source J source has little impact on the River Wallington, and furthermore, more water could be abstracted from the confined chalk at this location.</p> <p>Overall, this option has been assessed as having a neutral effect on Objective 3.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> It is assumed that construction activities would be undertaken in accordance with relevant best practice pollution prevention guidance and that appropriate

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<p>mitigation would be implemented (such as dust suppression, soil containment and emergency response procedures).</p> <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
4. To reduce the risk of flooding	<p>Will the option have the potential to cause or exacerbate flooding in the catchment area?</p> <p>Will the option have the potential to help alleviate flooding in the catchment area?</p> <p>Will the option enhance water infiltration and retention?</p> <p>Will the option be at risk of flooding or be affected by flooding, if it occurred?</p>	0	0	<p>Effects of Construction</p> <p>Construction would not cause or exacerbate flooding in the area, nor would the site be at risk from flooding.</p> <p>Effects of Operation</p> <p>During operation, this option is not expected to cause or exacerbate flooding in the area or elsewhere nor would the new boreholes and modified water treatment works be at risk of flooding as all aboveground infrastructure would be located within Flood Zone 1.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> It is assumed that an appropriate Flood Risk Assessment (FRA) would be undertaken prior to the implementation of this option with appropriate mitigation measures identified to ensure that flood risk is minimised. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
5. To limit the causes and effects of climate change and increase resilience to the consequences of climate change	<p>Will the option reduce vulnerability to the effects of climate change by appropriate adaptation?</p> <p>Will the option increase environmental resilience to the effects of climate change?</p> <p>Will the option reduce or minimise greenhouse gas emissions?</p> <p>Will the option deliver new infrastructure that is energy efficient or makes use of renewable energy sources?</p>	-	+/-	<p>Effects of Construction</p> <p>There would be c.365 vehicle movements over the 1 year implementation period (c. 1 HGV movement per day) which is not expected to result in any discernible traffic impacts regarding congestion/delay or significant greenhouse gas emissions.</p> <p>Implementation of the option would require new infrastructure and energy usage with limited opportunity to use recycled materials. Embodied carbon in new materials (108 tCO₂e) together with the use of plant and machinery (i.e. fuel consumption) is predicted to generate 156 tCO₂e during the construction period which has been assessed as having a minor negative effect on climate change (SEA Objective 5).</p> <p>Effects of Operation</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<p>The operation of this option would have an operational energy demand of 657,000 kWh/a for groundwater abstraction/pumping which would generate 230 tCO₂e per annum.</p> <p>The predicted effects of climate change (including drier summers) mean that this option would contribute positively to climate change adaptation by increasing water supply.</p> <p>There are no immediate plans to include renewable energy provision within the design of this option.</p> <p>Overall, this option has been assessed as having a minor negative effect on climate change (SEA Objective 5).</p> <p>Mitigation</p> <ul style="list-style-type: none"> Measures to reduce greenhouse gas emissions during construction should be considered including, for example, the use of low emission plant. Where appropriate, the design of new infrastructure should incorporate the use of energy efficient materials and building techniques and, if appropriate, renewable energy provision. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
<p>6. To maintain and enhance the economic and social wellbeing of the local community</p>	<p>Will the option ensure sufficient infrastructure is in place for predicted population increases?</p> <p>Will the option create local employment opportunities?</p> <p>Will the option support the local and regional economy?</p> <p>Will the option ensure that an affordable supply of water is maintained and vulnerable customers protected?</p> <p>Will the option avoid disruption through effects on the transport network?</p>	0	++	<p>Effects of Construction</p> <p>The construction of the option would represent a minor capital investment (£2.1m) which is not expected to generate a significant number of jobs in the long-term nor result in a discernible effect on the local economy associated with supply chain benefits (e.g. associated with the supply of raw materials and appointment of contractors to undertake the works).</p> <p>Due to the minor scale of the construction works, it is not expected that associated HGV movements would cause congestion and/or disruption/driver delay on the local road network.</p> <p>Overall, the option has been assessed as having a neutral effect on economic and social wellbeing (SEA Objective 6).</p> <p>Effects of Operation</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<p>The option has a design capacity of 12.5 Ml/d, serving to meet short term peak demands as well as addressing the deficit within the Portsmouth Water District Metering Zone which is based on critical period average demand. This may support economic and population growth. The additional supply may also ensure that an affordable supply of water is maintained in the long term, serving to protect vulnerable customers.</p> <p>Overall, in view of the overall design capacity of this option, effects on this objective have been assessed as significantly positive.</p> <p>Mitigation</p> <ul style="list-style-type: none"> Where possible, Portsmouth Water and any contractors should seek to utilise local labour. Where possible, Portsmouth Water and any contractors should seek to appoint local contractors/sub-contractors and utilise locally sourced materials. <p>Assumptions</p> <ul style="list-style-type: none"> A detailed transport assessment should be undertaken as part of the EIA process (if/as required). <p>Uncertainty</p> <ul style="list-style-type: none"> The extent to which the construction of this option would benefit the local economy/local labour market is uncertain.
<p>7. To ensure the protection and enhancement of human health</p>	<p>Will the option ensure the continuity of a safe and secure drinking water supply?</p> <p>Will the option ensure that surface water and bathing water quality are maintained within statutory standards?</p> <p>Will the option adversely affect human health by resulting in increased noise and/or adverse effects on air quality?</p> <p>Will the option affect opportunities for recreation and physical activity?</p>	0/?	++	<p>Effects of Construction</p> <p>The option is not expected to significantly affect opportunities for recreation and physical activity during the construction period, although there may be minor temporary noise disturbance (drilling) to walkers within the general vicinity of the development site (e.g. in the Forest of Bere).</p> <p>There may be a risk of noise disturbance/air quality impacts associated with drilling/excavation which could affect proximate residential receptors; specifically, there are two residential properties which face the site from the north, a residential property to the east, a public house (Chairmakers Arms) to the west, and ribbon development along Forest Road and Apless Lane. It should be noted, however, that the exact location of the new boreholes is uncertain and may be located away from the residential receptors.</p> <p>On balance, this option has been assessed as having a neutral effect on SEA Objective 7, although some uncertainty remains.</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<p>Effects of Operation</p> <p>The scheme would not adversely affect human health due to increased noise, nuisance or disruption, nor would it affect opportunities for recreation.</p> <p>The option has a design capacity of 12.5 Ml/d, serving to address deficit within the Portsmouth Water District Metering Zone. The option may also remove the vulnerability to short duration droughts within this zone by helping to ensure a continual supply of clean drinking water is available.</p> <p>Overall, the option has been assessed as having a significant positive effect on health (SEA Objective 7).</p> <p>Mitigation</p> <ul style="list-style-type: none"> Standard construction mitigation measures such as bunding, phasing of works, dust suppression and noise abatement could be adopted to help manage the impacts on residential receptors. <p>Assumptions</p> <ul style="list-style-type: none"> It is assumed that construction would adopt practices which seek to reduce noise/air quality impacts (such as those practices outlined under the Considerate Constructors' Scheme). <p>Uncertainty</p> <ul style="list-style-type: none"> The exact location of the new boreholes and the route of transfer pipelines to the existing treatment works are to be determined.
8. To promote the wise use of resources	<p>Will the option minimise the demand for raw materials?</p> <p>Will the option lead to reduced leakage from the supply network?</p> <p>Will the option improve efficiency in water consumption?</p> <p>Will the option seek to minimise the demand for raw materials?</p> <p>Will the option reduce or minimise energy use?</p> <p>Will the option promote the re-use and recycling of waste materials and reduce the proportion of waste sent to landfill?</p>	-	-	<p>Effects of Construction</p> <p>The implementation of this option would require new infrastructure and energy usage with limited opportunity to use recycled materials. The embodied carbon of new materials (108 tCO₂e) together with the use of plant and machinery (i.e. fuel consumption) is predicted to generate 156 tCO₂e during the construction period.</p> <p>This option would generate construction wastes which may include excavation waste and infrastructural waste (e.g. water treatment work equipment).</p> <p>Overall, this option has been assessed as having a minor negative effect on resource use (SEA Objective 8).</p> <p>Effects of Operation</p> <p>The operation of this option would require additional resources such as chemicals used in the treatment of raw water. The treatment and pumping of water would also</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
	Will the option promote the use of sustainable design and materials?			<p>result in a long term increase in energy use (operation energy usage is estimated to be approximately 657,000 KWh/MI) which would generate 230 tCO₂e per annum.</p> <p>The treatment of water would generate waste (e.g. sludge), although quantities are uncertain at this stage.</p> <p>Overall, the operation of this option has been assessed as having a minor negative effect on resource use.</p> <p>Mitigation</p> <ul style="list-style-type: none"> Construction and operational wastes should be reused/recycled where possible. Measures to reduce energy usage during construction should be considered including, for example, the use of low energy usage plant. The upgrade to the existing WTW could seek to promote the use of sustainable design and materials, for example by using recycled material where possible. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> Opportunities to reduce waste, reuse materials and use recycled materials for construction are unknown at this stage. The exact resource requirements (e.g. volumes of specific materials) associated with the construction/operation of this option are unknown at this stage. The volume of waste generated under operation of this option is uncertain at this stage
9. To conserve and enhance cultural and historic assets	<p>Will the option conserve or enhance the historic environment, including heritage assets such as historic buildings, conservation areas, features, places and spaces, and their settings?</p> <p>Will the option avoid or minimise damage to archaeologically important sites?</p> <p>Will the option affect public access to, or enjoyment of, features of cultural heritage?</p>	0	0	<p>Effects of Construction</p> <p>The Source J site does not include, nor is it situated within close proximity to, any heritage features. The nearest Scheduled Monuments are located approximately 1.2km to the northeast of the existing water treatment works (three bell barrows between 200 and 300 metres north of Great Ervills Farm). Additionally, three Grade II Listed Buildings are located within the general vicinity of the works: Pillar Box (c. 500m) and Hipley Farm Granary and Tythe Barn (968m). Due to the distance of these assets from the Source J site, the scale of construction works and location of the development within an existing site that benefits from a woodland buffer, it is not expected that construction works would result in any adverse effects on the settings of these assets.</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<p>Overall, this option has been assessed as having a neutral effect on Objective 9.</p> <p>Effects of Operation</p> <p>There would be no operational effects on designated cultural heritage assets.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> The exact location of the new boreholes and the route of transfer pipelines to the existing treatment works are to be determined.
<p>10. To conserve and enhance landscape character and other protected features</p>	<p>Will the option avoid adverse effects on, and enhance where possible, protected/designated landscapes (including woodlands), townscapes or seascapes such as National Parks or AONBs be avoided?</p> <p>Will the option affect public access to existing landscape features?</p> <p>Will the option minimise adverse visual impacts?</p>	-	0	<p>Effects of Construction</p> <p>The Source J site is not within or immediately proximate to any landscape designations. The site is located approximately 1.5 km south of the southern border of South Downs National Park; however, taking into account the minor scale of works required (a drilling rig and other plant/machinery) to construct the borehole headworks and transfer pipelines, their distance from the Park and location within an existing site that benefits from screening, not effects on this asset are expected.</p> <p>As development would be situated within an established operational site and would be small in scale, localised landscape/visual impacts are likely to be very minor, although works could have short term adverse impacts on proximate residential receptors.</p> <p>Overall, this option has been assessed as having a minor negative effect on Objective 10.</p> <p>Effects of Operation</p> <p>The new boreholes at the Source J site would introduce new aboveground infrastructure within a semi-rural greenfield setting; however, permanent changes to landscape character are considered insignificant as it assumed that the new boreholes would be part-and-parcel to the existing operational site and especially given the fact that only a low-level chamber(s) would be visible at the surface above the boreholes. Furthermore, it is not expected that the new boreholes would be visible from the South Downs National Park.</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<p>Overall, any landscape/visual impact is expected to be very minor, and a neutral effect has been identified in respect of Objective 10.</p> <p>Mitigation</p> <ul style="list-style-type: none"> It may be possible to screen the low-level chambers using planting or other techniques such as housing in a field barn structure using local materials, which is in-keeping with the local landscape. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> The exact design and scale of new infrastructure required under this option is unknown at this stage. The exact location of the new boreholes and the route of transfer pipelines to the existing treatment works are to be determined.

Option R023a Source H DO Recovery

Option Summary

This option would increase DO from the Source H source which is currently constrained by water quality problems at higher flows. This option would involve cleaning the boreholes of sediment by air lifting following a maximum flow pumping test. Overall, this option would return the source AOD to the licence figure of 9.1 MI/d resulting in a yield benefit of 2 MI/d.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
1. To ensure the protection and enhancement of biodiversity, priority habitats and species	<p>Will the option protect and enhance priority species, habitats and sites designated for their nature conservation value?</p> <p>Will the option protect and enhance non-designated sites and local biodiversity?</p> <p>Will the option provide opportunities for new habitat creation or restoration and link existing habitats as part of the development process?</p> <p>Will the option protect and enhance coastal and marine habitats and species?</p> <p>Will the option result in a change in the quality of habitats due to changes in groundwater/river water quality or quantity?</p> <p>Will the option affect riparian vegetation structure?</p>	0	?	<p>Effects of Construction</p> <p>This option involves small-scale construction works around the existing source boreholes. The closest designated site is Galley Down Wood SSSI approximately 3.8 km northwest. Other designated sites over 4 km from the source include The Moors, Bishop's Waltham SSSI and Waltham Chase Meadows SSSI and over 8 km from the source include Botley Wood and Everett's and Mushes Copses SSSI, Solent and Southampton Water RAMSAR / SPA, Upper Hamble Estuary and Woods SSSI, Solent Maritime SAC. The source boreholes are located near the River Meon which is not a European designated site but flows into the Solent and Southampton Water RAMSAR / SPA. It is assumed that cleaning of the source boreholes would be confined within the existing site and best practices would be adhered to. On this basis it is considered that construction work would not disturb or result in any detrimental impacts on these sites (SEA Objective 1).</p> <p>Effects of Operation</p> <p>The additional abstraction would be within the current licence. However, the EA has expressed some reservations that this option could have a negative effect on the lower reaches of the River Meon during periods of low flow in combination with existing abstractions for spray irrigation. As the River Meon flows into the Solent and Southampton Water RAMSAR / SPA, this in combination effect during low flows could affect the designated site although until further investigation is conducted, this is uncertain. On this basis, whilst within licensed amount, the operation of this option is assessed as uncertain on biodiversity (SEA Objective 1).</p> <p>Mitigation</p> <ul style="list-style-type: none"> Standard construction best practices pollution prevention guidance would be adopted and appropriate mitigation would be implemented (e.g. dust

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<p>suppression, and emergency response procedures) to prevent any impacts on the River Meon.</p> <p>Assumptions</p> <ul style="list-style-type: none"> None identified <p>Uncertainty</p> <ul style="list-style-type: none"> Effect of the additional abstraction on the lower reaches of the River Meon and the Solent and Southampton Water RAMSAR / SPA is unknown and requires further investigation.
<p>2. To ensure the appropriate and efficient use of land and protect soil quality and geodiversity</p>	<p>Will the option minimise the loss of best and most versatile agricultural land?</p> <p>Will the option protect and enhance soil health?</p> <p>Will the option minimise conflict with existing land use patterns?</p> <p>Will the option minimise land contamination?</p> <p>Will the option utilise previously developed (brownfield) land?</p> <p>Will the option protect and enhance protected sites designated for their geological interest and wider geodiversity?</p>	0	0	<p>Effects of Construction</p> <p>The small scale construction works (air lifting of the boreholes) would be carried out in the vicinity of the existing source boreholes. No changes or new above ground pipework are required. Overall, this option has been assessed as having a neutral effect on geology and soils (SEA Objective 2).</p> <p>Effects of Operation</p> <p>No impacts on land use or soils (SEA Objective 2) are anticipated during operational phase.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified <p>Assumptions</p> <ul style="list-style-type: none"> None identified <p>Uncertainty</p> <ul style="list-style-type: none"> None identified

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
3. To protect and enhance water quality and surface and groundwater resources and the ecological status of water bodies	<p>Will the option minimise the demand for water resources?</p> <p>Will the option protect and improve surface water, groundwater and coastal water quality?</p> <p>Will the option result in changes to river flows?</p> <p>Will the option result in changes to groundwater levels?</p> <p>Will the option prevent the deterioration of Water Framework Directive (WFD) waterbody status (or potential)?</p>	0	?	<p>Effects of Construction</p> <p>It is not expected that construction activity would affect water quality or quantity (SEA Objective 3), provided best practices are adhered to and mitigation implemented (e.g. dust suppression, and emergency response procedures).</p> <p>Effects of Operation</p> <p>No additional abstraction outside current licence would occur as a result of this option. However as stated above the additional abstraction could have a negative effect on the lower reaches of the River Meon (Main River) during periods of low flow in combination with existing abstractions for spray irrigation. In the 2016 WFD classification (Cycle 2) the River Meon was classified as at moderate ecological status and good chemical status. The magnitude of the potential impact on the River Meon remains uncertain until further investigation is conducted. On this basis, whilst within licensed amount, the operation of this option is assessed as having an uncertain effect on water quality and quantity (SEA Objective 3).</p> <p>Mitigation</p> <ul style="list-style-type: none"> Standard construction best practices pollution prevention guidance would be adopted and appropriate mitigation would be implemented (e.g. dust suppression, and emergency response procedures) to prevent any impacts on the River Meon. <p>Assumptions</p> <ul style="list-style-type: none"> None identified <p>Uncertainty</p> <ul style="list-style-type: none"> Effect of the additional abstraction on the lower reaches of the River Meon and the Solent and Southampton Water RAMSAR / SPA is unknown and requires further investigation.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
4. To reduce the risk of flooding	<p>Will the option have the potential to cause or exacerbate flooding in the catchment area?</p> <p>Will the option have the potential to help alleviate flooding in the catchment area?</p> <p>Will the option enhance water infiltration and retention?</p> <p>Will the option be at risk of flooding or be affected by flooding, if it occurred?</p>	--	0	<p>Effects of Construction</p> <p>The source boreholes and pumping station are located in Flood Zone 3 associated with the River Meon. Activities would be at risk of flooding (1 in 100 or greater annual probability of river flooding), but would neither exacerbate nor reduce the risk of flooding. Consequently, due to its location in Flood Zone 3, this option has been assessed as having a significant negative effect on flood risk (SEA Objective 4).</p> <p>Effects of Operation</p> <p>This option requires no changes to the existing above ground pipework. Operation of this option is not expected to cause or exacerbate flooding elsewhere although the existing boreholes and pumping station may be at risk of flooding during operation. This option has been assessed as having a neutral effect on flood risk (SEA Objective 4).</p> <p>Mitigation</p> <ul style="list-style-type: none"> Appropriate mitigation would be implemented during construction works to ensure safety of construction workers (e.g. review timings of works, preparation of Emergency Flood Response Plan). <p>Assumptions</p> <ul style="list-style-type: none"> None identified <p>Uncertainty</p> <ul style="list-style-type: none"> None identified
5. To limit the causes and effects of climate change and increase resilience to the consequences of climate change	<p>Will the option reduce vulnerability to the effects of climate change by appropriate adaptation?</p> <p>Will the option increase environmental resilience to the effects of climate change?</p> <p>Will the option reduce or minimise greenhouse gas emissions?</p>	-/0/?	0	<p>Effects of Construction</p> <p>Emissions of embodied carbon from construction of this option have not been quantified but are estimated to be low given the small scale of the construction works associated with borehole air lifting. It is considered that this option would have a minor negative/neutral effect on greenhouse gas emissions with some uncertainty remaining (SEA Objective 5).</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
	Will the option deliver new infrastructure that is energy efficient or makes use of renewable energy sources?			<p>Effects of Operation</p> <p>The total operational carbon emissions from this option associated with additional energy consumption for pumping and additional water treatment (yield 2 Ml/d) are estimated to be very low (2tCO₂e/a) and are below that for the thresholds identified in the definitions of significance. In consequence, it is considered that this option would have a neutral effect on greenhouse gas emissions (SEA Objective 5).</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified <p>Assumptions</p> <ul style="list-style-type: none"> Emissions of embodied carbon from construction of this option are likely to be low given the small scale of the construction works and assumed to have a minor negative/neutral effect on SEA Objective 5. The total operational carbon emissions for this option are likely to be very low (yield 2 Ml/d) and assumed to have a neutral effect on SEA Objective 5. <p>Uncertainty</p> <ul style="list-style-type: none"> Emissions of embodied carbon during the construction phase and total operational carbon emissions for this option have not been quantified
6. To maintain and enhance the economic and social wellbeing of the local community	<p>Will the option ensure sufficient infrastructure is in place for predicted population increases?</p> <p>Will the option create local employment opportunities?</p> <p>Will the option support the local and regional economy?</p> <p>Will the option ensure that an affordable supply of water is maintained and vulnerable customers protected?</p> <p>Will the option avoid disruption through effects on the transport network?</p>	0	+	<p>Effects of Construction</p> <p>The scale of the construction work is expected to be minor and therefore expenditure is likely to be of insufficient scale to have a discernible positive effect on the local economy through generation local employment opportunities. Disruption to the local traffic network as a result of construction activities it is not considered significant. Overall this option is considered to have a neutral impact on economic and social wellbeing (SEA Objective 6).</p> <p>Effects of Operation</p> <p>No nuisance effects are anticipated during operation of this option. This option would contribute towards ensuring the continual supply of safe and secure drinking</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<p>water (yield 2 MI/d) resulting in a minor positive effect on the local economy and social-wellbeing (SEA Objective 6).</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified <p>Assumptions</p> <ul style="list-style-type: none"> None identified <p>Uncertainty</p> <ul style="list-style-type: none"> None identified
<p>7. To ensure the protection and enhancement of human health</p>	<p>Will the option ensure the continuity of a safe and secure drinking water supply?</p> <p>Will the option ensure that surface water and bathing water quality are maintained within statutory standards?</p> <p>Will the option adversely affect human health by resulting in increased noise and/or adverse effects on air quality?</p> <p>Will the option affect opportunities for recreation and physical activity?</p>	0	+	<p>Effects of Construction</p> <p>Given the relative small scale of the construction works which would be limited to the area around the boreholes it is considered unlikely that disruption of use or loss of amenity would occur. The cumulative impacts of noise/vibration disturbance and nuisance resulting from construction works is not expected to result in any discernible effect on human health. Consequently, this option has been assessed as having a neutral effect on SEA Objective 7.</p> <p>Effects of Operation</p> <p>No nuisance effects are anticipated during operation of this option. This option would contribute towards ensuring the continual supply of safe and secure drinking water (yield 2 MI/d) resulting in a minor positive effect on human health (SEA Objective 7).</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified <p>Assumptions</p> <ul style="list-style-type: none"> None identified

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				Uncertainty <ul style="list-style-type: none"> None identified
8. To promote the wise use of resources	<p>Will the option minimise the demand for raw materials?</p> <p>Will the option lead to reduced leakage from the supply network?</p> <p>Will the option improve efficiency in water consumption?</p> <p>Will the option seek to minimise the demand for raw materials?</p> <p>Will the option reduce or minimise energy use?</p> <p>Will the option promote the re-use and recycling of waste materials and reduce the proportion of waste sent to landfill?</p> <p>Will the option promote the use of sustainable design and materials?</p>	-	0	Effects of Construction <p>The construction works would require the use of raw materials and associated energy and would generate waste, with limited options to use sustainable materials or recycled product. This has been assessed as having a minor negative effect on waste and resources (SEA Objective 8).</p> Effects of Operation <p>The operation of this option would not involve additional infrastructure but would result in additional energy consumption from pumping and additional water treatment (yield 2 MI/d). However, as it a very low additional amount (2tCO₂e/a), the option has been assessed as having a neutral effect on waste and resource use (SEA Objective 8).</p> Mitigation <ul style="list-style-type: none"> None identified Assumptions <ul style="list-style-type: none"> Energy consumption from operation of this option is assumed to be very low given the low additional abstraction (yield 2 MI/d). Uncertainty <ul style="list-style-type: none"> Energy consumption from operation of this option has not been quantified.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
9. To conserve and enhance cultural and historic assets	<p>Will the option conserve or enhance the historic environment, including heritage assets such as historic buildings, conservation areas, features, places and spaces, and their settings?</p> <p>Will the option avoid or minimise damage to archaeologically important sites?</p> <p>Will the option affect public access to, or enjoyment of, features of cultural heritage?</p>	0	0	<p>Effects of Construction</p> <p>The source boreholes are located approximately 50 m of Yew Tree Cottage (Grade II Listed Building). Other designated heritage sites within 150 m from the source include Maypoles, Maypole Cottage and Fir Trees (Grade II Listed Buildings). The scale of the construction work is expected to be minor and limited to the area around the boreholes. On this basis it is considered that construction would have a neutral effect on the amenity or structural integrity of the designated heritage sites (SEA Objective 9).</p> <p>Effects of Operation</p> <p>Operation of this option would have no impact on designated heritage sites (SEA Objective 9).</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified <p>Assumptions</p> <ul style="list-style-type: none"> None identified <p>Uncertainty</p> <ul style="list-style-type: none"> None identified
10. To conserve and enhance landscape character and other protected features	<p>Will the option avoid adverse effects on, and enhance where possible, protected/designated landscapes (including woodlands), townscapes or seascapes such as National Parks or AONBs be avoided?</p> <p>Will the option affect public access to existing landscape features?</p> <p>Will the option minimise adverse visual impacts?</p>	0	0	<p>Effects of Construction</p> <p>The source boreholes are located within the South Downs National Park. Construction works would be minor and limited to the area around the existing boreholes such that any adverse impacts on local landscape features would be minor and over a short timescale. Overall, this option has been assessed as having a neutral effect on landscape (SEA Objective 10).</p> <p>Effects of Operation</p>



Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<p>e option does not require new or changes to existing above ground infrastructure. Therefore operation of this option would have no impact on landscape features (SEA Objective 10).</p> <p>Mitigation</p> <ul style="list-style-type: none">• None identified <p>Assumptions</p> <ul style="list-style-type: none">• None identified <p>Uncertainty</p> <ul style="list-style-type: none">• None identified

Option R024a: Source C DO recovery scheme

Option Summary

This option would primarily involve the air scouring of the source boreholes, to remove a build-up of sediment, followed by a maximum rate pumping test in order to reduce turbidity at the WTW. The Source C borehole group cannot currently utilise their peak licenced volume due to turbidity levels resulting from an excess amount of turbid water being drawn into the raw water supply via fissures that feed into the boreholes. Whilst Portsmouth Water is already undertaking catchment management to minimise infiltration of sediments into the aquifer, in association with the EA and Natural England, turbidity levels in the aquifer are expected to take a long time to respond to catchment management. Consequently, implementation of the option is expected to recover between 4MI/d (Average Deployable Output (ADO)) and 5.5MI/d (PDO). It should be noted that additional abstraction required to achieve PDO is not included within the scope of this option as prior investigation has concluded that water availability within the local East Hampshire area is not conducive to promoting increased abstraction even within existing licensed limits.

Assessment

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
1. To ensure the protection and enhancement of biodiversity, priority habitats and species	<p>Will the option protect and enhance priority species, habitats and sites designated for their nature conservation value?</p> <p>Will the option protect and enhance non-designated sites and local biodiversity?</p> <p>Will the option provide opportunities for new habitat creation or restoration and link existing habitats as part of the development process?</p> <p>Will the option protect and enhance coastal and marine habitats and species?</p> <p>Will the option result in a change in the quality of habitats due to changes in groundwater/river water quality or quantity?</p> <p>Will the option affect riparian vegetation structure?</p>	0	0	<p>Effects of Construction</p> <p>It is not expected that the air scouring of the source would result in any effects, alone and/or in combination, on any proximate European conservation sites (e.g. Solent Maritime SAC (6.8km), Solent and Southampton Water SPA/Ramsar (6.8km), River Itchen SAC (8km), and Butser Hill SAC (15.5km). This reflects the fact that the scale of work required to implement this option would be confined within the existing site and best practices would be adhered to and so would represent a very low risk of disturbance, which in respect to the distance between the development sites and conservation areas, does not present any clear impact pathways to designated ecological features supported by these sites.</p> <p>There are several statutory and locally designated conservation areas within the general vicinity of the WTW: Claylands LNR (507m); Dunridge Meadows LNR (577m); the Moors, Bishop's Waltham LNR/SSSI (1.1km); and Galley Down Wood SSSI (1.8km). Because works would be confined within the established footprints of the existing infrastructure, it is considered unlikely that the works would result in any adverse effects on the designated flora interest features of these sites nor on proximate greenfield habitats and wildlife.</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<p>On this basis it is considered that construction work would not disturb or result in any detrimental impacts on these sites (SEA Objective 1). Overall, this option has been assessed as having a neutral effect on SEA Objective 1.</p> <p>Effects of Operation</p> <p>Once the air scouring and maximum pump test is completed, Source C WTW's treatment process would recover between 4MI/d (ADO) and 5.5MI/d (PDO). The existing licenced abstraction limit is 31.50 MI/d under peak (20.5 MI/d under annual average), although present turbidity levels has constrained output to 22.5 MI/d PDO (16.5 MI/d ADO); consequently, treated output including the newly recovered water would remain within the licensed limit which is assumed to have been subject to review under the EA Habitats Regulations Review of Consents process. As additional abstraction is not included within the operational scope of this scheme, it is considered highly unlikely that continued operation under the present licence would significantly or adversely affect European designated conservation sites. Specifically, there is a lack of clear impact pathways to Butser Hill SAC (15.5km) whereas Solent Maritime SAC (6.8km) and Solent and Southampton Water SPA/Ramsar (6.8km) do not contain any interest features sensitive to water resource permissions. Effects on River Itchen SAC (8km) would also be negligible due to intervening water inputs. Similarly, the continuation of current abstraction volume is not expected to significantly affect either statutory and locally designated conservations areas nor local habitats and wildlife within the general vicinity of the WTW.</p> <p>Overall, this option has been assessed as having a neutral effect on SEA Objective 1.</p> <p>Mitigation</p> <ul style="list-style-type: none"> The utilisation of scheme specific mitigation measures and established best practice throughout the implementation period is expected to minimise and/or prevent significant and/or adverse construction effects on both local wildlife features and designated conservation areas. <p>Assumptions</p> <ul style="list-style-type: none"> It is assumed that the current licence would have been reviewed by the EA under the Habitats Regulations Review of Consents process thus operation is not expected to have any significant effects alone or in combination on any European conservation sites. <p>Uncertainty</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<ul style="list-style-type: none"> None identified.
2. To ensure the appropriate and efficient use of land and protect soil quality and geodiversity	<p>Will the option minimise the loss of best and most versatile agricultural land?</p> <p>Will the option protect and enhance soil health?</p> <p>Will the option minimise conflict with existing land use patterns?</p> <p>Will the option minimise land contamination?</p> <p>Will the option utilise previously developed (brownfield) land?</p> <p>Will the option protect and enhance protected sites designated for their geological interest and wider geodiversity?</p>	0	0	<p>Effects of Construction</p> <p>The small scale of works required by this option (air scouring and maximum pump testing) would be carried out within the exiting site. No changes or new above ground pipework are required. Overall, this option has been assessed as having a neutral effect on geology and soils (SEA Objective 2).</p> <p>Effects of Operation</p> <p>Once construction activity is complete, no ongoing impact on land use/soils is expected; consequently, operational effects on land use/soil have been assessed as neutral.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
3. To protect and enhance water quality and surface and groundwater resources and the ecological status of water bodies	<p>Will the option minimise the demand for water resources?</p> <p>Will the option protect and improve surface water, groundwater and coastal water quality?</p> <p>Will the option result in changes to river flows?</p> <p>Will the option result in changes to groundwater levels?</p> <p>Will the option prevent the deterioration of Water Framework Directive (WFD) waterbody status (or potential)?</p>	0	0	<p>Effects of Construction</p> <p>It is assumed that construction activities would be undertaken in accordance with relevant best practice pollution prevention guidance and that appropriate mitigation would be implemented. In consequence, the option has been assessed as having a neutral effect on this objective during construction.</p> <p>Effects of Operation</p> <p>The option would result in the recovery of up to 5.5 Ml/d via a modified treatment process at Source C WTW which is within the existing licence. As additional abstraction is not included within the operational scope of this scheme, present abstraction volumes would be maintained thus operation would have a neutral effect on water quality and quantity.</p> <p>Mitigation</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<ul style="list-style-type: none"> None identified. Assumptions <ul style="list-style-type: none"> It is assumed that construction activities would be undertaken in accordance with relevant best practice pollution prevention guidance and that appropriate mitigation would be implemented. Uncertainty <ul style="list-style-type: none"> None identified.
4. To reduce the risk of flooding	<p>Will the option have the potential to cause or exacerbate flooding in the catchment area?</p> <p>Will the option have the potential to help alleviate flooding in the catchment area?</p> <p>Will the option enhance water infiltration and retention?</p> <p>Will the option be at risk of flooding or be affected by flooding, if it occurred?</p>	0	0	Effects of Construction <p>Source C WTW is situated within Flood Zone 1; consequently, it is unlikely that construction activities would be liable to flooding. Furthermore, it is not anticipated that activities would result in or exacerbate flooding elsewhere during the construction period. Overall, this option has been assessed as having a neutral effect on SEA Objective 4.</p> Effects of Operation <p>During operation, this option is not expected to cause or exacerbate flooding in the area or elsewhere nor would Source C WTW be at risk of flooding as all infrastructure targeted within the scheme is located within Flood Zone 1.</p> Mitigation <ul style="list-style-type: none"> None identified. Assumptions <ul style="list-style-type: none"> None identified. Uncertainty <ul style="list-style-type: none"> None identified.
5. To limit the causes and effects of climate change and increase resilience to the consequences of climate change	<p>Will the option reduce vulnerability to the effects of climate change by appropriate adaptation?</p> <p>Will the option increase environmental resilience to the effects of climate change?</p> <p>Will the option reduce or minimise greenhouse gas emissions?</p>	-/0/?	+/-	Effects of Construction <p>Emissions of embodied carbon from construction of this option have not been quantified but are estimated to be low given the small scale of the construction works associated with borehole air scouring and pump testing. It is considered that this option would have a minor negative/neutral effect on greenhouse gas emissions with some uncertainty remaining (SEA Objective 5).</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
	Will the option deliver new infrastructure that is energy efficient or makes use of renewable energy sources?			<p>Effects of Operation</p> <p>The scheme would have an operational energy demand of 401,500 kWh/a which would generate up to 141 tCO₂e per annum. It should be noted that increased efficiency within the treatment process (maximising treated output) under conditions of severe drought could increase resilience to climatic driven supply restrictions in the region due to forecasted hotter/drier summers.</p> <p>Overall, this option has been assessed as having a mixed minor positive and negative effect on climate change (Objective 5).</p> <p>Mitigation</p> <ul style="list-style-type: none"> Measures to reduce greenhouse gas emissions during construction should be considered including, for example, the use of low emission plant. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
6. To maintain and enhance the economic and social wellbeing of the local community	<p>Will the option ensure sufficient infrastructure is in place for predicted population increases?</p> <p>Will the option create local employment opportunities?</p> <p>Will the option support the local and regional economy?</p> <p>Will the option ensure that an affordable supply of water is maintained and vulnerable customers protected?</p> <p>Will the option avoid disruption through effects on the transport network?</p>	0	+	<p>Effects of Construction</p> <p>The scale of the construction work is expected to be minor and therefore expenditure is likely to be of insufficient scale to have a discernible positive effect on the local economy through generation local employment opportunities. Disruption to the local traffic network as a result of construction activities it is not considered significant. Overall this option is considered to have a neutral impact on economic and social wellbeing (SEA Objective 6).</p> <p>Effects of Operation</p> <p>The option has a design capacity of 5.5 Ml/d, serving to meet short term peak demands as well as addressing the deficit within the Portsmouth Water District Metering Zone which is based on critical period average demand. This may support economic and population growth. The additional supply may also ensure that an affordable supply of water is maintained in the long term, serving to protect vulnerable customers.</p> <p>Overall, in view of the overall design capacity of this option, effects on this objective have been assessed as positive.</p> <p>Mitigation</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<ul style="list-style-type: none"> Where possible, Portsmouth Water and any contractors should seek to utilise local labour. Where possible, Portsmouth Water and any contractors should seek to appoint local contractors/sub-contractors and utilise locally sourced materials. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> The extent to which the construction of this option would benefit the local economy/local labour market is uncertain.
7. To ensure the protection and enhancement of human health	<p>Will the option ensure the continuity of a safe and secure drinking water supply?</p> <p>Will the option ensure that surface water and bathing water quality are maintained within statutory standards?</p> <p>Will the option adversely affect human health by resulting in increased noise and/or adverse effects on air quality?</p> <p>Will the option affect opportunities for recreation and physical activity?</p>	0	+	<p>Effects of Construction</p> <p>The option is not expected to affect opportunities for recreation and physical activity during the construction period as construction would be confined within the existing WTW. Furthermore, the internal installation of the new equipment suggests that any noise associated with the works would be inaudible to proximate residential receptors (Northbrook Farm). Overall, this option has been assessed as having a neutral effect on SEA Objective 7.</p> <p>Effects of Operation</p> <p>The scheme would not adversely affect human health due to increased noise, nuisance or disruption, nor would it affect opportunities for recreation.</p> <p>The option has a design capacity of 5.5 Ml/d, serving to address deficit within the Portsmouth Water District Metering Zone; consequently, the option may also remove the vulnerability to short duration droughts within this zone by helping to ensure a continual supply of clean drinking water is available. The option has therefore been assessed as having a positive effect on health (SEA Objective 7).</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
8. To promote the wise use of resources	<p>Will the option minimise the demand for raw materials?</p> <p>Will the option lead to reduced leakage from the supply network?</p> <p>Will the option improve efficiency in water consumption?</p> <p>Will the option seek to minimise the demand for raw materials?</p> <p>Will the option reduce or minimise energy use?</p> <p>Will the option promote the re-use and recycling of waste materials and reduce the proportion of waste sent to landfill?</p> <p>Will the option promote the use of sustainable design and materials?</p>	-	+/-	<p>Effects of Construction</p> <p>The implementation of this option would require would require the use of raw materials and associated energy, which is considered to be very low. Using this as a proxy for resource use, any effects in this regard are expected to be very minor. The option would also generate waste (in the form of additional sediment), with limited options to use sustainable materials or recycled product.</p> <p>Overall, this has been assessed as having a minor negative effect on waste and resources (SEA Objective 8).</p> <p>Effects of Operation</p> <p>The operation of this option would require additional resources associated with the modified treatment process. The treatment and pumping of water would also result in a long term increase in energy use (operation energy usage is estimated to be approximately 401,500 KWh/a) which would generate up to 141 tCO₂e per annum.</p> <p>The saving of up to 5.5 Ml/d would help increase/ensure continuity of water supply through more efficient abstraction and treatment of water.</p> <p>Overall, the operation of this option has been assessed as having a mixed minor positive and negative effect on resource use (SEA Objective 8).</p> <p>Mitigation</p> <ul style="list-style-type: none"> Construction and operational wastes should be reused/recycled where possible. Measures to reduce energy usage during construction should be considered. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
9. To conserve and enhance cultural and historic assets	<p>Will the option conserve or enhance the historic environment, including heritage assets such as historic buildings, conservation areas, features, places and spaces, and their settings?</p> <p>Will the option avoid or minimise damage to archaeologically important sites?</p>	0	0	<p>Effects of Construction</p> <p>The Source C WTW site does not include any cultural heritage features. The nearest Scheduled Monument to the scheme is Bishop Waltham's Palace (c. 780m) while the remaining monuments within the general area exceed 1.5km in distance.</p> <p>Additionally, six Grade II Listed Buildings are proximate to Source C WTW: Northbrook Farmhouse/Granary (154m); Little Green (326m); Bramble Cottage (326m); Old Tanyard Cottage (326m); North Brook Cottage (326m); and Vernon Hill House (402m). Due to the nature of the activities undertaken during the construction</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
	Will the option affect public access to, or enjoyment of, features of cultural heritage?			<p>site (all on the existing site) internal installation of the disposable cartridge filters within the WTW, it is not expected that implementation would result in any adverse effects on these assets.</p> <p>This option has been assessed as having a neutral effect on Objective 9.</p> <p>Effects of Operation</p> <p>There would be no operational effects on designated cultural heritage assets.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
10. To conserve and enhance landscape character and other protected features	<p>Will the option avoid adverse effects on, and enhance where possible, protected/designated landscapes (including woodlands), townscapes or seascapes such as National Parks or AONBs be avoided?</p> <p>Will the option affect public access to existing landscape features?</p> <p>Will the option minimise adverse visual impacts?</p>	0	0	<p>Effects of Construction</p> <p>Source C WTW is directly situated within the South Downs National Park; however, the proposed works would be confined within the established footprint of the WTW, and furthermore, benefit from substantial woodland buffer along the peripheries of the site. Consequently, any localised landscape impacts are likely to be negligible.</p> <p>This option has been assessed as having a neutral negative effect on Objective 10.</p> <p>Effects of Operation</p> <p>The scheme would not introduce any new above ground infrastructure within the semi-rural greenfield setting of Source C WTW, and furthermore, the South Downs National Park. Consequently, operation would not result in any permanent changes to the local setting or the designated landscape character of the National Park. Overall, this option has been assessed as having a neutral effect on Objective 10.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p>



Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<ul style="list-style-type: none">None identified.

Option R068: Source S drought permit

Option Summary

This option would involve increasing the licenced daily abstraction limit of Source S borehole and WTW from 2.5 MI/d to 11 MI/d under severe drought conditions via a new drought permit in order to provide an additional 8.5 MI/d for public consumption. It should be noted that the facility was originally designed to operate under an 11 MI/d abstraction licence which was subsequently reduced to 2.5 MI/d in 1996. Current operation has caused chlorine dosing system problems due to complications resulting from the required underutilisation of equipment to facilitate the reduced licence. As Source S's existing infrastructure maintains an 11 MI/d design capacity, implementation of the new drought permit would not require modifications to the site nor construction of new ancillary infrastructure as operation would revert back to using the higher capacity pumps.

Assessment

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
1. To ensure the protection and enhancement of biodiversity, priority habitats and species	<p>Will the option protect and enhance priority species, habitats and sites designated for their nature conservation value?</p> <p>Will the option protect and enhance non-designated sites and local biodiversity?</p> <p>Will the option provide opportunities for new habitat creation or restoration and link existing habitats as part of the development process?</p> <p>Will the option protect and enhance coastal and marine habitats and species?</p> <p>Will the option result in a change in the quality of habitats due to changes in groundwater/river water quality or quantity?</p> <p>Will the option affect riparian vegetation structure?</p>	0	-/?	<p>Effects of Construction</p> <p>There would be no construction phase associated with this option as implementation of the scheme is contingent upon the modification of the current daily abstraction licence. The present Source S site already maintains the infrastructural capacity to accommodate increased abstraction under conditions of severe drought thus no internal/external modifications to the facility are necessary. Consequently, there are no effects on biodiversity (SEA Objective 1) emerging from construction.</p> <p>Effects of Operation</p> <p>The scheme would abstract an additional 8.5 MI/d under severe drought conditions which would require a new drought permit to increase the licenced abstraction limit. It is not expected that operation would result in any significant effects alone and/or in combination (clear impact pathways) on any proximate European sites, e.g. Arun Valley SPA/SAC/Ramsar (8.5km) and Duncton to Bignor Escarpment SAC/SSSI (5km). The Arun Valley SAC's primary interest feature (Ramshorn snail <i>Anisus vorticulus</i>) is dependent on the wash lands of the Arun floodplain (Amberley Wild Brooks SSSI) and the beech forests (Duncton to Bignor Escarpment) do not require high groundwater levels, although it is uncertain whether the effects of abstraction would be magnified under drought conditions. Swanbourne Lake and Arundel Wildlife and Wetland Centre, components of Arundel Park SSSI, are c. 6km from the Source S borehole and share a groundwater supply with the borehole (water accumulates in the lake from subterranean chalk springs). Arundel Park supports a range of ecological features including rare invertebrate species, variety of chalk</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<p>grassland and woodland, and a diverse breeding bird community which includes shelduck, little grebe and tufted duck which utilise Swanbourne Lake in addition to a number of waders supported by the reed bed in the Wildfowl Reserve. Consequently, abstraction beyond permitted volumes under normal 'dry' conditions is not permitted due to assumed adverse effects on the SSSI's interest features; however, Swanbourne Lake naturally dries out during severe drought conditions which is expected to precede operation of the scheme.</p> <p>The EA previously concluded that impacts from abstraction on an 'already' dry lake may be insignificant which suggests that increased abstraction may have a negligible effect on Swanbourne Lake, although potential effects on Arundel Park remain uncertain without further investigation (modelling). Furthermore, Swanbourne Lake would not be spilling during the severe drought conditions thus abstraction is not expected to impact on the downstream Mill Stream regarding in-stream habitats, macrophytes, and mobile aquatic species.</p> <p>In general, the extent of the chalk springs from which groundwater is abstracted is not currently known beyond Swanbourne Lake and Arundel Park; consequently, other designated and non-designated ecological receptors within the scheme's general vicinity (e.g. Fairmile Bottom LNR/SSSI (2.5km), East Dean Park Wood (6km), and Levin Down SSSI (8.3km) may also be effected under drought conditions due to their chalky-based flora interest features.</p> <p>Overall, this option has been assessed as having a negative effect on Objective 1 though uncertainty remains until further investigation is conducted.</p> <p>Mitigation</p> <ul style="list-style-type: none"> Operational requirements should be determined at the earliest opportunity to allow investigation schemes and mitigation to be identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> It is currently unknown whether the effects of abstraction (increase of 8.5 Ml/d) would be magnified under drought conditions regarding biodiversity. The EA previously concluded that impacts from abstraction on an 'already' dry lake (Swanbourne) may be insignificant, although potential effects on Arundel Park remain uncertain.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<ul style="list-style-type: none"> The extent of the chalk springs from which groundwater is abstracted is not currently known beyond Swanbourne Lake and Arundel Park; consequently, other designated and non-designated ecological receptors proximate to the scheme may also be adversely impacted.
2. To ensure the appropriate and efficient use of land and protect soil quality and geodiversity	<p>Will the option minimise the loss of best and most versatile agricultural land?</p> <p>Will the option protect and enhance soil health?</p> <p>Will the option minimise conflict with existing land use patterns?</p> <p>Will the option minimise land contamination?</p> <p>Will the option utilise previously developed (brownfield) land?</p> <p>Will the option protect and enhance protected sites designated for their geological interest and wider geodiversity?</p>	0	0	<p>Effects of Construction</p> <p>There is no construction phase associated with this option as implementation of the scheme is contingent upon the modification of the current daily abstraction licence. The present Source S site already maintains the infrastructural capacity to accommodate increased abstraction under conditions of severe drought thus no internal/external modifications to the facility are necessary. Consequently, there are no effects on land use/soil (SEA Objective 2) emerging from construction.</p> <p>Effects of Operation</p> <p>The scheme would abstract up to an additional 8.5 Ml/d under severe drought conditions which is not expected to result in any discernible effects on the appropriate and efficient use of land (SEA Objective 2).</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
3. To protect and enhance water quality and surface and groundwater resources and the ecological status of water bodies	<p>Will the option minimise the demand for water resources?</p> <p>Will the option protect and improve surface water, groundwater and coastal water quality?</p> <p>Will the option result in changes to river flows?</p> <p>Will the option result in changes to groundwater levels?</p>	0	-/?	<p>Effects of Construction</p> <p>There is no construction phase associated with this option as implementation of the scheme is contingent upon the modification of the current daily abstraction licence. The present Source S site already maintains the infrastructural capacity to accommodate increased abstraction under conditions of severe drought thus no internal/external modifications to the facility are necessary. Consequently, there are no effects on water quality/quantity (SEA Objective 3) emerging from construction.</p> <p>Effects of Operation</p> <p>The option would result in the additional abstraction of up to 8.5 Ml/d of groundwater from subterranean chalk springs. As these chalk springs supply groundwater to</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
	Will the option prevent the deterioration of Water Framework Directive (WFD) waterbody status (or potential)?			<p>proximate waterbodies within the vicinity of the Source S borehole (e.g. Swanbourne Lake and Arundel Park), the increased abstraction limit may potentially exacerbate the effects of drought on the local water system regarding supply and recovery. This option has therefore been assessed as having a negative effect on SEA Objective 3, although some uncertainty remains until further investigation (modelling) is conducted.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> It is currently unknown whether the effects of abstraction (increase of 8.5 Ml/d) would be magnified under drought conditions regarding water quantity/quality. The extent of the chalk springs from which groundwater is abstracted is not currently known beyond Swanbourne Lake and Arundel Park; consequently, other waterbodies may also be adversely impacted.
4. To reduce the risk of flooding	<p>Will the option have the potential to cause or exacerbate flooding in the catchment area?</p> <p>Will the option have the potential to help alleviate flooding in the catchment area?</p> <p>Will the option enhance water infiltration and retention?</p> <p>Will the option be at risk of flooding or be affected by flooding, if it occurred?</p>	0	0	<p>Effects of Construction</p> <p>There is no construction phase associated with this option as implementation of the scheme is contingent upon the modification of the current daily abstraction licence. The present Source S site already maintains the infrastructural capacity to accommodate increased abstraction under conditions of severe drought thus no internal/external modifications to the facility are necessary. Consequently, there are no effects on flood risk (SEA Objective 4) emerging from construction.</p> <p>Effects of Operation</p> <p>As operation would occur under conditions of severe drought, it is considered highly unlikely that the increased abstraction of 8.5 Ml/d would cause or exacerbate flooding in the area or elsewhere now or into the future.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				Uncertainty <ul style="list-style-type: none"> None identified.
5. To limit the causes and effects of climate change and increase resilience to the consequences of climate change	<p>Will the option reduce vulnerability to the effects of climate change by appropriate adaptation?</p> <p>Will the option increase environmental resilience to the effects of climate change?</p> <p>Will the option reduce or minimise greenhouse gas emissions?</p> <p>Will the option deliver new infrastructure that is energy efficient or makes use of renewable energy sources?</p>	0	+	Effects of Construction <p>There is no construction phase associated with this option as implementation of the scheme is contingent upon the modification of the current daily abstraction licence. The present Source S site already maintains the infrastructural capacity to accommodate increased abstraction under conditions of severe drought thus no internal/external modifications to the facility are necessary. Consequently, there are no effects on climate change (SEA Objective 5) emerging from construction.</p> Effects of Operation <p>The option would not require new infrastructure, and furthermore, operation would occur under severe drought conditions only (1 in every 50 years) such that operational energy demand (182,500 kWh) and associated carbon emissions in respect of abstraction/pumping would have a minor, if not negligible, effect on climate change.</p> <p>It should be noted that the increase in abstraction volume under conditions of severe drought could increase resilience to climatic driven supply restrictions in the region.</p> <p>Overall, this option has been assessed as having a minor positive effect on climate change (Objective 5).</p> Mitigation <ul style="list-style-type: none"> None identified. Assumptions <ul style="list-style-type: none"> None identified. Uncertainty <ul style="list-style-type: none"> None identified.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
6. To maintain and enhance the economic and social wellbeing of the local community	<p>Will the option ensure sufficient infrastructure is in place for predicted population increases?</p> <p>Will the option create local employment opportunities?</p> <p>Will the option support the local and regional economy?</p> <p>Will the option ensure that an affordable supply of water is maintained and vulnerable customers protected?</p> <p>Will the option avoid disruption through effects on the transport network?</p>	0	+	<p>Effects of Construction</p> <p>There is no construction phase associated with this option as implementation of the scheme is contingent upon the modification of the current daily abstraction licence. Consequently, there are no effects on economic and social wellbeing (SEA Objective 6) emerging from construction.</p> <p>Effects of Operation</p> <p>The increased abstraction under drought powers (8.5 Ml/d) would enable the continued supply of water. Without these powers in a severe drought, there would be a risk of a deficit, placing public water supplies at an unacceptable risk. Consequently, the operation of this option would help maintain and support economic activity and population growth under adverse conditions. The additional supply may also ensure that an affordable supply of water is maintained in the short term, serving to protect vulnerable customers.</p> <p>Overall, in view of the overall design capacity of this option, effects on this objective have been assessed as positive.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
7. To ensure the protection and enhancement of human health	<p>Will the option ensure the continuity of a safe and secure drinking water supply?</p> <p>Will the option ensure that surface water and bathing water quality are maintained within statutory standards?</p> <p>Will the option adversely affect human health by resulting in increased noise and/or adverse effects on air quality?</p> <p>Will the option affect opportunities for recreation and physical activity?</p>	0	+	<p>Effects of Construction</p> <p>There is no construction phase associated with this option as implementation of the scheme is contingent upon the modification of the current daily abstraction licence. The present Source S site already maintains the infrastructural capacity to accommodate increased abstraction under conditions of severe drought thus no internal/external modifications to the facility are necessary. Consequently, there are no effects on human health (SEA Objective 7) emerging from construction.</p> <p>Effects of Operation</p> <p>The scheme would not adversely affect human health due to increased noise, nuisance or disruption. As utilisation of the new drought permit would occur under severe drought conditions, it is assumed that recreational activities such as</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<p>angling/boating would have already been adversely affected by natural water drawdown.</p> <p>In general, increased abstraction under drought powers would enable the continued supply of water. Without these powers in a severe drought, there would be a risk of a deficit, placing public water supplies at an unacceptable risk. The increased capacity of up to 8.5 Ml/d would therefore generate a positive effect on health (SEA Objective 7).</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> It is assumed that recreational activities such as angling/boating would have already been adversely affected by natural water drawdown during conditions of severe drought such that increased abstraction would be negligible. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
8. To promote the wise use of resources	<p>Will the option minimise the demand for raw materials?</p> <p>Will the option lead to reduced leakage from the supply network?</p> <p>Will the option improve efficiency in water consumption?</p> <p>Will the option seek to minimise the demand for raw materials?</p> <p>Will the option reduce or minimise energy use?</p> <p>Will the option promote the re-use and recycling of waste materials and reduce the proportion of waste sent to landfill?</p> <p>Will the option promote the use of sustainable design and materials?</p>	0	0	<p>Effects of Construction</p> <p>There is no construction phase associated with this option as implementation of the scheme is contingent upon the modification of the current daily abstraction licence. The present Source S site already maintains the infrastructural capacity to accommodate increased abstraction under conditions of severe drought thus no internal/external modifications to the facility are necessary. Consequently, there are no effects on resource use (SEA Objective 8) emerging from construction.</p> <p>Effects of Operation</p> <p>The option would not require new infrastructure, and furthermore, operation would occur under severe drought conditions (1 in every 50 years) such that operational energy demand (182,500 kWh) and associated carbon emissions in respect of abstraction/pumping would have a minor, if not negligible, effect. Overall, this option has been assessed as having a neutral effect on resource use (Objective 8).</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<ul style="list-style-type: none"> None identified. Uncertainty <ul style="list-style-type: none"> None identified.
9. To conserve and enhance cultural and historic assets	<p>Will the option conserve or enhance the historic environment, including heritage assets such as historic buildings, conservation areas, features, places and spaces, and their settings?</p> <p>Will the option avoid or minimise damage to archaeologically important sites?</p> <p>Will the option affect public access to, or enjoyment of, features of cultural heritage?</p>	0	0/?	Effects of Construction <p>There is no construction phase associated with this option as implementation of the scheme is contingent upon the modification of the current daily abstraction licence. The present Source S site already maintains the infrastructural capacity to accommodate increased abstraction under conditions of severe drought thus no internal/external modifications to the facility are necessary. Consequently, there are no effects on cultural heritage (SEA Objective 9) emerging from construction.</p> Effects of Operation <p>Operation of the new drought permit would occur under severe drought conditions thus it is assumed that local waterbodies would have already been adversely affected by natural water drawdown. Consequently, it is not anticipated that increased abstraction would significantly amplify the loss of visual amenity to the settings of cultural heritage assets within the vicinity of affected waterbodies. For example, Swanbourne Lake is expected to have dried up prior to operation such that the settings of Arundel Castle Scheduled Monument and a range of Grade II Listed Buildings (e.g. Swanbourne Lodge, Hiorns Tower, and Home Farmhouse and ancillary infrastructure) would have already been affected by the alteration of their setting. Notwithstanding this, increased abstraction under these conditions has the potential to cause 'dewatering' on archaeological deposits, although there are no records of any archaeological deposits in the area.</p> <p>Overall, this option has been assessed as having a neutral effect on Objective 9; however, a degree of uncertainty remains.</p> Mitigation <ul style="list-style-type: none"> None identified. Assumptions <ul style="list-style-type: none"> It is assumed that local waterbodies would have already been adversely affected by natural water drawdown by the start of operation; consequently, it is not anticipated that increased abstraction would significantly amplify the loss of visual amenity to the settings of cultural heritage assets within the vicinity of affected waterbodies.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				Uncertainty <ul style="list-style-type: none"> It is uncertain whether increased abstraction under severe drought conditions would cause 'dewatering' of unknown archaeological deposits.
10. To conserve and enhance landscape character and other protected features	<p>Will the option avoid adverse effects on, and enhance where possible, protected/designated landscapes (including woodlands), townscapes or seascapes such as National Parks or AONBs be avoided?</p> <p>Will the option affect public access to existing landscape features?</p> <p>Will the option minimise adverse visual impacts?</p>	0	0	Effects of Construction <p>There is no construction phase associated with this option as implementation of the scheme is contingent upon the modification of the current daily abstraction licence. The present Source S site already maintains the infrastructural capacity to accommodate increased abstraction under conditions of severe drought thus no internal/external modifications to the facility are necessary. Consequently, there are no effects on landscape (SEA Objective 10) emerging from construction.</p> Effects of Operation <p>Although the scheme would be situated within the South Downs National Park, operation of the new drought permit would occur under severe drought conditions thus it is assumed that local waterbodies, e.g. Swanbourne Lake and Arundel Park, would have already been adversely affected by natural water drawdown. Consequently, it is not anticipated that increased abstraction would significantly affect landscape character or the special qualities of the National Park beyond reasonable expectation. Overall, this option has been assessed as having neutral effect on Objective 10.</p> Mitigation <ul style="list-style-type: none"> None identified. Assumptions <ul style="list-style-type: none"> It is assumed that waterbodies within South Downs National Park would have already been adversely affected by natural water drawdown by the start of operation; consequently, it is not anticipated that increased abstraction would significantly amplify the loss of visual amenity or adversely alter the character this protected landscape. Uncertainty <ul style="list-style-type: none"> None identified.

Revised Preferred Water Demand and Efficiency Options

Option C005: Smart Metering Trial (NFR)

Option Summary

This option is a refinement of the feasible option and would involve the installation of SMART meters where no meter currently present. This distinguishes it from the previous C005 that installed smart meters in households already metered using a "dumb meter". It would operate over the period 2020/21 - 2044/45 and it is assumed that some 13,000 meters would be installed and would lead to a yield of up to 0.08Ml/d.

Assessment

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
1. To ensure the protection and enhancement of biodiversity, priority habitats and species	<p>Will the option protect and enhance priority species, habitats and sites designated for their nature conservation value?</p> <p>Will the option protect and enhance non-designated sites and local biodiversity?</p> <p>Will the option provide opportunities for new habitat creation or restoration and link existing habitats as part of the development process?</p> <p>Will the option protect and enhance coastal and marine habitats and species?</p> <p>Will the option result in a change in the quality of habitats due to changes in groundwater/river water quality or quantity?</p> <p>Will the option affect riparian vegetation structure?</p>	0	0	<p>Effects of Construction</p> <p>The proposed works would be targeting new properties that do not have a meter and in consequence, implementation would occur within the existing operational footprints of domestic properties which may encompass a wide range of urban, semi-rural, and rural settings. It is unlikely, however, that construction would have any discernible impacts on immediate biodiversity, priority habitats, e.g. European designated conservation areas, SSSIs, local nature reserves, and etc., or protected species due to the minor to negligible scale of construction associated with implementation. Overall, this option has been assessed as having a neutral effect on biodiversity (SEA Objective 1).</p> <p>Effects of Operation</p> <p>It is assumed that the use of meters by customers would decrease water demand (by on average 15% per property when compared to unmetered properties in the Portsmouth Water DMZ). The effect of increased water efficiency on designated nature conservation sites (e.g. SACs, SPAs, Ramsar and SSSIs) and the ecological quality of habitats and associated groundwater/river water bodies is considered to be slightly positive as the increased efficiency reduces demand for additional water resources and increases resilience of existing network; however, the magnitude of change is assessed as neutral.</p> <p>Mitigation</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<ul style="list-style-type: none"> None identified. Assumptions <ul style="list-style-type: none"> None identified. Uncertainty <ul style="list-style-type: none"> None identified.
2. To ensure the appropriate and efficient use of land and protect soil quality and geodiversity	<p>Will the option minimise the loss of best and most versatile agricultural land?</p> <p>Will the option protect and enhance soil health?</p> <p>Will the option minimise conflict with existing land use patterns?</p> <p>Will the option minimise land contamination?</p> <p>Will the option utilise previously developed (brownfield) land?</p> <p>Will the option protect and enhance protected sites designated for their geological interest and wider geodiversity?</p>	0	0	Effects of Construction and Operation <p>The installation of the new metering infrastructure would be contained within the operational footprints of domestic premises; consequently, implementation would not require any new land-take.</p> <p>The utilisation of metering would not have a discernible effect on the appropriate and efficient use of land.</p> <p>This option has therefore been assessed as having a neutral effect on the appropriate and efficient use of land (SEA Objective 2).</p> Mitigation <ul style="list-style-type: none"> None identified. Assumptions <ul style="list-style-type: none"> None identified. Uncertainty <ul style="list-style-type: none"> None identified.
3. To protect and enhance water quality and surface and groundwater resources and the ecological status of water bodies	<p>Will the option minimise the demand for water resources?</p> <p>Will the option protect and improve surface water, groundwater and coastal water quality?</p> <p>Will the option result in changes to river flows?</p> <p>Will the option result in changes to groundwater levels?</p> <p>Will the option prevent the deterioration of Water Framework Directive (WFD) waterbody status (or potential)?</p>	0	+	Effects of Construction <p>It is not expected that the installation of metering infrastructure would affect river flows or groundwater levels, or on water quality, provided best practices are employed. This option has therefore been assessed as having a neutral effect in respect of SEA Objective 3.</p> Effects of Operation <p>The utilisation of metering by eligible customers would likely increase/ensure continuity of water supply through a reduction of water demand from previously metered domestic properties, and subsequently, a reduction of leakage within the water distribution network (the option has a design capacity of 0.08Ml/d), generating a very minor positive effect in respect of water quantity (SEA Objective 3). Overall, increased water efficiency may protect and slightly enhance the quality and quantity</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<p>of the surface water environment and the groundwater resource, and/or rates of recharge.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
4. To reduce the risk of flooding	<p>Will the option have the potential to cause or exacerbate flooding in the catchment area?</p> <p>Will the option have the potential to help alleviate flooding in the catchment area?</p> <p>Will the option enhance water infiltration and retention?</p> <p>Will the option be at risk of flooding or be affected by flooding, if it occurred?</p>	0	0	<p>Effects of Construction and Operation</p> <p>It is assumed that works could be scheduled to avoid periods of flooding should there be a risk. Furthermore, it is considered highly unlikely that implementation of the scheme would result in and/or exacerbate flooding elsewhere now or in the future. This option has therefore been assessed as having a neutral effect on SEA Objective 4.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
5. To limit the causes and effects of climate change and increase resilience to the consequences of climate change	<p>Will the option reduce vulnerability to the effects of climate change by appropriate adaptation?</p> <p>Will the option increase environmental resilience to the effects of climate change?</p> <p>Will the option reduce or minimise greenhouse gas emissions?</p> <p>Will the option deliver new infrastructure that is energy efficient or makes use of renewable energy sources?</p>	-	0	<p>Effects of Construction</p> <p>The installation of metering infrastructure is expected to generate carbon emissions throughout the implementation period. It is estimated that there would be up to 8,000km/annum from vehicle movements from site visits and the installation works. It is assumed, however, that vehicle movements could be clustered as appropriate which may help minimise vehicle emissions. Additionally, the provision and installation of new meters would generate carbon emissions arising from embodied carbon within the new meters (5.05kg CO₂/e). Consequently, this option would generate up to 237 tCO₂e during construction which has been assessed as having a significant negative effect on climate change (SEA Objective 5).</p> <p>Effects of Operation</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<p>Once the installation of new meters is complete, the cumulative effects of reduced leakage and greater water efficiency through lowered water demand by previously metered domestic customers is anticipated to result in a minor reduction of energy required to process and pump water (-43tCO₂e/year). Operational carbon emission savings include those from a reduction in vehicle movements (from eliminating the need for 5,667 meter readings. Overall, the reduction of net operational greenhouse gas emissions in respect of energy savings has been assessed against the definitions as negligible against climate change (SEA Objective 5).</p> <p>Mitigation</p> <ul style="list-style-type: none"> Consideration should be given to the co-ordination of travel in order to minimise overall vehicle movements and associated greenhouse gas emissions. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
<p>6. To maintain and enhance the economic and social wellbeing of the local community</p>	<p>Will the option ensure sufficient infrastructure is in place for predicted population increases?</p> <p>Will the option create local employment opportunities?</p> <p>Will the option support the local and regional economy?</p> <p>Will the option ensure that an affordable supply of water is maintained and vulnerable customers protected?</p> <p>Will the option avoid disruption through effects on the transport network?</p>	+	0	<p>Effects of Construction</p> <p>The implementation of this option would be unlikely to generate significant investment or employment opportunities and is classified as a medium level of investment in the definitions of significance (£3.3m). It is likely that a limited number of local employment and supply chain benefits could arise. In consequence, this option has been assessed as having a minor positive effect on SEA Objective 6.</p> <p>Effects of Operation</p> <p>It is assumed that the use of metering by customers would assist in decreasing network leakage through lowered water demand which should help reduce water loss in the Portsmouth Water DMZ. Operation is therefore likely to increase/ensure continuity of water supply thus helping ensure that a greater volume of water is available for future populations, commercial increases, and any seasonal demands. However, an increase of up to 0.08 Ml/d is insufficient to have a substantive effect and overall the option is assessed as having a neutral effect on the local economy and local community wellbeing (SEA Objective 6).</p> <p>Mitigation</p> <ul style="list-style-type: none"> Where possible, Portsmouth Water and any contractors should seek to utilise local labour.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<ul style="list-style-type: none"> Where possible, Portsmouth Water and any contractors should seek to appoint local contractors/sub-contractors and utilise locally sourced materials/equipment. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
7. To ensure the protection and enhancement of human health	<p>Will the option ensure the continuity of a safe and secure drinking water supply?</p> <p>Will the option ensure that surface water and bathing water quality are maintained within statutory standards?</p> <p>Will the option adversely affect human health by resulting in increased noise and/or adverse effects on air quality?</p> <p>Will the option affect opportunities for recreation and physical activity?</p>	0	0	<p>Effects of Construction</p> <p>The proposed works would be contained within the operational footprints of domestic premises such that the scale of implementation should not disrupt the use or result in the loss of amenity to proximate recreational activity and sport. The impacts of noise/vibration disturbance and nuisance resulting from the installation of new meters is not expected to result in any discernible effects on human health due to the scale and brevity of installation. Overall, implementation of this scheme is not expected to affect drinking water supply, surface water and bathing water quality, or recreation. This option has therefore been assessed as having a neutral effect on health (SEA Objective 7).</p> <p>Effects of Operation</p> <p>The scheme should not significantly affect human health by increased noise, nuisance or disruption nor would it affect opportunities for recreation. It is assumed that the cumulative effects of lowered water demand would help increase/ensure continuity of water supply through water efficiency. Overall, an increase of up to 0.08 MI/d would help ensure a continual supply of clean drinking water, however, is insufficient to have a substantive effect and overall the option is assessed as having a neutral effect on health (SEA Objective 7).</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
8. To promote the wise use of resources	<p>Will the option minimise the demand for raw materials?</p> <p>Will the option lead to reduced leakage from the supply network?</p> <p>Will the option improve efficiency in water consumption?</p> <p>Will the option seek to minimise the demand for raw materials?</p> <p>Will the option reduce or minimise energy use?</p> <p>Will the option promote the re-use and recycling of waste materials and reduce the proportion of waste sent to landfill?</p> <p>Will the option promote the use of sustainable design and materials?</p>	-	0	<p>Effects of Construction</p> <p>The installation of new meters would require a raw materials and energy to implement. Using the estimated carbon emissions associated with the embodied carbon within new meters in addition to vehicle greenhouse gas emissions as a proxy, material use and energy requirements are considered to be notable, and the option has therefore been assessed as having a minor negative effect on this objective. Furthermore, this option would generate construction wastes which may include infrastructural waste (original meter infrastructure) in addition to fuel usage for vehicles. Overall, this option has been assessed as having a minor negative effect on sustainable resource use (SEA Objective 8).</p> <p>Effects of Operation</p> <p>No significant amount of resources or energy would be required once the upgrading of prior metering infrastructure to metering is complete. As illustrated by the scale of operational carbon savings associated with reduced treatment and pumping of water (-43tCO₂e/year), operation has been assessed as having negligible energy savings. Notwithstanding, a further decrease in water demand from previously metered domestic properties should facilitate greater leakage reduction within the water distribution network. On balance, this option has been assessed as having a neutral effect on the sustainable use of resources (SEA Objective 8).</p> <p>Mitigation</p> <ul style="list-style-type: none"> • Opportunities to utilise reused/recycled materials (discarded appliances) during implementation should be considered where appropriate. <p>Assumptions</p> <ul style="list-style-type: none"> • None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> • None identified.
9. To conserve and enhance cultural and historic assets	<p>Will the option conserve or enhance the historic environment, including heritage assets such as historic buildings, conservation areas, features, places and spaces, and their settings?</p> <p>Will the option avoid or minimise damage to archaeologically important sites?</p>	0	0	<p>Effects of Construction</p> <p>Whilst it is unknown which properties would be affected, it is expected that the installation of new metering infrastructure will be low-impact. Installation will take place within the operational footprint of domestic sites and should have a negligible effect on the structural integrity and visual amenity of historic assets within the general vicinity. Overall, this option has been assessed as having a neutral effect on cultural and historic assets (SEA Objective 9).</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
	Will the option affect public access to, or enjoyment of, features of cultural heritage?			<p>Effects of Operation</p> <p>There are no discernible risks or clear impact pathways to cultural/historic heritage assets regarding the use of metering. This option has therefore been assessed as having a neutral effect on cultural and historic assets (SEA Objective 9).</p> <p>Mitigation</p> <ul style="list-style-type: none"> • None identified. <p>Assumptions</p> <ul style="list-style-type: none"> • None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> • None identified.
<p>10. To conserve and enhance landscape character and other protected features</p>	<p>Will the option avoid adverse effects on, and enhance where possible, protected/designated landscapes (including woodlands), townscapes or seascapes such as National Parks or AONBs be avoided?</p> <p>Will the option affect public access to existing landscape features?</p> <p>Will the option minimise adverse visual impacts?</p>	0	0	<p>Effects of Construction</p> <p>The structural scale of the new meters is expected to be minor such that installation should not result in any adverse impacts to the visual or landscape amenity of protected or local settings, e.g. designated national parks, townscapes, seascapes, or AONBs, due to the assumed low-intensity scale of construction in addition to the confined nature of these sites within operational footprints of domestic sites. Overall, this option has been assessed as having a neutral effect on landscape (SEA Objective 10).</p> <p>Effects of Operation</p> <p>There are no discernible risks or clear impact pathways to either the visual amenity or character of proximate local and designated landscapes, townscapes, or seascapes such as AONBs or national parks regarding the use of SMART metering. This option has therefore been assessed as having a neutral effect on landscape (SEA Objective 10).</p> <p>Mitigation</p> <ul style="list-style-type: none"> • None identified. <p>Assumptions</p> <ul style="list-style-type: none"> • None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> • None identified.

Option C006a: Metering on change of occupancy – existing meter pits

Option Summary

This option would involve the upgrade of existing metering infrastructure on a change of ownership, although it will still be a 'dumb' meter that would be read once every six months once installed. The option would start in 2020/21 and is assumed to go through to the rest of AMP7. It is estimated that 4,926 meters would be installed. Implementation is assumed to achieve a 15% saving per annum in water use per property. It is anticipated that up to 0.28 Ml/d of lost water would be saved following the implementation of this option.

Assessment

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
1. To ensure the protection and enhancement of biodiversity, priority habitats and species	<p>Will the option protect and enhance priority species, habitats and sites designated for their nature conservation value?</p> <p>Will the option protect and enhance non-designated sites and local biodiversity?</p> <p>Will the option provide opportunities for new habitat creation or restoration and link existing habitats as part of the development process?</p> <p>Will the option protect and enhance coastal and marine habitats and species?</p> <p>Will the option result in a change in the quality of habitats due to changes in groundwater/river water quality or quantity?</p> <p>Will the option affect riparian vegetation structure?</p>	0	0	<p>Effects of Construction</p> <p>The proposed works would be targeting existing water network infrastructure (meters) and in consequence, implementation would occur within the existing operational footprints of domestic properties which may encompass a wide range of urban, semi-rural, and rural settings. It is unlikely, however, that construction would have any discernible impacts on immediate biodiversity, priority habitats, e.g. European designated conservation areas, SSSIs, local nature reserves, and etc., or protected species due to the minor to negligible scale of construction associated with implementation. Overall, this option has been assessed as having a neutral effect on biodiversity (SEA Objective 1).</p> <p>Effects of Operation</p> <p>It is assumed that the use of meters by customers would decrease water demand (by on average 15% per property when compared to unmetered properties in the Portsmouth Water DMZ). The effect of increased water efficiency on designated nature conservation sites (e.g. SACs, SPAs, Ramsar and SSSIs) and the ecological quality of habitats and associated groundwater/river water bodies is considered to be slightly positive as the increased efficiency reduces demand for additional water resources and increases resilience of existing network; however, the magnitude of change is assessed as neutral.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<ul style="list-style-type: none"> None identified. Uncertainty <ul style="list-style-type: none"> None identified.
2. To ensure the appropriate and efficient use of land and protect soil quality and geodiversity	<p>Will the option minimise the loss of best and most versatile agricultural land?</p> <p>Will the option protect and enhance soil health?</p> <p>Will the option minimise conflict with existing land use patterns?</p> <p>Will the option minimise land contamination?</p> <p>Will the option utilise previously developed (brownfield) land?</p> <p>Will the option protect and enhance protected sites designated for their geological interest and wider geodiversity?</p>	0	0	Effects of Construction <p>The upgrading of existing metering infrastructure s would target existing infrastructure contained within the operational footprints of domestic premises; consequently, implementation would not require any new land-take. This option has therefore been assessed as having a neutral effect on the appropriate and efficient use of land (SEA Objective 2).</p> Effects of Operation <p>The utilisation of metering would not have a discernible effect on the appropriate and efficient use of land (SEA Objective 2).</p> Mitigation <ul style="list-style-type: none"> None identified. Assumptions <ul style="list-style-type: none"> None identified. Uncertainty <ul style="list-style-type: none"> None identified.
3. To protect and enhance water quality and surface and groundwater resources and the ecological status of water bodies	<p>Will the option minimise the demand for water resources?</p> <p>Will the option protect and improve surface water, groundwater and coastal water quality?</p> <p>Will the option result in changes to river flows?</p> <p>Will the option result in changes to groundwater levels?</p> <p>Will the option prevent the deterioration of Water Framework Directive (WFD) waterbody status (or potential)?</p>	0	+	Effects of Construction <p>It is not expected that the upgrading of existing metering infrastructure would affect river flows or groundwater levels, or on water quality, provided best practices are employed. This option has therefore been assessed as having a neutral effect in respect of SEA Objective 3.</p> Effects of Operation <p>The utilisation of metering by eligible customers would likely increase/ensure continuity of water supply through a reduction of water demand from previously metered domestic properties, and subsequently, a reduction of leakage within the water distribution network (the option has a design capacity of 0.28Ml/d), generating a minor positive effect in respect of water quantity (SEA Objective 3). Overall, increased water efficiency may protect and slightly enhance the quality and quantity</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<p>of the surface water environment and the groundwater resource, and/or rates of recharge.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
4. To reduce the risk of flooding	<p>Will the option have the potential to cause or exacerbate flooding in the catchment area?</p> <p>Will the option have the potential to help alleviate flooding in the catchment area?</p> <p>Will the option enhance water infiltration and retention?</p> <p>Will the option be at risk of flooding or be affected by flooding, if it occurred?</p>	0	0	<p>Effects of Construction</p> <p>It is assumed that works could be scheduled to avoid periods of flooding should there be a risk. Furthermore, it is considered highly unlikely that implementation of the scheme would result in and/or exacerbate flooding elsewhere now or in the future. This option has therefore been assessed as having a neutral effect on SEA Objective 4.</p> <p>Effects of Operation</p> <p>It is considered unlikely that the utilisation of metering would result in and/or exacerbate flooding elsewhere now or in the future. This option has therefore been assessed as having a neutral effect on SEA Objective 4.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
5. To limit the causes and effects of climate change and increase resilience to the consequences of climate change	<p>Will the option reduce vulnerability to the effects of climate change by appropriate adaptation?</p> <p>Will the option increase environmental resilience to the effects of climate change?</p> <p>Will the option reduce or minimise greenhouse gas emissions?</p>	-	+	<p>Effects of Construction</p> <p>The installation of metering infrastructure is expected to generate carbon emissions throughout the implementation period. It is estimated that there would be 15,763 km/a from vehicle movements which corresponds with site visits and the installation works. It is assumed, however, that vehicle movements could be clustered as appropriate which may help minimise vehicle emissions. Additionally, the provision and installation of 4,926 new meters would generate carbon emissions arising from</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
	Will the option deliver new infrastructure that is energy efficient or makes use of renewable energy sources?			<p>embodied carbon within the new meters (5.05kg CO₂/e) and from vehicle emissions. Consequently, this option would generate up to 174 tCO₂e during construction which has been assessed as having a minor negative effect on climate change (SEA Objective 5).</p> <p>Effects of Operation</p> <p>Once the installation of new meters is complete, the cumulative effects of reduced leakage and greater water efficiency through lowered water demand by previously metered domestic customers is anticipated to result in a minor reduction of energy required to process and pump water (-142tCO₂e/year). Operational carbon emissions in respect of vehicle movement from up to 19,704 km per annum arising from meter readings are considered to be small. Overall, the reduction of net operational greenhouse gas emissions in respect of energy savings has been assessed as having a minor positive effect on climate change (SEA Objective 5).</p> <p>Mitigation</p> <ul style="list-style-type: none"> Consideration should be given to the co-ordination of travel in order to minimise overall vehicle movements and associated greenhouse gas emissions. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
6. To maintain and enhance the economic and social wellbeing of the local community	<p>Will the option ensure sufficient infrastructure is in place for predicted population increases?</p> <p>Will the option create local employment opportunities?</p> <p>Will the option support the local and regional economy?</p> <p>Will the option ensure that an affordable supply of water is maintained and vulnerable customers protected?</p> <p>Will the option avoid disruption through effects on the transport network?</p>	0	0	<p>Effects of Construction</p> <p>The option is expected to represent a low capital investment (£0.97m) which is not expected to generate a significant number of jobs in the long-term nor result in a discernible effect on the local economy associated with supply chain benefits (e.g. associated with the supply of raw materials and appointment of contractors to undertake the works). Due to the modest volume of vehicle movement associated with site visits and the installation of meters, it is unlikely that implementation would result in adverse impacts on the road network throughout the Portsmouth Water DMZ. Overall, this option has been assessed as having a neutral effect on local community wellbeing (SEA Objective 6).</p> <p>Effects of Operation</p> <p>It is assumed that the use of metering by customers would assist in decreasing network leakage through lowered water demand which should help reduce water loss in the Portsmouth Water DMZ. Operation is therefore likely to increase/ensure</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<p>continuity of water supply thus helping ensure that a greater volume of water is available for future populations, commercial increases, and any seasonal demands. However, an increase of up to 0.28 MI/d is insufficient to have a substantive effect and overall the option is assessed as having a neutral effect on the local economy and local community wellbeing (SEA Objective 6).</p> <p>Mitigation</p> <ul style="list-style-type: none"> Where possible, Portsmouth Water and any contractors should seek to utilise local labour. Where possible, Portsmouth Water and any contractors should seek to appoint local contractors/sub-contractors and utilise locally sourced materials/equipment. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
<p>7. To ensure the protection and enhancement of human health</p>	<p>Will the option ensure the continuity of a safe and secure drinking water supply?</p> <p>Will the option ensure that surface water and bathing water quality are maintained within statutory standards?</p> <p>Will the option adversely affect human health by resulting in increased noise and/or adverse effects on air quality?</p> <p>Will the option affect opportunities for recreation and physical activity?</p>	0	0	<p>Effects of Construction</p> <p>The proposed works would be contained within the operational footprints of domestic premises such that the scale of implementation should not disrupt the use or result in the loss of amenity to proximate recreational activity and sport. The impacts of noise/vibration disturbance and nuisance resulting from the installation of new meters is not expected to result in any discernible effects on human health due to the scale and brevity of installation. Overall, implementation of this scheme is not expected to affect drinking water supply, surface water and bathing water quality, or recreation. This option has therefore been assessed as having a neutral effect on health (SEA Objective 7).</p> <p>Effects of Operation</p> <p>The scheme should not significantly affect human health by increased noise, nuisance or disruption nor would it affect opportunities for recreation. It is assumed that the cumulative effects of lowered water demand would help increase/ensure continuity of water supply through water efficiency. Overall, an increase of up to 0.28 MI/d would help ensure a continual supply of clean drinking water, however, is insufficient to have a substantive effect and overall the option is assessed as having a neutral effect on health (SEA Objective 7).</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				Mitigation <ul style="list-style-type: none"> None identified. Assumptions <ul style="list-style-type: none"> None identified. Uncertainty <ul style="list-style-type: none"> None identified.
8. To promote the wise use of resources	<p>Will the option minimise the demand for raw materials?</p> <p>Will the option lead to reduced leakage from the supply network?</p> <p>Will the option improve efficiency in water consumption?</p> <p>Will the option seek to minimise the demand for raw materials?</p> <p>Will the option reduce or minimise energy use?</p> <p>Will the option promote the re-use and recycling of waste materials and reduce the proportion of waste sent to landfill?</p> <p>Will the option promote the use of sustainable design and materials?</p>	-	+	Effects of Construction <p>The installation of new meters would require a raw materials and energy to implement. Using the estimated carbon emissions associated with the embodied carbon within new meters in addition to vehicle greenhouse gas emissions as a proxy, material use and energy requirements are considered to be notable, and the option has therefore been assessed as having a minor negative effect on this objective. Furthermore, this option would generate construction wastes which may include infrastructural waste (original meter infrastructure) in addition to fuel usage for vehicles. Overall, this option has been assessed as having a minor negative effect on sustainable resource use (SEA Objective 8).</p> Effects of Operation <p>No significant amount of resources or energy would be required once the upgrading of prior metering infrastructure to metering is complete. As illustrated by the scale of operational carbon savings associated with reduced treatment and pumping of water (-142tCO₂e/year), operation has been assessed as having minor energy savings. Notwithstanding, a further decrease in water demand from previously metered domestic properties should facilitate greater leakage reduction within the water distribution network. On balance, this option has been assessed as having a minor positive effect on the sustainable use of resources (SEA Objective 8).</p> Mitigation <ul style="list-style-type: none"> Opportunities to utilise reused/recycled materials (discarded appliances) during implementation should be considered where appropriate. Assumptions <ul style="list-style-type: none"> None identified. Uncertainty <ul style="list-style-type: none"> None identified.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
9. To conserve and enhance cultural and historic assets	<p>Will the option conserve or enhance the historic environment, including heritage assets such as historic buildings, conservation areas, features, places and spaces, and their settings?</p> <p>Will the option avoid or minimise damage to archaeologically important sites?</p> <p>Will the option affect public access to, or enjoyment of, features of cultural heritage?</p>	0	0	<p>Effects of Construction</p> <p>Whilst it is unknown which properties would be affected, it is expected that the installation of new metering infrastructure will be low-impact. Installation will take place within the operational footprint of domestic sites and should have a negligible effect on the structural integrity and visual amenity of historic assets within the general vicinity. Overall, this option has been assessed as having a neutral effect on cultural and historic assets (SEA Objective 9).</p> <p>Effects of Operation</p> <p>There are no discernible risks or clear impact pathways to cultural/historic heritage assets regarding the use of metering. This option has therefore been assessed as having a neutral effect on cultural and historic assets (SEA Objective 9).</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
10. To conserve and enhance landscape character and other protected features	<p>Will the option avoid adverse effects on, and enhance where possible, protected/designated landscapes (including woodlands), townscapes or seascapes such as National Parks or AONBs be avoided?</p> <p>Will the option affect public access to existing landscape features?</p> <p>Will the option minimise adverse visual impacts?</p>	0	0	<p>Effects of Construction</p> <p>The structural scale of the new meters is expected to be minor such that installation should not result in any adverse impacts to the visual or landscape amenity of protected or local settings, e.g. designated national parks, townscapes, seascapes, or AONBs, due to the assumed low-intensity scale of construction in addition to the confined nature of these sites within operational footprints of domestic sites. Overall, this option has been assessed as having a neutral effect on landscape (SEA Objective 10).</p> <p>Effects of Operation</p> <p>There are no discernible risks or clear impact pathways to either the visual amenity or character of proximate local and designated landscapes, townscapes, or seascapes such as AONBs or national parks regarding the use of SMART metering. This option has therefore been assessed as having a neutral effect on landscape (SEA Objective 10).</p> <p>Mitigation</p>



Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<ul style="list-style-type: none">• None identified. Assumptions <ul style="list-style-type: none">• None identified. Uncertainty <ul style="list-style-type: none">• None identified.

Option C006b: Metering on change of occupancy - all properties

Option Summary

The option would involve the installation of meters into households that currently do not have a meter, on the change of ownership. This option would require Portsmouth Water to be notified by a relevant authority at point of sale and given access to the property to install a new 'dumb' meter that would be read once every six months once installed. The option would start in 2025/26 and is assumed to go through to 2044/45 and an estimated 94,727 meters would be installed over the period. Implementation is assumed to achieve a 15% saving per annum in water use per property. It is anticipated that up to 4.68 Ml/d of lost water would be saved following the implementation of this option.

Assessment

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
1. To ensure the protection and enhancement of biodiversity, priority habitats and species	<p>Will the option protect and enhance priority species, habitats and sites designated for their nature conservation value?</p> <p>Will the option protect and enhance non-designated sites and local biodiversity?</p> <p>Will the option provide opportunities for new habitat creation or restoration and link existing habitats as part of the development process?</p> <p>Will the option protect and enhance coastal and marine habitats and species?</p> <p>Will the option result in a change in the quality of habitats due to changes in groundwater/river water quality or quantity?</p> <p>Will the option affect riparian vegetation structure?</p>	0	0	<p>Effects of Construction</p> <p>The proposed works would be targeting new properties that do not have a meter and in consequence, implementation would occur within the existing operational footprints of domestic properties which may encompass a wide range of urban, semi-rural, and rural settings. It is unlikely, however, that construction would have any discernible impacts on immediate biodiversity, priority habitats, e.g. European designated conservation areas, SSSIs, local nature reserves, and etc., or protected species due to the minor to negligible scale of construction associated with implementation. Overall, this option has been assessed as having a neutral effect on biodiversity (SEA Objective 1).</p> <p>Effects of Operation</p> <p>It is assumed that the use of meters by customers would decrease water demand (by on average 15% per property when compared to unmetered properties in the Portsmouth Water DMZ). The effect of increased water efficiency on designated nature conservation sites (e.g. SACs, SPAs, Ramsar and SSSIs) and the ecological quality of habitats and associated groundwater/river water bodies is considered to be slightly positive as the increased efficiency reduces demand for additional water resources and increases resilience of existing network; however, the magnitude of change is assessed as neutral.</p> <p>Mitigation</p> <ul style="list-style-type: none"> • None identified. <p>Assumptions</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<ul style="list-style-type: none"> None identified. Uncertainty <ul style="list-style-type: none"> None identified.
2. To ensure the appropriate and efficient use of land and protect soil quality and geodiversity	<p>Will the option minimise the loss of best and most versatile agricultural land?</p> <p>Will the option protect and enhance soil health?</p> <p>Will the option minimise conflict with existing land use patterns?</p> <p>Will the option minimise land contamination?</p> <p>Will the option utilise previously developed (brownfield) land?</p> <p>Will the option protect and enhance protected sites designated for their geological interest and wider geodiversity?</p>	0	0	<p>Effects of Construction and Operation</p> <p>The installation of the new metering infrastructure would be contained within the operational footprints of domestic premises; consequently, implementation would not require any new land-take. This option has therefore been assessed as having a neutral effect on the appropriate and efficient use of land (SEA Objective 2).</p> <p>Effects of Construction and Operation</p> <p>The utilisation of metering would not have a discernible effect on the appropriate and efficient use of land (SEA Objective 2).</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
3. To protect and enhance water quality and surface and groundwater resources and the ecological status of water bodies	<p>Will the option minimise the demand for water resources?</p> <p>Will the option protect and improve surface water, groundwater and coastal water quality?</p> <p>Will the option result in changes to river flows?</p> <p>Will the option result in changes to groundwater levels?</p> <p>Will the option prevent the deterioration of Water Framework Directive (WFD) waterbody status (or potential)?</p>	0	+	<p>Effects of Construction</p> <p>It is not expected that the installation of metering infrastructure would affect river flows or groundwater levels, or on water quality, provided best practices are employed. This option has therefore been assessed as having a neutral effect in respect of SEA Objective 3.</p> <p>Effects of Operation</p> <p>The utilisation of metering by eligible customers would likely increase/ensure continuity of water supply through a reduction of water demand from previously metered domestic properties, and subsequently, a reduction of leakage within the water distribution network (the option has a design capacity of 4.68 Ml/d, generating a minor positive effect in respect of water quantity (SEA Objective 3)).</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				Assumptions <ul style="list-style-type: none"> None identified. Uncertainty <ul style="list-style-type: none"> None identified.
4. To reduce the risk of flooding	<p>Will the option have the potential to cause or exacerbate flooding in the catchment area?</p> <p>Will the option have the potential to help alleviate flooding in the catchment area?</p> <p>Will the option enhance water infiltration and retention?</p> <p>Will the option be at risk of flooding or be affected by flooding, if it occurred?</p>	0	0	Effects of Construction <p>It is assumed that works could be scheduled to avoid periods of flooding should there be a risk. Furthermore, it is considered highly unlikely that implementation of the scheme would result in and/or exacerbate flooding elsewhere now or in the future. This option has therefore been assessed as having a neutral effect on SEA Objective 4.</p> Effects of Operation <p>It is considered unlikely that the utilisation of metering would result in and/or exacerbate flooding elsewhere now or in the future. This option has therefore been assessed as having a neutral effect on SEA Objective 4.</p> Mitigation <ul style="list-style-type: none"> None identified. Assumptions <ul style="list-style-type: none"> None identified. Uncertainty <ul style="list-style-type: none"> None identified.
5. To limit the causes and effects of climate change and increase resilience to the consequences of climate change	<p>Will the option reduce vulnerability to the effects of climate change by appropriate adaptation?</p> <p>Will the option increase environmental resilience to the effects of climate change?</p> <p>Will the option reduce or minimise greenhouse gas emissions?</p> <p>Will the option deliver new infrastructure that is energy efficient or makes use of renewable energy sources?</p>	--	++	Effects of Construction <p>The installation of metering infrastructure is expected to generate carbon emissions throughout the implementation period. It is estimated that there would be up to 133,716km/a from vehicle movements (with an average of 75,758km/a over the 20 year implementation period) which corresponds with site visits and the installation works. It is assumed, however, that vehicle movements could be clustered as appropriate which may help minimise vehicle emissions. Additionally, the provision and installation of new meters would generate carbon emissions arising from embodied carbon within the new meters (5.05kg CO₂/e). Consequently, this option would generate up to 2,294 tCO₂e during construction which has been assessed as having a significant negative effect on climate change (SEA Objective 5).</p> Effects of Operation

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<p>Once the installation of new meters is complete, the cumulative effects of reduced leakage and greater water efficiency through lowered water demand by previously metered domestic customers is anticipated to result in a significant reduction of energy required to process and pump water (-2,516 tCO₂e/year). Whilst, operational carbon emissions from vehicle movement are expected (estimated up to 33,444 km per annum) arising from meter readings, carbon emissions associated with the movements are small compared to the reduction in energy use. Overall, the reduction of net operational greenhouse gas emissions in respect of energy savings is considered a significant benefit; consequently, this option has been assessed as having a significant positive effect on climate change (SEA Objective 5).</p> <p>Mitigation</p> <ul style="list-style-type: none"> Consideration should be given to the co-ordination of travel in order to minimise overall vehicle movements and associated greenhouse gas emissions. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
<p>6. To maintain and enhance the economic and social wellbeing of the local community</p>	<p>Will the option ensure sufficient infrastructure is in place for predicted population increases?</p> <p>Will the option create local employment opportunities?</p> <p>Will the option support the local and regional economy?</p> <p>Will the option ensure that an affordable supply of water is maintained and vulnerable customers protected?</p> <p>Will the option avoid disruption through effects on the transport network?</p>	<p>++/-</p>	<p>+</p>	<p>Effects of Construction</p> <p>The option is expected to represent a significant capital investment (£21.5m) which is expected to generate a number of long term jobs and which could have effects on the local economy associated with supply chain benefits (e.g. associated with the supply of raw materials and appointment of contractors to undertake the works). However, whilst the total is substantial, it is spread over a 20 year period which will lessen the impact in any one year. Due to the significant volume of vehicle movement associated with site visits and the installation of meters, it is likely that implementation would result in adverse impacts on the road network throughout the Portsmouth Water DMZ. Overall, this option has been assessed as having a mixed significant positive and minor negative effect on local community wellbeing (SEA Objective 6).</p> <p>Effects of Operation</p> <p>It is assumed that the use of metering by customers would assist in decreasing network leakage through lowered water demand which should help reduce water loss in the Portsmouth Water DMZ. Operation is therefore likely to increase/ensure continuity of water supply thus helping ensure that a greater volume of water is available for future populations, commercial increases, and any seasonal demands.</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<p>An increase of up to 4.68 MI/d will have a minor positive effects (when compared to the definition of significance) and overall the option is assessed as having a minor positive effect on the local economy and local community wellbeing (SEA Objective 6).</p> <p>Mitigation</p> <ul style="list-style-type: none"> Where possible, Portsmouth Water and any contractors should seek to utilise local labour. Where possible, Portsmouth Water and any contractors should seek to appoint local contractors/sub-contractors and utilise locally sourced materials/equipment. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
<p>7. To ensure the protection and enhancement of human health</p>	<p>Will the option ensure the continuity of a safe and secure drinking water supply?</p> <p>Will the option ensure that surface water and bathing water quality are maintained within statutory standards?</p> <p>Will the option adversely affect human health by resulting in increased noise and/or adverse effects on air quality?</p> <p>Will the option affect opportunities for recreation and physical activity?</p>	0	+	<p>Effects of Construction</p> <p>The proposed works would be contained within the operational footprints of domestic premises such that the scale of implementation should not disrupt the use or result in the loss of amenity to proximate recreational activity and sport. The impacts of noise/vibration disturbance and nuisance resulting from the installation of new meters is not expected to result in any discernible effects on human health due to the scale and brevity of installation; however, there may be some localised effects from traffic movements. Overall, implementation of this scheme is not expected to affect drinking water supply, surface water and bathing water quality, or recreation. This option has therefore been assessed as having a neutral effect on health (SEA Objective 7).</p> <p>Effects of Operation</p> <p>The scheme should not significantly affect human health by increased noise, nuisance or disruption nor would it affect opportunities for recreation; however, there may be some localised effects from traffic movements (estimated at 33,444km/a). It is assumed that the cumulative effects of lowered water demand would help increase/ensure continuity of water supply through water efficiency. Overall, an increase of up to 4.68 MI/d would help ensure a continual supply of clean drinking water and overall the option is assessed as having a minor positive effect on health (SEA Objective 7).</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				Mitigation <ul style="list-style-type: none"> None identified. Assumptions <ul style="list-style-type: none"> None identified. Uncertainty <ul style="list-style-type: none"> None identified.
8. To promote the wise use of resources	<p>Will the option minimise the demand for raw materials?</p> <p>Will the option lead to reduced leakage from the supply network?</p> <p>Will the option improve efficiency in water consumption?</p> <p>Will the option seek to minimise the demand for raw materials?</p> <p>Will the option reduce or minimise energy use?</p> <p>Will the option promote the re-use and recycling of waste materials and reduce the proportion of waste sent to landfill?</p> <p>Will the option promote the use of sustainable design and materials?</p>	--	++	Effects of Construction <p>The installation of new meters would require a raw materials and energy to implement. Using the estimated carbon emissions associated with the embodied carbon within new meters in addition to vehicle greenhouse gas emissions as a proxy, material use and energy requirements are considered to be notable, and the option has therefore been assessed as having a significant negative effect on this objective. Furthermore, this option would generate construction wastes which may include infrastructural waste in addition to fuel usage for vehicles. Overall, this option has been assessed as having a significant negative effect on sustainable resource use (SEA Objective 8).</p> Effects of Operation <p>No significant amount of resources or energy would be required once the metering infrastructure installation is complete. As illustrated by the scale of operational carbon savings associated with reduced treatment and pumping of water (-2,516 tCO₂e/year), operation has been assessed as having significant energy savings which has been assessed as having a significant positive effect on the sustainable use of resources (SEA Objective 8).</p> Mitigation <ul style="list-style-type: none"> Opportunities to utilise reused/recycled materials (discarded appliances) during implementation should be considered where appropriate. Assumptions <ul style="list-style-type: none"> None identified. Uncertainty <ul style="list-style-type: none"> None identified.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
9. To conserve and enhance cultural and historic assets	<p>Will the option conserve or enhance the historic environment, including heritage assets such as historic buildings, conservation areas, features, places and spaces, and their settings?</p> <p>Will the option avoid or minimise damage to archaeologically important sites?</p> <p>Will the option affect public access to, or enjoyment of, features of cultural heritage?</p>	0	0	<p>Effects of Construction</p> <p>Whilst it is unknown which properties would be affected, it is expected that the installation of new metering infrastructure will be low-impact. Installation will take place within the operational footprint of domestic sites and should have a negligible effect on the structural integrity and visual amenity of historic assets within the general vicinity. Overall, this option has been assessed as having a neutral effect on cultural and historic assets (SEA Objective 9).</p> <p>Effects of Operation</p> <p>There are no discernible risks or clear impact pathways to cultural/historic heritage assets regarding the use of metering. This option has therefore been assessed as having a neutral effect on cultural and historic assets (SEA Objective 9).</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
10. To conserve and enhance landscape character and other protected features	<p>Will the option avoid adverse effects on, and enhance where possible, protected/designated landscapes (including woodlands), townscapes or seascapes such as National Parks or AONBs be avoided?</p> <p>Will the option affect public access to existing landscape features?</p> <p>Will the option minimise adverse visual impacts?</p>	0	0	<p>Effects of Construction</p> <p>The structural scale of the new meters is expected to be minor such that installation should not result in any adverse impacts to the visual or landscape amenity of protected or local settings, e.g. designated national parks, townscapes, seascapes, or AONBs, due to the assumed low-intensity scale of construction in addition to the confined nature of these sites within operational footprints of domestic sites. Overall, this option has been assessed as having a neutral effect on landscape (SEA Objective 10).</p> <p>Effects of Operation</p> <p>There are no discernible risks or clear impact pathways to either the visual amenity or character of proximate local and designated landscapes, townscapes, or seascapes such as AONBs or national parks regarding the use of metering. This option has therefore been assessed as having a neutral effect on landscape (SEA Objective 10).</p> <p>Mitigation</p>



Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<ul style="list-style-type: none">• None identified. Assumptions <ul style="list-style-type: none">• None identified. Uncertainty <ul style="list-style-type: none">• None identified.

Revised Preferred Water Efficiency Options

Option C026: Subsidy to customers that purchase water efficient appliances (washing machines and dishwashers, showers and WCs)

Option Summary

This option would involve the provision of financial subsidies (10% reduction on measured bills over 3 years) in conjunction with customer awareness programmes and basic water audits in order to incentivise/accelerate the replacement of ageing inefficient appliances (washing machines, dishwashers, showers, and WCs) with more water-efficient models. Within the 3 year implementation period, it is estimated that up to 2,300 measured domestic households would be targeted.

Assessment

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
1. To ensure the protection and enhancement of biodiversity, priority habitats and species	<p>Will the option protect and enhance priority species, habitats and sites designated for their nature conservation value?</p> <p>Will the option protect and enhance non-designated sites and local biodiversity?</p> <p>Will the option provide opportunities for new habitat creation or restoration and link existing habitats as part of the development process?</p> <p>Will the option protect and enhance coastal and marine habitats and species?</p> <p>Will the option result in a change in the quality of habitats due to changes in groundwater/river water quality or quantity?</p> <p>Will the option affect riparian vegetation structure?</p>	0	0	<p>Effects of Construction</p> <p>There would be no physical construction associated with this option as implementation of the scheme is contingent upon the provision of financial subsidies and awareness programmes/water audits. Consequently, the option has been assessed as having a neutral effect on biodiversity (SEA Objective 1).</p> <p>Effects of Operation</p> <p>It is assumed that the provision of financial subsidies and awareness programmes/water audits to domestic Portsmouth Water customers would help reduce water demand. This may benefit the water environment and the ecology it supports through reduced abstraction. However, effects in this regard are not expected to be significant and a neutral effect has therefore been identified in respect of this objective.</p> <p>Mitigation</p> <ul style="list-style-type: none"> • None identified. <p>Assumptions</p> <ul style="list-style-type: none"> • None identified.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				Uncertainty <ul style="list-style-type: none"> None identified.
2. To ensure the appropriate and efficient use of land and protect soil quality and geodiversity	<p>Will the option minimise the loss of best and most versatile agricultural land?</p> <p>Will the option protect and enhance soil health?</p> <p>Will the option minimise conflict with existing land use patterns?</p> <p>Will the option minimise land contamination?</p> <p>Will the option utilise previously developed (brownfield) land?</p> <p>Will the option protect and enhance protected sites designated for their geological interest and wider geodiversity?</p>	0	0	Effects of Construction and Operation <p>There would be no land take associated with this option and in consequence, neutral effects have been identified in respect of geology and soils during both construction and operation.</p> Mitigation <ul style="list-style-type: none"> None identified. Assumptions <ul style="list-style-type: none"> None identified. Uncertainty <ul style="list-style-type: none"> None identified.
3. To protect and enhance water quality and surface and groundwater resources and the ecological status of water bodies	<p>Will the option minimise the demand for water resources?</p> <p>Will the option protect and improve surface water, groundwater and coastal water quality?</p> <p>Will the option result in changes to river flows?</p> <p>Will the option result in changes to groundwater levels?</p> <p>Will the option prevent the deterioration of Water Framework Directive (WFD) waterbody status (or potential)?</p>	0	+	Effects of Construction <p>There would be no physical construction associated with this option as implementation of the scheme is contingent upon the provision of financial subsidies and awareness programmes/water audits. Consequently, no effects on water quality/quantity (SEA Objective 3) are predicted.</p> Effects of Operation <p>The utilisation of more efficient appliances and the uptake of water efficiency advice by domestic customers following awareness programmes/water audits would reduce the demand for water. In this regard, the option is expected to generate water savings of up to 0.31 MI/d. It is possible that reduced demand for water could protect and enhance the quality and quantity of the surface water environment and the groundwater resource.</p> <p>Overall, this option has been assessed as having a positive effect on SEA Objective 3.</p> Mitigation <ul style="list-style-type: none"> None identified. Assumptions <ul style="list-style-type: none"> None identified.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				Uncertainty <ul style="list-style-type: none"> The level of customer uptake and application of financial subsidies and knowledge gained from awareness programmes and basic water audits may vary from that predicted.
4. To reduce the risk of flooding	<p>Will the option have the potential to cause or exacerbate flooding in the catchment area?</p> <p>Will the option have the potential to help alleviate flooding in the catchment area?</p> <p>Will the option enhance water infiltration and retention?</p> <p>Will the option be at risk of flooding or be affected by flooding, if it occurred?</p>	0	0	Effects of Construction and Operation <p>It is not expected that the provision of financial subsidies and awareness programmes/water audits would result in/exacerbate flooding. This option has therefore been assessed as having a neutral effect on SEA Objective 4 during both implementation and operation.</p> Mitigation <ul style="list-style-type: none"> None identified. Assumptions <ul style="list-style-type: none"> None identified. Uncertainty <ul style="list-style-type: none"> None identified.
5. To limit the causes and effects of climate change and increase resilience to the consequences of climate change	<p>Will the option reduce vulnerability to the effects of climate change by appropriate adaptation?</p> <p>Will the option increase environmental resilience to the effects of climate change?</p> <p>Will the option reduce or minimise greenhouse gas emissions?</p> <p>Will the option deliver new infrastructure that is energy efficient or makes use of renewable energy sources?</p>	-	+	Effects of Construction <p>Awareness campaigns and conducting of water audits by Portsmouth Water representatives is expected to generate carbon emissions associated with vehicle movements. It is assumed, however, that vehicle movements could be geographically clustered as appropriate which may help minimise vehicle emissions in this regard.</p> <p>Overall, this option would generate up to 105.5 tCO₂e during implementation (depending on the intensity of movement throughout the DMZ) and this has been assessed as having a minor negative effect on climate change (SEA Objective 5).</p> Effects of Operation <p>This option would be expected to reduce the demand for water. This would result in a reduction in energy associated with the treatment and pumping of water (-20,897 kWh/a) and related emissions (-163 tCO₂e/year).</p> <p>The predicted effects of climate change (including drier summers) mean that this option could assist in strengthening climate change adaptation by increasing water supply/storage.</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<p>Overall, this option has been assessed as having a minor positive effect on climate change (SEA Objective 5).</p> <p>Mitigation</p> <ul style="list-style-type: none"> Consideration should be given to the co-ordination of travel in order to minimise overall vehicle movements and associated greenhouse gas emissions. Public transport should be utilised wherever possible. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> The level of customer uptake and application of financial subsidies and knowledge gained from awareness programmes and basic water audits may vary from that predicted.
<p>6. To maintain and enhance the economic and social wellbeing of the local community</p>	<p>Will the option ensure sufficient infrastructure is in place for predicted population increases?</p> <p>Will the option create local employment opportunities?</p> <p>Will the option support the local and regional economy?</p> <p>Will the option ensure that an affordable supply of water is maintained and vulnerable customers protected?</p> <p>Will the option avoid disruption through effects on the transport network?</p>	0	0	<p>Effects of Construction</p> <p>The implementation of this option would be unlikely to generate significant investment or employment opportunities (£0.4m). It is likely that any additional work would be accommodated in existing employees' or contractors'/partners' workloads. In consequence, this option has been assessed as having a neutral effect on SEA Objective 6.</p> <p>Effects of Operation</p> <p>It is assumed that increased knowledge regarding smart and sustainable water consumption and the use of water efficient devices would reduce the demand for water. In-turn, this may support population and economic growth by helping to ensure that there is sufficient water availability. Reduced water demand may also help lower water bills (for those customers that are metered). However, savings associated with this option would be very small (0.31 Ml/d) and a neutral effect has therefore been identified in respect of the local economy and local community wellbeing (SEA Objective 6).</p> <p>Mitigation</p> <ul style="list-style-type: none"> Where possible, Portsmouth Water and any contractors should seek to utilise local labour.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<ul style="list-style-type: none"> Where possible, Portsmouth Water and any contractors should seek to appoint local contractors/sub-contractors and utilise locally sourced materials/equipment. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> The level of customer uptake and application of financial subsidies and knowledge gained from awareness programmes and basic water audits may vary from that predicted.
7. To ensure the protection and enhancement of human health	<p>Will the option ensure the continuity of a safe and secure drinking water supply?</p> <p>Will the option ensure that surface water and bathing water quality are maintained within statutory standards?</p> <p>Will the option adversely affect human health by resulting in increased noise and/or adverse effects on air quality?</p> <p>Will the option affect opportunities for recreation and physical activity?</p>	0	0	<p>Effects of Construction</p> <p>It is not expected that awareness campaigns and conducting of water audits by Portsmouth Water representatives within the premises of domestic properties would have any discernible effects on health. This option has therefore been assessed as having a neutral effect on SEA Objective 7.</p> <p>Effects of Operation</p> <p>It is assumed that increased knowledge regarding smart and sustainable water consumption and the use of water efficient devices would reduce the demand for water. In-turn, this may contribute to the continuity of water supply. However, savings associated with this option would be very small (0.31 MI/d) and a neutral effect has therefore been identified in respect of SEA Objective 7.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> The level of customer uptake and application of financial subsidies and knowledge gained from awareness programmes and basic water audits may vary from that predicted.
8. To promote the wise use of resources	Will the option minimise the demand for raw materials?	-	+	<p>Effects of Construction</p> <p>Awareness campaigns and conducting of water audits by Portsmouth Water representatives would result in fuel consumption associated with related vehicle movements. Using the estimated carbon emissions associated with vehicle</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
	<p>Will the option lead to reduced leakage from the supply network?</p> <p>Will the option improve efficiency in water consumption?</p> <p>Will the option seek to minimise the demand for raw materials?</p> <p>Will the option reduce or minimise energy use?</p> <p>Will the option promote the re-use and recycling of waste materials and reduce the proportion of waste sent to landfill?</p> <p>Will the option promote the use of sustainable design and materials?</p>			<p>emissions as a proxy (105.5 tCO₂e), energy requirements are considered to be slightly adverse and the option has therefore been assessed as having a minor negative effect on this objective. The implementation of this option may also indirectly generate waste associated with discarded appliances.</p> <p>Effects of Operation</p> <p>This option would be expected to reduce the demand for water (savings associated with this option would be 0.31 Ml/d).</p> <p>Demand reductions would in-turn result in a reduction in energy associated with the treatment and pumping of water (-20,897 kWh/a).</p> <p>Overall, this option has been assessed as having a minor positive effect on resource use (SEA Objective 8).</p> <p>Mitigation</p> <ul style="list-style-type: none"> • Opportunities to utilise reused/recycled materials (discarded appliances) during implementation should be considered where appropriate. <p>Assumptions</p> <ul style="list-style-type: none"> • None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> • The level of customer uptake and application of financial subsidies and knowledge gained from awareness programmes and basic water audits may vary from that predicted.
9. To conserve and enhance cultural and historic assets	<p>Will the option conserve or enhance the historic environment, including heritage assets such as historic buildings, conservation areas, features, places and spaces, and their settings?</p> <p>Will the option avoid or minimise damage to archaeologically important sites?</p> <p>Will the option affect public access to, or enjoyment of, features of cultural heritage?</p>	0	0	<p>Effects of Construction and Operation</p> <p>There would no physical construction associated with this option as implementation of the scheme is contingent upon the provision of financial subsidies and awareness programmes/water audits. Consequently, there would be no effects on cultural heritage (SEA Objective 9) during both construction and operation.</p> <p>Mitigation</p> <ul style="list-style-type: none"> • None identified. <p>Assumptions</p> <ul style="list-style-type: none"> • None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> • None identified.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
10. To conserve and enhance landscape character and other protected features	<p>Will the option avoid adverse effects on, and enhance where possible, protected/designated landscapes (including woodlands), townscapes or seascapes such as National Parks or AONBs be avoided?</p> <p>Will the option affect public access to existing landscape features?</p> <p>Will the option minimise adverse visual impacts?</p>	0	0	<p>Effects of Construction and Operation</p> <p>There would be no physical construction associated with this option as implementation of the scheme is contingent upon the provision of financial subsidies and awareness programmes/water audits. Consequently, there would be no effects on landscape (SEA Objective 10) during both construction and operation.</p> <p>Mitigation</p> <ul style="list-style-type: none"> • None identified. <p>Assumptions</p> <ul style="list-style-type: none"> • None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> • None identified.

Option C034: Water saving devices - Retrofitting existing toilets (with flush >9l)

Option Summary

This option would involve the provision and installation of one free dual flush retrofit device by Portsmouth Water and/or partners in order to incentivise/accelerate the replacement of 'larger size' single flush WCs. Within the 3 year implementation period, it is predicted that up to 951 eligible measured domestic households would be targeted.

Assessment

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
1. To ensure the protection and enhancement of biodiversity, priority habitats and species	<p>Will the option protect and enhance priority species, habitats and sites designated for their nature conservation value?</p> <p>Will the option protect and enhance non-designated sites and local biodiversity?</p> <p>Will the option provide opportunities for new habitat creation or restoration and link existing habitats as part of the development process?</p> <p>Will the option protect and enhance coastal and marine habitats and species?</p> <p>Will the option result in a change in the quality of habitats due to changes in groundwater/river water quality or quantity?</p> <p>Will the option affect riparian vegetation structure?</p>	0	0	<p>Effects of Construction</p> <p>The installation of dual flush retrofit devices is expected to be low-impact and would have no discernible effect on biodiversity. Overall, this option has been assessed as having a neutral effect on SEA Objective 1.</p> <p>Effects of Operation</p> <p>It is assumed that the use of more efficient dual flush retrofit devices would help reduce water demand. This may benefit the water environment and the ecology it supports through reduced abstraction. However, effects in this regard are not expected to be significant and a neutral effect has therefore been identified in respect of this objective.</p> <p>Mitigation</p> <ul style="list-style-type: none"> • None identified. <p>Assumptions</p> <ul style="list-style-type: none"> • None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> • None identified.
2. To ensure the appropriate and efficient use of land and protect soil quality and geodiversity	<p>Will the option minimise the loss of best and most versatile agricultural land?</p> <p>Will the option protect and enhance soil health?</p> <p>Will the option minimise conflict with existing land use patterns?</p>	0	0	<p>Effects of Construction and Operation</p> <p>There would be no land take associated with this option and in consequence, neutral effects have been identified in respect of geology and soils during both construction and operation.</p> <p>Mitigation</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
	<p>Will the option minimise land contamination?</p> <p>Will the option utilise previously developed (brownfield) land?</p> <p>Will the option protect and enhance protected sites designated for their geological interest and wider geodiversity?</p>			<ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
3. To protect and enhance water quality and surface and groundwater resources and the ecological status of water bodies	<p>Will the option minimise the demand for water resources?</p> <p>Will the option protect and improve surface water, groundwater and coastal water quality?</p> <p>Will the option result in changes to river flows?</p> <p>Will the option result in changes to groundwater levels?</p> <p>Will the option prevent the deterioration of Water Framework Directive (WFD) waterbody status (or potential)?</p>	0	+	<p>Effects of Construction</p> <p>It is not expected that the installation of dual flush retrofit devices would affect river flows, groundwater levels or water quality. This option has therefore been assessed as having a neutral effect in respect of SEA Objective 3.</p> <p>Effects of Operation</p> <p>The utilisation of dual flush retrofit devices would reduce water demand. In this regard, the option is expected to generate water savings of up to 0.11 Ml/d. It is possible that reduced demand for water could protect and enhance the quality and quantity of the surface water environment and the groundwater resource.</p> <p>Overall, this option has been assessed as having a positive effect on SEA Objective 3.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> The level of customer participation regarding the uptake of dual flush retrofit devices with advice adoption may vary from that predicted.
4. To reduce the risk of flooding	<p>Will the option have the potential to cause or exacerbate flooding in the catchment area?</p> <p>Will the option have the potential to help alleviate flooding in the catchment area?</p> <p>Will the option enhance water infiltration and retention?</p>	0	0	<p>Effects of Construction and Operation</p> <p>It is not expected that the installation and use of dual flush retrofit devices would result in/exacerbate flooding. This option has therefore been assessed as having a neutral effect on SEA Objective 4 during both implementation and operation.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
	Will the option be at risk of flooding or be affected by flooding, if it occurred?			Assumptions <ul style="list-style-type: none"> None identified. Uncertainty <ul style="list-style-type: none"> None identified.
5. To limit the causes and effects of climate change and increase resilience to the consequences of climate change	<p>Will the option reduce vulnerability to the effects of climate change by appropriate adaptation?</p> <p>Will the option increase environmental resilience to the effects of climate change?</p> <p>Will the option reduce or minimise greenhouse gas emissions?</p> <p>Will the option deliver new infrastructure that is energy efficient or makes use of renewable energy sources?</p>	0	0	Effects of Construction <p>The provision and installation of dual flush retrofit devices by Portsmouth Water representatives (or partners) is expected to generate carbon emissions throughout the implementation period. It is estimated that there would be up to 15,224km travelled per annum in respect to site visits and the installation of equipment which would generate vehicle emissions. It is assumed, however, that vehicle movements could be geographically clustered as appropriate which may help minimise vehicle emissions. Additionally, there would be embodied carbon in devices. Overall carbon emissions associated with this option would, however, be small (12.9 tCO₂e) which has been assessed as having a neutral effect on climate change (SEA Objective 5).</p> Effects of Operation <p>Demand reductions related to the use of dual flush retrofit devices may reduce greenhouse gas emissions and energy use associated with reduced treatment and pumping of water. However, emissions reductions associated with this option would be very small and in consequence, the option has been assessed as having a neutral effect on SEA Objective 5.</p> Mitigation <ul style="list-style-type: none"> Consideration should be given to the co-ordination of travel in order to minimise overall vehicle movements and associated greenhouse gas emissions. Assumptions <ul style="list-style-type: none"> None identified. Uncertainty <ul style="list-style-type: none"> The level of customer participation regarding the uptake of dual flush retrofit devices with advice adoption may vary from that predicted.
6. To maintain and enhance the economic and social	<p>Will the option ensure sufficient infrastructure is in place for predicted population increases?</p>	0	0	Effects of Construction <p>The implementation of this option would be unlikely to generate significant investment or employment opportunities (£0.01m). It is likely that any additional</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
wellbeing of the local community	<p>Will the option create local employment opportunities?</p> <p>Will the option support the local and regional economy?</p> <p>Will the option ensure that an affordable supply of water is maintained and vulnerable customers protected?</p> <p>Will the option avoid disruption through effects on the transport network?</p>			<p>work would be accommodated in existing employees' or contractors'/partners' workloads. In consequence, this option has been assessed as having a neutral effect on SEA Objective 6.</p> <p>Effects of Operation</p> <p>It is assumed that the utilisation of dual flush retrofit devices would reduce the demand for water. In-turn, this may support population and economic growth by helping to ensure that there is sufficient water availability. Reduced water demand may also help lower water bills (for those customers that are metered). However, savings associated with this option would be very small (0.11 Ml/d) and a neutral effect has therefore been identified in respect of the local economy and local community wellbeing (SEA Objective 6).</p> <p>Mitigation</p> <ul style="list-style-type: none"> Where possible, Portsmouth Water and any contractors should seek to utilise local labour. Where possible, Portsmouth Water and any contractors should seek to appoint local contractors/sub-contractors and utilise locally sourced goods. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> The level of customer participation regarding the uptake of dual flush retrofit devices with advice adoption may vary from that predicted.
7. To ensure the protection and enhancement of human health	<p>Will the option ensure the continuity of a safe and secure drinking water supply?</p> <p>Will the option ensure that surface water and bathing water quality are maintained within statutory standards?</p> <p>Will the option adversely affect human health by resulting in increased noise and/or adverse effects on air quality?</p> <p>Will the option affect opportunities for recreation and physical activity?</p>	0	0	<p>Effects of Construction</p> <p>It is not expected that the provision and installation of dual flush retrofit devices within the premises of domestic properties would have any discernible effects on health. This option has therefore been assessed as having a neutral effect on SEA Objective 7.</p> <p>Effects of Operation</p> <p>It is assumed that the use of water efficient devices would reduce the demand for water. In-turn, this may contribute to the continuity of water supply. However, savings associated with this option would be very small (0.11 Ml/d) and a neutral effect has therefore been identified in respect of SEA Objective 7.</p> <p>Mitigation</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<ul style="list-style-type: none"> None identified. Assumptions <ul style="list-style-type: none"> None identified Uncertainty <ul style="list-style-type: none"> The level of customer participation regarding the uptake of dual flush retrofit devices with advice adoption may vary from that predicted.
8. To promote the wise use of resources	<p>Will the option minimise the demand for raw materials?</p> <p>Will the option lead to reduced leakage from the supply network?</p> <p>Will the option improve efficiency in water consumption?</p> <p>Will the option seek to minimise the demand for raw materials?</p> <p>Will the option reduce or minimise energy use?</p> <p>Will the option promote the re-use and recycling of waste materials and reduce the proportion of waste sent to landfill?</p> <p>Will the option promote the use of sustainable design and materials?</p>	0	+	Effects of Construction <p>The provision and installation of dual flush retrofit devices would require a small volume of raw materials and energy to implement. Using estimated emissions associated with embodied carbon within the new devices and vehicle movements as a proxy, material use and energy requirements associated with this option are considered likely to be very small. In consequence, the option has been assessed as having a neutral effect on this objective.</p> Effects of Operation <p>This option would be expected to reduce the demand for water (savings associated with this option would be 0.11 Ml/d)</p> <p>Demand reductions would in-turn result in a reduction in energy associated with the treatment and pumping of water, although energy savings associated with this option would be small (-7,517 kWh/a).</p> <p>Overall, this option has been assessed as having a minor positive effect on resource use (SEA Objective 8).</p> Mitigation <ul style="list-style-type: none"> Opportunities to utilise reused/recycled materials (discarded appliances) during implementation should be considered where appropriate. Assumptions <ul style="list-style-type: none"> None identified. Uncertainty <ul style="list-style-type: none"> The level of customer participation regarding the uptake of dual flush retrofit devices with advice adoption may vary from that predicted.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
9. To conserve and enhance cultural and historic assets	<p>Will the option conserve or enhance the historic environment, including heritage assets such as historic buildings, conservation areas, features, places and spaces, and their settings?</p> <p>Will the option avoid or minimise damage to archaeologically important sites?</p> <p>Will the option affect public access to, or enjoyment of, features of cultural heritage?</p>	0	0	<p>Effects of Construction and Operation</p> <p>There would be no physical construction associated with this option. Consequently, there would be no effects on cultural heritage (SEA Objective 9) during both construction and operation.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
10. To conserve and enhance landscape character and other protected features	<p>Will the option avoid adverse effects on, and enhance where possible, protected/designated landscapes (including woodlands), townscapes or seascapes such as National Parks or AONBs be avoided?</p> <p>Will the option affect public access to existing landscape features?</p> <p>Will the option minimise adverse visual impacts?</p>	0	0	<p>Effects of Construction and Operation</p> <p>There would be no physical construction associated with this option. Consequently, there would be no effects on landscape (SEA Objective 10) during both construction and operation.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <p>None identified.</p>

Option C040: Water saving devices – Spray Taps

Option Summary

This option would involve the provision of one free pair of replacement spray taps in conjunction with an initial information campaign by Portsmouth Water and partners in order to incentivise/accelerate the replacement of inefficient higher flow non-spray taps. Within the 5 year implementation period, it is predicted that up to 3,400 spray taps would be installed per annum (17,000 total) within eligible domestic households.

Assessment

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
1. To ensure the protection and enhancement of biodiversity, priority habitats and species	<p>Will the option protect and enhance priority species, habitats and sites designated for their nature conservation value?</p> <p>Will the option protect and enhance non-designated sites and local biodiversity?</p> <p>Will the option provide opportunities for new habitat creation or restoration and link existing habitats as part of the development process?</p> <p>Will the option protect and enhance coastal and marine habitats and species?</p> <p>Will the option result in a change in the quality of habitats due to changes in groundwater/river water quality or quantity?</p> <p>Will the option affect riparian vegetation structure?</p>	0	0	<p>Effects of Construction</p> <p>The installation of replacement spray taps is expected to be low-impact and would have no discernible effect on biodiversity. Overall, this option has been assessed as having a neutral effect on SEA Objective 1.</p> <p>Effects of Operation</p> <p>It is assumed that the use of spray taps would help reduce water demand. This may benefit the water environment and the ecology it supports through reduced abstraction. However, effects in this regard are not expected to be significant and a neutral effect has therefore been identified in respect of this objective.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
2. To ensure the appropriate and efficient use of land and protect soil quality and geodiversity	<p>Will the option minimise the loss of best and most versatile agricultural land?</p> <p>Will the option protect and enhance soil health?</p> <p>Will the option minimise conflict with existing land use patterns?</p> <p>Will the option minimise land contamination?</p>	0	0	<p>Effects of Construction and Operation</p> <p>There would be no land take associated with this option and in consequence, neutral effects have been identified in respect of geology and soils during both construction and operation.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
	<p>Will the option utilise previously developed (brownfield) land?</p> <p>Will the option protect and enhance protected sites designated for their geological interest and wider geodiversity?</p>			<p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
3. To protect and enhance water quality and surface and groundwater resources and the ecological status of water bodies	<p>Will the option minimise the demand for water resources?</p> <p>Will the option protect and improve surface water, groundwater and coastal water quality?</p> <p>Will the option result in changes to river flows?</p> <p>Will the option result in changes to groundwater levels?</p> <p>Will the option prevent the deterioration of Water Framework Directive (WFD) waterbody status (or potential)?</p>	0	+	<p>Effects of Construction</p> <p>It is not expected that the installation of spray taps would affect river flows, groundwater levels or water quality. This option has therefore been assessed as having a neutral effect in respect of SEA Objective 3.</p> <p>Effects of Operation</p> <p>The utilisation of spray taps would reduce water demand. In this regard, the option is expected to generate water savings of up to 0.07 Ml/d. It is possible that reduced demand for water could protect and enhance the quality and quantity of the surface water environment and the groundwater resource.</p> <p>Overall, this option has been assessed as having a positive effect on SEA Objective 3.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> The level of customer participation regarding the uptake of replacement spray taps together with advice adoption may vary from that predicted.
4. To reduce the risk of flooding	<p>Will the option have the potential to cause or exacerbate flooding in the catchment area?</p> <p>Will the option have the potential to help alleviate flooding in the catchment area?</p> <p>Will the option enhance water infiltration and retention?</p>	0	0	<p>Effects of Construction and Operation</p> <p>It is not expected that the installation and use of spray taps would result in/exacerbate flooding. This option has therefore been assessed as having a neutral effect on SEA Objective 4 during both implementation and operation.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
	Will the option be at risk of flooding or be affected by flooding, if it occurred?			<ul style="list-style-type: none"> None identified. Uncertainty <ul style="list-style-type: none"> None identified.
5. To limit the causes and effects of climate change and increase resilience to the consequences of climate change	<p>Will the option reduce vulnerability to the effects of climate change by appropriate adaptation?</p> <p>Will the option increase environmental resilience to the effects of climate change?</p> <p>Will the option reduce or minimise greenhouse gas emissions?</p> <p>Will the option deliver new infrastructure that is energy efficient or makes use of renewable energy sources?</p>	0	0	Effects of Construction <p>The provision and installation of spray taps by Portsmouth Water representatives (or partners) is expected to generate carbon emissions throughout the implementation period. It is estimated that there would be up to 54,460km travelled within the first year of roll out (23,682km per annum during the subsequent two years) in respect to site visits and the installation of equipment. It is assumed, however, that vehicle movements could be geographically clustered as appropriate which may help minimise vehicle emissions. Additionally, there would be embodied carbon in devices. Overall carbon emissions associated with this option would, however, be small (85.7 tCO₂e) which has been assessed as having a neutral effect on climate change (SEA Objective 5).</p> Effects of Operation <p>Demand reductions related to the use of spray taps may reduce greenhouse gas emissions and energy use associated with reduced treatment and pumping of water and the heating of water in the home. However, emissions reductions associated with this option would be very small (-38.3 tCO₂e/year) and in consequence, the option has been assessed as having a neutral effect on SEA Objective 5.</p> Mitigation <ul style="list-style-type: none"> Consideration should be given to the co-ordination of travel in order to minimise overall vehicle movements and associated greenhouse gas emissions. Assumptions <ul style="list-style-type: none"> None identified. Uncertainty <ul style="list-style-type: none"> The level of customer participation regarding the uptake of replacement spray taps together with advice adoption may vary from that predicted.
6. To maintain and enhance the economic and social wellbeing of the local community	<p>Will the option ensure sufficient infrastructure is in place for predicted population increases?</p> <p>Will the option create local employment opportunities?</p>	0	0	Effects of Construction <p>The implementation of this option would be unlikely to generate significant investment or employment opportunities (£2.3m). It is likely that any additional work would be accommodated in existing employees' or contractors'/partners' workloads.</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
	<p>Will the option support the local and regional economy?</p> <p>Will the option ensure that an affordable supply of water is maintained and vulnerable customers protected?</p> <p>Will the option avoid disruption through effects on the transport network?</p>			<p>In consequence, this option has been assessed as having a neutral effect on SEA Objective 6.</p> <p>Effects of Operation</p> <p>It is assumed that the utilisation of spray taps would reduce the demand for water. In-turn, this may support population and economic growth by helping to ensure that there is sufficient water availability. Reduced water demand may also help lower water bills (for those customers that are metered). However, savings associated with this option would be very small (0.07 Ml/d) and a neutral effect has therefore been identified in respect of the local economy and local community wellbeing (SEA Objective 6).</p> <p>Mitigation</p> <ul style="list-style-type: none"> Where possible, Portsmouth Water and any contractors should seek to utilise local labour. Where possible, Portsmouth Water and any contractors should seek to appoint local contractors/sub-contractors and utilise locally sourced goods. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> The level of customer participation regarding the uptake of replacement spray taps together with advice adoption may vary from that predicted.
7. To ensure the protection and enhancement of human health	<p>Will the option ensure the continuity of a safe and secure drinking water supply?</p> <p>Will the option ensure that surface water and bathing water quality are maintained within statutory standards?</p> <p>Will the option adversely affect human health by resulting in increased noise and/or adverse effects on air quality?</p> <p>Will the option affect opportunities for recreation and physical activity?</p>	0	0	<p>Effects of Construction</p> <p>It is not expected that the provision and installation of spray taps within the premises of domestic properties would have any discernible effects on health. This option has therefore been assessed as having a neutral effect on SEA Objective 7.</p> <p>Effects of Operation</p> <p>It is assumed that the use of water efficient devices would reduce the demand for water. In-turn, this may contribute to the continuity of water supply. However, savings associated with this option would be very small (0.07 Ml/d) and a neutral effect has therefore been identified in respect of SEA Objective 7.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<ul style="list-style-type: none"> None identified. Uncertainty <ul style="list-style-type: none"> The level of customer participation regarding the uptake of replacement spray taps together with advice adoption may vary from that predicted.
8. To promote the wise use of resources	<p>Will the option minimise the demand for raw materials?</p> <p>Will the option lead to reduced leakage from the supply network?</p> <p>Will the option improve efficiency in water consumption?</p> <p>Will the option seek to minimise the demand for raw materials?</p> <p>Will the option reduce or minimise energy use?</p> <p>Will the option promote the re-use and recycling of waste materials and reduce the proportion of waste sent to landfill?</p> <p>Will the option promote the use of sustainable design and materials?</p>	0	+	Effects of Construction <p>The provision and installation of spray taps would require a small volume of raw materials and energy to implement. Using estimated emissions associated with embodied carbon within the new devices and vehicle movements as a proxy, material use and energy requirements associated with this option are considered likely to be very small. In consequence, the option has been assessed as having a neutral effect on this objective.</p> Effects of Operation <p>This option would be expected to reduce the demand for water (savings associated with this option would be 0.07 Ml/d).</p> <p>Demand reductions would in-turn result in a reduction in energy associated with the treatment and pumping of water and the heating of water in the home, although energy savings associated with this option would be very small (-4,944 kWh/a).</p> <p>Overall, this option has been assessed as having a minor positive effect on resource use (SEA Objective 8).</p> Mitigation <ul style="list-style-type: none"> Construction and operational wastes (former faucets) should be reused/recycled where possible. Assumptions <ul style="list-style-type: none"> None identified. Uncertainty <ul style="list-style-type: none"> The level of customer participation regarding the uptake of replacement spray taps together with advice adoption may vary from that predicted.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
9. To conserve and enhance cultural and historic assets	<p>Will the option conserve or enhance the historic environment, including heritage assets such as historic buildings, conservation areas, features, places and spaces, and their settings?</p> <p>Will the option avoid or minimise damage to archaeologically important sites?</p> <p>Will the option affect public access to, or enjoyment of, features of cultural heritage?</p>	0	0	<p>Effects of Construction and Operation</p> <p>There would be no physical construction associated with this option. Consequently, there would be no effects on cultural heritage (SEA Objective 9) during both construction and operation.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
10. To conserve and enhance landscape character and other protected features	<p>Will the option avoid adverse effects on, and enhance where possible, protected/designated landscapes (including woodlands), townscape or seascapes such as National Parks or AONBs be avoided?</p> <p>Will the option affect public access to existing landscape features?</p> <p>Will the option minimise adverse visual impacts?</p>	0	0	<p>Effects of Construction and Operation</p> <p>There would be no physical construction associated with this option. Consequently, there would be no effects on landscape (SEA Objective 10) during both construction and operation.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.

Option C043: Water saving devices - Trigger nozzles & water butts

Option Summary

This option would involve the provision of hosepipe trigger nozzles and water butts in conjunction with regular annual messages about long-term sustainable garden care to metered customers owning garden space. Within the 3 year implementation period, it is estimated that 40% of eligible customers would receive a free hose nozzle and 30% would receive a free water butt (of the 35% of customers who agree to take the mandatory pre-questionnaire) which would total approximately 4,440 nozzles and 3,330 water butts.

Assessment

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
1. To ensure the protection and enhancement of biodiversity, priority habitats and species	<p>Will the option protect and enhance priority species, habitats and sites designated for their nature conservation value?</p> <p>Will the option protect and enhance non-designated sites and local biodiversity?</p> <p>Will the option provide opportunities for new habitat creation or restoration and link existing habitats as part of the development process?</p> <p>Will the option protect and enhance coastal and marine habitats and species?</p> <p>Will the option result in a change in the quality of habitats due to changes in groundwater/river water quality or quantity?</p> <p>Will the option affect riparian vegetation structure?</p>	0	0	<p>Effects of Construction</p> <p>The fitting of trigger nozzles and water butts is expected to be low-impact and would have no discernible effect on biodiversity. Overall, this option has been assessed as having a neutral effect on SEA Objective 1.</p> <p>Effects of Operation</p> <p>It is assumed that the use of trigger nozzles and water butts, together with the promotion of long-term sustainable garden care, would help reduce water demand. This may benefit the water environment and the ecology it supports through reduced abstraction. However, effects in this regard are not expected to be significant and a neutral effect has therefore been identified in respect of this objective.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
2. To ensure the appropriate and efficient use of land and protect soil quality and geodiversity	<p>Will the option minimise the loss of best and most versatile agricultural land?</p> <p>Will the option protect and enhance soil health?</p> <p>Will the option minimise conflict with existing land use patterns?</p> <p>Will the option minimise land contamination?</p> <p>Will the option utilise previously developed (brownfield) land?</p> <p>Will the option protect and enhance protected sites designated for their geological interest and wider geodiversity?</p>	0	0	<p>Effects of Construction and Operation</p> <p>There would be no land take associated with this option and in consequence, neutral effects have been identified in respect of geology and soils during both construction and operation.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <p>None identified.</p>
3. To protect and enhance water quality and surface and groundwater resources and the ecological status of water bodies	<p>Will the option minimise the demand for water resources?</p> <p>Will the option protect and improve surface water, groundwater and coastal water quality?</p> <p>Will the option result in changes to river flows?</p> <p>Will the option result in changes to groundwater levels?</p> <p>Will the option prevent the deterioration of Water Framework Directive (WFD) waterbody status (or potential)?</p>	0	+	<p>Effects of Construction</p> <p>It is not expected that the fitting of trigger nozzles and water butts would affect river flows, groundwater levels or water quality. This option has therefore been assessed as having a neutral effect in respect of SEA Objective 3.</p> <p>Effects of Operation</p> <p>The use of trigger nozzles and water butts, together with the promotion of long-term sustainable garden care, would reduce water demand. In this regard, the option is expected to generate water savings of up to 0.06 Ml/d. It is possible that reduced demand for water could protect and enhance the quality and quantity of the surface water environment and the groundwater resource.</p> <p>Overall, this option has been assessed as having a positive effect on SEA Objective 3.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> The level of customer participation regarding the uptake of hosepipe trigger nozzles and water butts together with advice adoption may vary from that predicted.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
4. To reduce the risk of flooding	<p>Will the option have the potential to cause or exacerbate flooding in the catchment area?</p> <p>Will the option have the potential to help alleviate flooding in the catchment area?</p> <p>Will the option enhance water infiltration and retention?</p> <p>Will the option be at risk of flooding or be affected by flooding, if it occurred?</p>	0	0	<p>Effects of Construction and Operation</p> <p>It is not expected that the fitting of trigger nozzles and water butts would result in/exacerbate flooding. This option has therefore been assessed as having a neutral effect on SEA Objective 4 during both implementation and operation.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
5. To limit the causes and effects of climate change and increase resilience to the consequences of climate change	<p>Will the option reduce vulnerability to the effects of climate change by appropriate adaptation?</p> <p>Will the option increase environmental resilience to the effects of climate change?</p> <p>Will the option reduce or minimise greenhouse gas emissions?</p> <p>Will the option deliver new infrastructure that is energy efficient or makes use of renewable energy sources?</p>	0	0	<p>Effects of Construction</p> <p>The provision and fitting of trigger nozzles and water butts is expected to generate carbon emissions throughout the implementation period. It is estimated that there would be up to 23,682km travelled per annum, although vehicle movements could be geographically clustered as appropriate which may help minimise associated vehicle emissions. Additionally, the provision and installation of new water efficiency equipment (4,440 nozzles and 3,330 water butts) would generate carbon emissions arising from embodied carbon within the new equipment (est. 17.72kg CO₂/e). Cumulatively, this option would generate up to 60 tCO₂e during the construction and installation which has been assessed as having a neutral negative effect on climate change (SEA Objective 5).</p> <p>Effects of Operation</p> <p>Demand reductions related to the use of trigger nozzles and water butts, together with the promotion of long-term sustainable garden care, may reduce greenhouse gas emissions and energy use associated with reduced treatment and pumping of water. However, emissions reductions associated with this option would be very small and in consequence, the option has been assessed as having a neutral effect on SEA Objective 5.</p> <p>Mitigation</p> <ul style="list-style-type: none"> Consideration should be given to the co-ordination of travel in order to minimise overall vehicle movements and associated greenhouse gas emissions. <p>Assumptions</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<ul style="list-style-type: none"> None identified. Uncertainty <ul style="list-style-type: none"> The level of customer participation regarding the uptake of hosepipe trigger nozzles and water butts together with advice adoption may vary from that predicted.
6. To maintain and enhance the economic and social wellbeing of the local community	<p>Will the option ensure sufficient infrastructure is in place for predicted population increases?</p> <p>Will the option create local employment opportunities?</p> <p>Will the option support the local and regional economy?</p> <p>Will the option ensure that an affordable supply of water is maintained and vulnerable customers protected?</p> <p>Will the option avoid disruption through effects on the transport network?</p>	0	0	Effects of Construction <p>The implementation of this option would be unlikely to generate significant investment or employment opportunities (£0.4m). It is likely that any additional work would be accommodated in existing employees' or contractors'/partners' workloads. In consequence, this option has been assessed as having a neutral effect on SEA Objective 6.</p> Effects of Operation <p>It is assumed that the use of trigger nozzles and water butts, together with the promotion of long-term sustainable garden care, would reduce water demand. In turn, this may support population and economic growth by helping to ensure that there is sufficient water availability. Reduced water demand may also help lower water bills (for those customers that are metered). However, savings associated with this option would be very small (0.06 Ml/d) and a neutral effect has therefore been identified in respect of the local economy and local community wellbeing (SEA Objective 6).</p> Mitigation <ul style="list-style-type: none"> Where possible, Portsmouth Water and any contractors should seek to utilise local labour. Where possible, Portsmouth Water and any contractors should seek to appoint local contractors/sub-contractors and utilise locally sourced goods. Assumptions <ul style="list-style-type: none"> None identified. Uncertainty <ul style="list-style-type: none"> The level of customer participation regarding the uptake of hosepipe trigger nozzles and water butts together with advice adoption may vary from that predicted.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
7. To ensure the protection and enhancement of human health	<p>Will the option ensure the continuity of a safe and secure drinking water supply?</p> <p>Will the option ensure that surface water and bathing water quality are maintained within statutory standards?</p> <p>Will the option adversely affect human health by resulting in increased noise and/or adverse effects on air quality?</p> <p>Will the option affect opportunities for recreation and physical activity?</p>	0	0	<p>Effects of Construction</p> <p>It is not expected that the provision and fitting of trigger nozzles and water butts would have any discernible effects on health. This option has therefore been assessed as having a neutral effect on SEA Objective 7.</p> <p>Effects of Operation</p> <p>It is assumed that the use of water efficient devices would reduce the demand for water. In-turn, this may contribute to the continuity of water supply. However, savings associated with this option would be very small (0.06 Ml/d) and a neutral effect has therefore been identified in respect of SEA Objective 7.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> The level of customer participation regarding the uptake of hosepipe trigger nozzles and water butts together with advice adoption may vary from that predicted.
8. To promote the wise use of resources	<p>Will the option minimise the demand for raw materials?</p> <p>Will the option lead to reduced leakage from the supply network?</p> <p>Will the option improve efficiency in water consumption?</p> <p>Will the option seek to minimise the demand for raw materials?</p> <p>Will the option reduce or minimise energy use?</p> <p>Will the option promote the re-use and recycling of waste materials and reduce the proportion of waste sent to landfill?</p> <p>Will the option promote the use of sustainable design and materials?</p>	0	+	<p>Effects of Construction</p> <p>The provision and fitting of hosepipe trigger nozzles and water butts would require raw materials and energy. Using estimated emissions associated with embodied carbon within the new devices and vehicle movements as a proxy, material use and energy requirements associated with this option are considered to be negligible,. In consequence, the option has been assessed as having a neutral effect on SEA Objective 8.</p> <p>Effects of Operation</p> <p>This option would be expected to reduce the demand for water (savings associated with this option would be 0.06 Ml/d).</p> <p>Demand reductions would in-turn result in a reduction in energy associated with the treatment and pumping of water, although energy savings associated with this option would be very small (-1,376 kWh/a).</p> <p>Overall, this option has been assessed as having a minor positive effect on resource use (SEA Objective 8).</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				Mitigation <ul style="list-style-type: none"> None identified. Assumptions <ul style="list-style-type: none"> None identified. Uncertainty <ul style="list-style-type: none"> The level of customer participation regarding the uptake of hosepipe trigger nozzles and water butts together with advice adoption may vary from that predicted.
9. To conserve and enhance cultural and historic assets	<p>Will the option conserve or enhance the historic environment, including heritage assets such as historic buildings, conservation areas, features, places and spaces, and their settings?</p> <p>Will the option avoid or minimise damage to archaeologically important sites?</p> <p>Will the option affect public access to, or enjoyment of, features of cultural heritage?</p>	0	0	Effects of Construction and Operation <p>There would be no physical construction associated with this option. Consequently, there would be no effects on cultural heritage (SEA Objective 9) during both construction and operation.</p> Mitigation <ul style="list-style-type: none"> None identified. Assumptions <ul style="list-style-type: none"> None identified. Uncertainty <ul style="list-style-type: none"> None identified.
10. To conserve and enhance landscape character and other protected features	<p>Will the option avoid adverse effects on, and enhance where possible, protected/designated landscapes (including woodlands), townscapes or seascapes such as National Parks or AONBs be avoided?</p> <p>Will the option affect public access to existing landscape features?</p> <p>Will the option minimise adverse visual impacts?</p>	0	0	Effects of Construction and Operation <p>There would be no physical construction associated with this option. Consequently, there would be no effects on landscape (SEA Objective 10) during both construction and operation.</p> Mitigation <ul style="list-style-type: none"> None identified. Assumptions <ul style="list-style-type: none"> None identified. Uncertainty <ul style="list-style-type: none"> None identified.

Option C046: Household water efficiency programme (partnering approach, home visit)

Option Summary

This option would involve the provision of water audits and the installation of water efficiency equipment, e.g. dual flush retrofits, low flow showerheads, shower timers, pair of spray tap inserts, and a hose trigger nozzle (if applicable), for all existing Portsmouth Water customers, metered or unmetered, through a partnership-based implementation programme involving Portsmouth Water and public organisations. Within the 5 year implementation period, it is estimated that 16,500 social housing units will be eligible for auditing and provision of water efficiency equipment whereas 50% of metered private dwellings and 20% of unmetered properties will agree to participate in the scheme.

Assessment

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
1. To ensure the protection and enhancement of biodiversity, priority habitats and species	<p>Will the option protect and enhance priority species, habitats and sites designated for their nature conservation value?</p> <p>Will the option protect and enhance non-designated sites and local biodiversity?</p> <p>Will the option provide opportunities for new habitat creation or restoration and link existing habitats as part of the development process?</p> <p>Will the option protect and enhance coastal and marine habitats and species?</p> <p>Will the option result in a change in the quality of habitats due to changes in groundwater/river water quality or quantity?</p> <p>Will the option affect riparian vegetation structure?</p>	0	0	<p>Effects of Construction</p> <p>The provision and fitting of water efficiency equipment is expected to be low-impact and would have no discernible effect on biodiversity. Overall, this option has been assessed as having a neutral effect on SEA Objective 1.</p> <p>Effects of Operation</p> <p>It is assumed that the use of water efficiency equipment would help reduce water demand. This may benefit the water environment and the ecology it supports through reduced abstraction. However, effects in this regard are not expected to be significant and a neutral effect has therefore been identified in respect of this objective.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
2. To ensure the appropriate and efficient use of land and protect soil quality and geodiversity	<p>Will the option minimise the loss of best and most versatile agricultural land?</p> <p>Will the option protect and enhance soil health?</p> <p>Will the option minimise conflict with existing land use patterns?</p> <p>Will the option minimise land contamination?</p> <p>Will the option utilise previously developed (brownfield) land?</p> <p>Will the option protect and enhance protected sites designated for their geological interest and wider geodiversity?</p>	0	0	<p>Effects of Construction and Operation</p> <p>There would be no land take associated with this option and in consequence, neutral effects have been identified in respect of geology and soils during both construction and operation.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
3. To protect and enhance water quality and surface and groundwater resources and the ecological status of water bodies	<p>Will the option minimise the demand for water resources?</p> <p>Will the option protect and improve surface water, groundwater and coastal water quality?</p> <p>Will the option result in changes to river flows?</p> <p>Will the option result in changes to groundwater levels?</p> <p>Will the option prevent the deterioration of Water Framework Directive (WFD) waterbody status (or potential)?</p>	0	+	<p>Effects of Construction</p> <p>It is not expected that the provision and fitting of water efficiency devices would affect river flows, groundwater levels or water quality. This option has therefore been assessed as having a neutral effect in respect of SEA Objective 3.</p> <p>Effects of Operation</p> <p>The use of water efficiency devices would reduce water demand. In this regard, the option is expected to generate water savings of up to 1.27 Ml/d. It is possible that reduced demand for water could protect and enhance the quality and quantity of the surface water environment and the groundwater resource.</p> <p>Overall, this option has been assessed as having a positive effect on SEA Objective 3.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> The level of customer participation regarding the uptake of water efficiency equipment together with advice adoption may vary from that predicted.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
4. To reduce the risk of flooding	<p>Will the option have the potential to cause or exacerbate flooding in the catchment area?</p> <p>Will the option have the potential to help alleviate flooding in the catchment area?</p> <p>Will the option enhance water infiltration and retention?</p> <p>Will the option be at risk of flooding or be affected by flooding, if it occurred?</p>	0	0	<p>Effects of Construction and Operation</p> <p>It is not expected that the installation and use of water efficiency devices would result in/exacerbate flooding. This option has therefore been assessed as having a neutral effect on SEA Objective 4 during both implementation and operation.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
5. To limit the causes and effects of climate change and increase resilience to the consequences of climate change	<p>Will the option reduce vulnerability to the effects of climate change by appropriate adaptation?</p> <p>Will the option increase environmental resilience to the effects of climate change?</p> <p>Will the option reduce or minimise greenhouse gas emissions?</p> <p>Will the option deliver new infrastructure that is energy efficient or makes use of renewable energy sources?</p>	-	+	<p>Effects of Construction</p> <p>The provision of water efficiency devices is expected to generate carbon emissions throughout the implementation period. It is estimated that there would be up to 67,685km travelled per annum, although vehicle movements could be geographically clustered as appropriate which may help minimise associated vehicle emissions. Additionally, the provision of new water efficiency devices would generate carbon emissions arising from embodied carbon (est. 3.38kg CO₂/e). Overall, this option would generate up to 109.2 tCO₂e during the implementation phase which has been assessed as having a negative effect on climate change (SEA Objective 5).</p> <p>Effects of Operation</p> <p>Demand reductions related to the use of water efficiency equipment may reduce greenhouse gas emissions and energy use associated with reduced treatment and pumping of water as well as the heating of water in the home. Emissions reductions associated with this option would be -667.8 tCO₂e/year.</p> <p>The predicted effects of climate change (including drier summers) mean that this option could assist in strengthening climate change adaptation by increasing water supply/storage.</p> <p>Overall, this option has been assessed as having a positive effect on climate change (SEA Objective 5).</p> <p>Mitigation</p> <ul style="list-style-type: none"> Consideration should be given to the co-ordination of travel in order to minimise overall vehicle movements and associated greenhouse gas emissions.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				Assumptions <ul style="list-style-type: none"> None identified. Uncertainty <ul style="list-style-type: none"> The level of customer participation regarding the uptake of water efficiency equipment together with advice adoption may vary from that predicted.
6. To maintain and enhance the economic and social wellbeing of the local community	<p>Will the option ensure sufficient infrastructure is in place for predicted population increases?</p> <p>Will the option create local employment opportunities?</p> <p>Will the option support the local and regional economy?</p> <p>Will the option ensure that an affordable supply of water is maintained and vulnerable customers protected?</p> <p>Will the option avoid disruption through effects on the transport network?</p>	0	+	Effects of Construction <p>The implementation of this option would be unlikely to generate significant investment or employment opportunities (£1.1m). It is likely that any additional work would be accommodated in existing employees' or contractors'/partners' workloads. In consequence, this option has been assessed as having a neutral effect on SEA Objective 6.</p> Effects of Operation <p>It is assumed that the utilisation of water efficiency equipment would reduce the demand for water. In-turn, this may support population and economic growth by helping to ensure that there is sufficient water availability. Reduced water demand may also help lower water bills (for those customers that are metered). Savings associated with this option would be 1.27 Ml/d which has been assessed as having a positive effect in respect of the local economy and local community wellbeing (SEA Objective 6).</p> Mitigation <ul style="list-style-type: none"> Where possible, Portsmouth Water and any contractors should seek to utilise local labour. Where possible, Portsmouth Water and any contractors should seek to appoint local contractors/sub-contractors and utilise locally sourced goods. Assumptions <ul style="list-style-type: none"> None identified. Uncertainty <ul style="list-style-type: none"> The level of customer participation regarding the uptake of water efficiency equipment together with advice adoption may vary from that predicted.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
7. To ensure the protection and enhancement of human health	<p>Will the option ensure the continuity of a safe and secure drinking water supply?</p> <p>Will the option ensure that surface water and bathing water quality are maintained within statutory standards?</p> <p>Will the option adversely affect human health by resulting in increased noise and/or adverse effects on air quality?</p> <p>Will the option affect opportunities for recreation and physical activity?</p>	0	+	<p>Effects of Construction</p> <p>It is not expected that the provision and fitting of water efficiency equipment would have any discernible effects on health. This option has therefore been assessed as having a neutral effect on SEA Objective 7.</p> <p>Effects of Operation</p> <p>It is assumed that the use of water efficient devices would reduce the demand for water. In-turn, this may contribute to the continuity of water supply. Savings associated with this option would be 1.27 MI/d and this has been assessed as having a positive effect on SEA Objective 7.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> The level of customer participation regarding the uptake of water efficiency equipment together with advice adoption may vary from that predicted.
8. To promote the wise use of resources	<p>Will the option minimise the demand for raw materials?</p> <p>Will the option lead to reduced leakage from the supply network?</p> <p>Will the option improve efficiency in water consumption?</p> <p>Will the option seek to minimise the demand for raw materials?</p> <p>Will the option reduce or minimise energy use?</p> <p>Will the option promote the re-use and recycling of waste materials and reduce the proportion of waste sent to landfill?</p> <p>Will the option promote the use of sustainable design and materials?</p>	-	+	<p>Effects of Construction</p> <p>The provision and fitting of water efficiency equipment would require raw materials and energy. Using estimated emissions associated with embodied carbon within the new devices and vehicle movements as a proxy, material use and energy requirements associated with this option have been assessed as having a negative effect on SEA Objective 8.</p> <p>Effects of Operation</p> <p>This option would be expected to reduce the demand for water (savings associated with this option would be 1.27 MI/d).</p> <p>Reduced demand for water would in-turn result in a reduction in energy associated with the treatment and pumping of water (-85,728 kWh/a).</p> <p>Overall, this option has been assessed as having a minor positive effect on resource use (SEA Objective 8).</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				Assumptions <ul style="list-style-type: none"> None identified. Uncertainty <ul style="list-style-type: none"> The level of customer participation regarding the uptake of water efficiency equipment together with advice adoption may vary from that predicted.
9. To conserve and enhance cultural and historic assets	<p>Will the option conserve or enhance the historic environment, including heritage assets such as historic buildings, conservation areas, features, places and spaces, and their settings?</p> <p>Will the option avoid or minimise damage to archaeologically important sites?</p> <p>Will the option affect public access to, or enjoyment of, features of cultural heritage?</p>	0	0	Effects of Construction and Operation <p>There would be no physical construction associated with this option. Consequently, there would be no effects on cultural heritage (SEA Objective 9) during both construction and operation.</p> Mitigation <ul style="list-style-type: none"> None identified. Assumptions <ul style="list-style-type: none"> None identified. Uncertainty <ul style="list-style-type: none"> None identified.
10. To conserve and enhance landscape character and other protected features	<p>Will the option avoid adverse effects on, and enhance where possible, protected/designated landscapes (including woodlands), townscapes or seascapes such as National Parks or AONBs be avoided?</p> <p>Will the option affect public access to existing landscape features?</p> <p>Will the option minimise adverse visual impacts?</p>	0	0	Effects of Construction and Operation <p>There would be no physical construction associated with this option. Consequently, there would be no effects on landscape (SEA Objective 10) during both construction and operation.</p> Mitigation <ul style="list-style-type: none"> None identified. Assumptions <ul style="list-style-type: none"> None identified. Uncertainty <ul style="list-style-type: none"> None identified.

Option C084: Void metering

Option Summary

This option involves the installation of external meters (and assumes that there is no access to properties with no occupant). Metering voids enables better assessments of leakage and estimates of illegal use from void properties. The option would start in 2020/21 and runs through to 2044/45 and is estimated that 5,672 meters would be installed. It is anticipated that up to 0.28 Ml/d of lost water would be saved following the implementation of this option.

Assessment

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
1. To ensure the protection and enhancement of biodiversity, priority habitats and species	<p>Will the option protect and enhance priority species, habitats and sites designated for their nature conservation value?</p> <p>Will the option protect and enhance non-designated sites and local biodiversity?</p> <p>Will the option provide opportunities for new habitat creation or restoration and link existing habitats as part of the development process?</p> <p>Will the option protect and enhance coastal and marine habitats and species?</p> <p>Will the option result in a change in the quality of habitats due to changes in groundwater/river water quality or quantity?</p> <p>Will the option affect riparian vegetation structure?</p>	0	0	<p>Effects of Construction</p> <p>The proposed works would involve the installation of meters, and whilst it is assumed no access to the property will be gained, implementation would occur within the existing operational footprints of domestic properties which may encompass a wide range of urban, semi-rural, and rural settings. It is unlikely, however, that construction would have any discernible impacts on immediate biodiversity, priority habitats, e.g. European designated conservation areas, SSSIs, local nature reserves, and etc., or protected species due to the minor to negligible scale of construction associated with implementation. Overall, this option has been assessed as having a neutral effect on biodiversity (SEA Objective 1).</p> <p>Effects of Operation</p> <p>It is assumed that the use of meters by customers would decrease water demand (by improving assessments of leakage and estimates of illegal use from void properties). The effect of increased water efficiency on designated nature conservation sites (e.g. SACs, SPAs, Ramsar and SSSIs) and the ecological quality of habitats and associated groundwater/river water bodies is considered to be slightly positive as the increased efficiency reduces demand for additional water resources and increases resilience of existing network; however, the magnitude of change is assessed as neutral.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				Uncertainty <ul style="list-style-type: none"> None identified.
2. To ensure the appropriate and efficient use of land and protect soil quality and geodiversity	<p>Will the option minimise the loss of best and most versatile agricultural land?</p> <p>Will the option protect and enhance soil health?</p> <p>Will the option minimise conflict with existing land use patterns?</p> <p>Will the option minimise land contamination?</p> <p>Will the option utilise previously developed (brownfield) land?</p> <p>Will the option protect and enhance protected sites designated for their geological interest and wider geodiversity?</p>	0	0	Effects of Construction <p>The installation of meter infrastructure would take place within the operational footprints of domestic premises; consequently, implementation would not require any new land-take. This option has therefore been assessed as having a neutral effect on the appropriate and efficient use of land (SEA Objective 2).</p> Effects of Operation <p>The utilisation of metering would not have a discernible effect on the appropriate and efficient use of land (SEA Objective 2).</p> Mitigation <ul style="list-style-type: none"> None identified. Assumptions <ul style="list-style-type: none"> None identified. Uncertainty <ul style="list-style-type: none"> None identified.
3. To protect and enhance water quality and surface and groundwater resources and the ecological status of water bodies	<p>Will the option minimise the demand for water resources?</p> <p>Will the option protect and improve surface water, groundwater and coastal water quality?</p> <p>Will the option result in changes to river flows?</p> <p>Will the option result in changes to groundwater levels?</p> <p>Will the option prevent the deterioration of Water Framework Directive (WFD) waterbody status (or potential)?</p>	0	+	Effects of Construction <p>It is not expected that the upgrading of existing metering infrastructure would affect river flows or groundwater levels, or on water quality, provided best practices are employed. This option has therefore been assessed as having a neutral effect in respect of SEA Objective 3.</p> Effects of Operation <p>The utilisation of metering by eligible customers would likely increase/ensure continuity of water supply through a reduction of water demand from previously metered domestic properties, and subsequently, a reduction of leakage within the water distribution network (the option has a design capacity of 0.28Ml/d), generating a minor positive effect in respect of water quantity (SEA Objective 3). Overall, increased water efficiency may protect and slightly enhance the quality and quantity of the surface water environment and the groundwater resource, and/or rates of recharge.</p> Mitigation

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<ul style="list-style-type: none"> None identified. Assumptions <ul style="list-style-type: none"> None identified. Uncertainty <ul style="list-style-type: none"> None identified.
4. To reduce the risk of flooding	<p>Will the option have the potential to cause or exacerbate flooding in the catchment area?</p> <p>Will the option have the potential to help alleviate flooding in the catchment area?</p> <p>Will the option enhance water infiltration and retention?</p> <p>Will the option be at risk of flooding or be affected by flooding, if it occurred?</p>	0	0	Effects of Construction <p>It is assumed that works could be scheduled to avoid periods of flooding should there be a risk. Furthermore, it is considered highly unlikely that implementation of the scheme would result in and/or exacerbate flooding elsewhere now or in the future. This option has therefore been assessed as having a neutral effect on SEA Objective 4.</p> Effects of Operation <p>It is considered unlikely that the utilisation of metering would result in and/or exacerbate flooding elsewhere now or in the future. This option has therefore been assessed as having a neutral effect on SEA Objective 4.</p> Mitigation <ul style="list-style-type: none"> None identified. Assumptions <ul style="list-style-type: none"> None identified. Uncertainty <ul style="list-style-type: none"> None identified.
5. To limit the causes and effects of climate change and increase resilience to the consequences of climate change	<p>Will the option reduce vulnerability to the effects of climate change by appropriate adaptation?</p> <p>Will the option increase environmental resilience to the effects of climate change?</p> <p>Will the option reduce or minimise greenhouse gas emissions?</p> <p>Will the option deliver new infrastructure that is energy efficient or makes use of renewable energy sources?</p>	-	+	Effects of Construction <p>The installation of metering infrastructure is expected to generate carbon emissions throughout the implementation period. It is estimated that there would be 3,600 km/a from vehicle movements which corresponds with site visits and the installation works. It is assumed, however, that vehicle movements could be clustered as appropriate which may help minimise vehicle emissions. Additionally, the provision and installation of 5,672 new meters would generate carbon emissions arising from embodied carbon within the new meters (5.05kg CO₂/e) and from vehicle emissions. Consequently, this option would generate up to 176 tCO₂e during construction which</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<p>has been assessed as having a minor negative effect on climate change (SEA Objective 5).</p> <p>Effects of Operation</p> <p>Once the installation of new meters is complete, the cumulative effects of reduced leakage and greater water efficiency through lowered water demand by previously metered domestic customers is anticipated to result in a minor reduction of energy required to process and pump water (-151tCO₂e/year). Operational carbon emissions from vehicle movement will be small (arising from movements that start in 2020/21 at 974km rising to 22,668km/ per annum in 2044/45) in respect of meter readings. Overall, the reduction of net operational greenhouse gas emissions in respect of energy savings is assessed as having a minor positive effect on climate change (SEA Objective 5).</p> <p>Mitigation</p> <ul style="list-style-type: none"> Consideration should be given to the co-ordination of travel in order to minimise overall vehicle movements and associated greenhouse gas emissions. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
<p>6. To maintain and enhance the economic and social wellbeing of the local community</p>	<p>Will the option ensure sufficient infrastructure is in place for predicted population increases?</p> <p>Will the option create local employment opportunities?</p> <p>Will the option support the local and regional economy?</p> <p>Will the option ensure that an affordable supply of water is maintained and vulnerable customers protected?</p> <p>Will the option avoid disruption through effects on the transport network?</p>	0	0	<p>Effects of Construction</p> <p>The option is expected to represent a low capital investment (£1.4m) which is not expected to generate a significant number of jobs in the long-term nor result in a discernible effect on the local economy associated with supply chain benefits (e.g. associated with the supply of raw materials and appointment of contractors to undertake the works). Due to the modest volume of vehicle movement associated with site visits and the installation of meters, it is unlikely that implementation would result in adverse impacts on the road network throughout the Portsmouth Water DMZ. Overall, this option has been assessed as having a neutral effect on local community wellbeing (SEA Objective 6).</p> <p>Effects of Operation</p> <p>It is assumed that the use of metering of void properties would assist in decreasing network leakage through lowered water demand which should help reduce water loss in the Portsmouth Water DMZ. Operation is therefore likely to increase/ensure continuity of water supply thus helping ensure that a greater volume of water is</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<p>available for future populations, commercial increases, and any seasonal demands. However, an increase of up to 0.28 MI/d is insufficient to have a substantive effect and overall the option is assessed as having a neutral effect on the local economy and local community wellbeing (SEA Objective 6).</p> <p>Mitigation</p> <ul style="list-style-type: none"> Where possible, Portsmouth Water and any contractors should seek to utilise local labour. Where possible, Portsmouth Water and any contractors should seek to appoint local contractors/sub-contractors and utilise locally sourced materials/equipment. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
<p>7. To ensure the protection and enhancement of human health</p>	<p>Will the option ensure the continuity of a safe and secure drinking water supply?</p> <p>Will the option ensure that surface water and bathing water quality are maintained within statutory standards?</p> <p>Will the option adversely affect human health by resulting in increased noise and/or adverse effects on air quality?</p> <p>Will the option affect opportunities for recreation and physical activity?</p>	0	0	<p>Effects of Construction</p> <p>The proposed works would be contained within the operational footprints of domestic premises such that the scale of implementation should not disrupt the use or result in the loss of amenity to proximate recreational activity and sport. The impacts of noise/vibration disturbance and nuisance resulting from the installation of new meters is not expected to result in any discernible effects on human health due to the scale and brevity of installation. Overall, implementation of this scheme is not expected to affect drinking water supply, surface water and bathing water quality, or recreation. This option has therefore been assessed as having a neutral effect on health (SEA Objective 7).</p> <p>Effects of Operation</p> <p>The scheme should not significantly affect human health by increased noise, nuisance or disruption nor would it affect opportunities for recreation. It is assumed that the cumulative effects of lowered water demand would help increase/ensure continuity of water supply through water efficiency. Overall, an increase of up to 0.28 MI/d would help ensure a continual supply of clean drinking water, however, is insufficient to have a substantive effect and overall the option is assessed as having a neutral effect on health (SEA Objective 7).</p> <p>Mitigation</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<ul style="list-style-type: none"> None identified. Assumptions <ul style="list-style-type: none"> None identified. Uncertainty <ul style="list-style-type: none"> None identified.
8. To promote the wise use of resources	<p>Will the option minimise the demand for raw materials?</p> <p>Will the option lead to reduced leakage from the supply network?</p> <p>Will the option improve efficiency in water consumption?</p> <p>Will the option seek to minimise the demand for raw materials?</p> <p>Will the option reduce or minimise energy use?</p> <p>Will the option promote the re-use and recycling of waste materials and reduce the proportion of waste sent to landfill?</p> <p>Will the option promote the use of sustainable design and materials?</p>	-	+	Effects of Construction <p>The installation of new meters would require a raw materials and energy to implement. Using the estimated carbon emissions associated with the embodied carbon within new meters in addition to vehicle greenhouse gas emissions as a proxy, material use and energy requirements are considered to be notable, and the option has therefore been assessed as having a minor negative effect on this objective. Furthermore, this option would generate construction wastes which may include infrastructural waste (original meter infrastructure) in addition to fuel usage for vehicles. Overall, this option has been assessed as having a minor negative effect on sustainable resource use (SEA Objective 8).</p> Effects of Operation <p>No significant amount of resources or energy would be required once the upgrading of prior metering infrastructure to metering is complete. As illustrated by the scale of operational carbon savings associated with reduced treatment and pumping of water (-151tCO₂e/year), operation has been assessed as having minor energy savings. Notwithstanding, a further decrease in water demand from previously metered domestic properties should facilitate greater leakage reduction within the water distribution network. On balance, this option has been assessed as having a minor positive effect on the sustainable use of resources (SEA Objective 8).</p> Mitigation <ul style="list-style-type: none"> Opportunities to utilise reused/recycled materials (discarded appliances) during implementation should be considered where appropriate. Assumptions <ul style="list-style-type: none"> None identified. Uncertainty <ul style="list-style-type: none"> None identified.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
9. To conserve and enhance cultural and historic assets	<p>Will the option conserve or enhance the historic environment, including heritage assets such as historic buildings, conservation areas, features, places and spaces, and their settings?</p> <p>Will the option avoid or minimise damage to archaeologically important sites?</p> <p>Will the option affect public access to, or enjoyment of, features of cultural heritage?</p>	0	0	<p>Effects of Construction</p> <p>Whilst it is unknown which properties would be affected, it is expected that the installation of new metering infrastructure will be low-impact. Installation will take place within the operational footprint of domestic sites and should have a negligible effect on the structural integrity and visual amenity of historic assets within the general vicinity. Overall, this option has been assessed as having a neutral effect on cultural and historic assets (SEA Objective 9).</p> <p>Effects of Operation</p> <p>There are no discernible risks or clear impact pathways to cultural/historic heritage assets regarding the use of metering. This option has therefore been assessed as having a neutral effect on cultural and historic assets (SEA Objective 9).</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
10. To conserve and enhance landscape character and other protected features	<p>Will the option avoid adverse effects on, and enhance where possible, protected/designated landscapes (including woodlands), townscapes or seascapes such as National Parks or AONBs be avoided?</p> <p>Will the option affect public access to existing landscape features?</p> <p>Will the option minimise adverse visual impacts?</p>	0	0	<p>Effects of Construction</p> <p>The structural scale of the new meters is expected to be minor such that installation should not result in any adverse impacts to the visual or landscape amenity of protected or local settings, e.g. designated national parks, townscapes, seascapes, or AONBs, due to the assumed low-intensity scale of construction in addition to the confined nature of these sites within operational footprints of domestic sites. Overall, this option has been assessed as having a neutral effect on landscape (SEA Objective 10).</p> <p>Effects of Operation</p> <p>There are no discernible risks or clear impact pathways to either the visual amenity or character of proximate local and designated landscapes, townscapes, or seascapes such as AONBs or national parks regarding the use of SMART metering. This option has therefore been assessed as having a neutral effect on landscape (SEA Objective 10).</p> <p>Mitigation</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<ul style="list-style-type: none"> None identified. Assumptions <ul style="list-style-type: none"> None identified. Uncertainty <ul style="list-style-type: none"> None identified.

Revised Preferred Drought Options

Option C078: Drought: Voluntary restraint & leakage action

Option Summary

This option would involve enhanced public awareness campaigns aimed at domestic and commercial customers (e.g. tourism sector) during periods of drought concerning the benefits of water use restraint on supply as well as the natural environment. Specifically, public awareness campaigns would be provided through a partnership-based implementation programme involving relevant water retailers (in respect of commercial customers) and Portsmouth Water, who would provide information to all customers on water supplies, water statuses, and the risks associated with unmitigated demand. It is expected that public awareness campaigns would improve proactive behaviour regarding smart and sustainable consumption: reducing the use of water appliances (toilet flushes, shower durations, washing machines, etc.), reducing and/or eliminating non-essential water use (vehicle washing, window washing, garden watering, hot tubs, etc.), and prioritising the identification/repair of leakages within private properties. Simultaneously, Portsmouth Water would expand Active Leakage Control (ALC) operations in order to enhance find and fix rates, accelerate response time, and increase leak volume threshold during drought periods.

Assessment

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
1. To ensure the protection and enhancement of biodiversity, priority habitats and species	<p>Will the option protect and enhance priority species, habitats and sites designated for their nature conservation value?</p> <p>Will the option protect and enhance non-designated sites and local biodiversity?</p> <p>Will the option provide opportunities for new habitat creation or restoration and link existing habitats as part of the development process?</p> <p>Will the option protect and enhance coastal and marine habitats and species?</p>	0/?	0	<p>Effects of Construction</p> <p>The development and delivery of public awareness campaigns would not have a discernible effect on biodiversity.</p> <p>Construction activity associated with ALC (which is likely to require pipeline replacement/repairs) may impact on biodiversity including priority habitats and/or protected species if existing pipelines pass through ecologically sensitive areas. Effects may be direct (for example, the loss of habitats or species) or indirect (for example, disturbance to habitats and species caused by emissions to air and noise and the fragmentation of habitats). If this is the case, these areas would have been previously disturbed during pipeline laying but are assumed now to have been restored and through this option may be subject to extensive excavation and disruption along the route of the affected water main. Neither the locations of the pipelines requiring repair nor the scale of the proposed works are currently known</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
	<p>Will the option result in a change in the quality of habitats due to changes in groundwater/river water quality or quantity?</p> <p>Will the option affect riparian vegetation structure?</p>			<p>although it is expected that works are likely to focus on areas where the distribution network is most dense (under roads, tracks, and/or footpaths) which should limit impact pathways to sensitive ecological receptors. Further, impacts would be felt in the short term only and it is expected that site-specific mitigation measures and established best practice would prevent any significant adverse effects from occurring.</p> <p>Overall, this option has been assessed as having a neutral effect on Objective 1, although some uncertainty remains.</p> <p>Effects of Operation</p> <p>It is assumed that the adoption of 'water restraint' would facilitate more proactive behaviour regarding smart and conscientious water consumption by domestic and commercial customers. Additionally, the reduction in leakage would reduce demand for water. Collectively, this is expected to increase water efficiency and minimise water loss during periods of drought which could benefit the water environment and the ecology it supports. However, effects are unlikely to be significant.</p> <p>Mitigation</p> <ul style="list-style-type: none"> The works programme and requirements should be determined at the earliest opportunity to allow investigation schemes, protected species surveys and mitigation to be appropriately scheduled and to provide sufficient time for consultations with Natural England. Bio-security measures should be implemented during construction phase. <p>Assumptions</p> <ul style="list-style-type: none"> It is assumed that repair works are likely to focus on areas where the distribution network is most dense (under roads, tracks, and/or footpaths), and will be in locations where ground has been disturbed in the past. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
2. To ensure the appropriate and efficient use of land and protect soil quality and geodiversity	<p>Will the option minimise the loss of best and most versatile agricultural land?</p> <p>Will the option protect and enhance soil health?</p> <p>Will the option minimise conflict with existing land use patterns?</p>	0	0	<p>Effects of Construction and Operation</p> <p>Any works associated with this option would target the existing pipeline network and would not require any new land take. Further, all excavated land would be reinstated following the construction period such that any disruption to land use would be temporary.</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
	<p>Will the option minimise land contamination?</p> <p>Will the option utilise previously developed (brownfield) land?</p> <p>Will the option protect and enhance protected sites designated for their geological interest and wider geodiversity?</p>			<p>There is the potential for works to affect sites designated for their geological interest. However, any impacts would be felt in the short term only and it is expected that site specific mitigation measures and established best practice would prevent any significant adverse effects from occurring.</p> <p>Works may disturb contaminated land or result in contamination (for example, through the accidental release of fuels or oils). However, this is expected to be managed through appropriate pollution prevention control techniques.</p> <p>Overall, the option has been assessed as having a neutral effect on this objective during construction and operation.</p> <p>Mitigation</p> <ul style="list-style-type: none"> Appropriate construction methods should be employed to minimise the risk of contamination. <p>Assumptions</p> <ul style="list-style-type: none"> It is expected that soils displaced during excavation associated with pipeline works would be replaced following the completion of construction activity. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
3. To protect and enhance water quality and surface and groundwater resources and the ecological status of water bodies	<p>Will the option minimise the demand for water resources?</p> <p>Will the option protect and improve surface water, groundwater and coastal water quality?</p> <p>Will the option result in changes to river flows?</p> <p>Will the option result in changes to groundwater levels?</p> <p>Will the option prevent the deterioration of Water Framework Directive (WFD) waterbody status (or potential)?</p>	0	+	<p>Effects of Construction</p> <p>Neither the development and delivery of public awareness campaigns nor leakage investigation and leakage reduction activity would affect river flows, groundwater levels or water quality, provided best practices are adhered to and mitigation implemented (such as dust suppression, soil containment and emergency response procedures). This option has therefore been assessed as having a neutral effect in respect of SEA Objective 3.</p> <p>Effects of Operation</p> <p>The adoption of proactive 'water restraint' behaviour by domestic and commercial customers together with leakage reduction would likely increase/ensure continuity of water supply during times of drought through the reduction of water demand/loss (the option has a design capacity of 4.3 Ml/d). This is likely to have benefits in respect of water quantity and, potentially, quality and in consequence, the option has been assessed as having a positive effect on this objective.</p> <p>Mitigation</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<ul style="list-style-type: none"> None identified. Assumptions <ul style="list-style-type: none"> It is assumed that construction activities would be undertaken in accordance with relevant best practice pollution prevention guidance and that appropriate mitigation would be implemented (such as dust suppression, soil containment and emergency response procedures). Uncertainty <ul style="list-style-type: none"> The level of customer uptake of 'restraint' behaviour may vary from that predicted.
4. To reduce the risk of flooding	<p>Will the option have the potential to cause or exacerbate flooding in the catchment area?</p> <p>Will the option have the potential to help alleviate flooding in the catchment area?</p> <p>Will the option enhance water infiltration and retention?</p> <p>Will the option be at risk of flooding or be affected by flooding, if it occurred?</p>	0	0	Effects of Construction and Operation <p>Works associated with ALC may take place in areas of flood risk and in consequence, could be vulnerable to flooding. However, whilst the location of repair activity is currently unknown, it is assumed that works could be scheduled to avoid periods of flooding. It is also assumed that an appropriate Flood Risk Assessment (FRA) would be undertaken prior to works occurring with appropriate mitigation measures identified to ensure that flood risk is minimised.</p> <p>Once pipeline works have been completed, no effects on flood risk would be anticipated.</p> <p>Overall, this option has been assessed as having a neutral effect on Objective 4 during both construction and operation.</p> Mitigation <ul style="list-style-type: none"> None identified. Assumptions <ul style="list-style-type: none"> It is assumed that an appropriate Flood Risk Assessment (FRA) would be undertaken prior to the implementation of this option with appropriate mitigation measures identified to ensure that flood risk is minimised. It is assumed that works could be scheduled to avoid periods of flooding. Uncertainty <ul style="list-style-type: none"> None identified.
5. To limit the causes and effects of climate change and	Will the option reduce vulnerability to the effects of climate change by appropriate adaptation?	0	+	Effects of Construction

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
increase resilience to the consequences of climate change	<p>Will the option increase environmental resilience to the effects of climate change?</p> <p>Will the option reduce or minimise greenhouse gas emissions?</p> <p>Will the option deliver new infrastructure that is energy efficient or makes use of renewable energy sources?</p>			<p>The development and delivery of public awareness campaigns and accelerated ALC is expected to generate carbon emissions throughout the implementation period. The presentation of public awareness campaigns and leakage investigation/reduction activity would require vehicle movements in respect of the transportation of material, equipment, and personnel. It is estimated that vehicle movements per annum (5 year implementation period) would include up to 819,200km for ALC operation whilst up to 307,200km would be accumulated for mains repairs in addition to movements required for campaign organisation and delivery; these movements would contribute to greenhouse gas emissions. There would also be emissions associated with the operation of plant as well as embodied carbon within new pipelines (3.37 tCO₂e). However, overall emissions associated with this option would be very small (up to 7.7 tCO₂e) and in consequence, the option has been assessed as having a neutral effect on climate change (SEA Objective 5) (depending on the volume of campaigns delivered, length of pipeline targeted for leakage repair, and the intensity of movement throughout the DMZ as dictated by drought conditions).</p> <p>Effects of Operation</p> <p>Reduced demand associated with the adoption of proactive 'water restraint' behaviour by domestic and commercial customers and lower levels of leakage may reduce greenhouse gas emissions and energy use associated with reduced treatment and pumping of water. Reductions in greenhouse gas emissions associated with this option would, however, be very small.</p> <p>Increased water efficiency and reduced leakage during periods of drought may improve the resilience of the water supply network to the effects of climate change (drought) by increasing water availability.</p> <p>Overall, this option has been assessed as having a minor positive effect on climate change (SEA Objective 5).</p> <p>Mitigation</p> <ul style="list-style-type: none"> Measures to reduce greenhouse gas emissions during construction should be considered including, for example, the use of low emission plant. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> The level of customer uptake of 'restraint' behaviour may vary from that predicted.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
6. To maintain and enhance the economic and social wellbeing of the local community	<p>Will the option ensure sufficient infrastructure is in place for predicted population increases?</p> <p>Will the option create local employment opportunities?</p> <p>Will the option support the local and regional economy?</p> <p>Will the option ensure that an affordable supply of water is maintained and vulnerable customers protected?</p> <p>Will the option avoid disruption through effects on the transport network?</p>	0	+	<p>Effects of Construction</p> <p>Employment opportunities and supply chain benefits (e.g. associated with the supply of raw materials and appointment of contractors to undertake pipeline works) may be generated during the implementation phase of this option. However, the level of investment associated with this option is expected to be small (£0.48m).</p> <p>Works may take place within and/or utilise road networks which, together with associated vehicle movements, could result in increases in localised congestion and disruption/driver delay throughout the implementation phase. However, any effects in this regard would be temporary, infrequent and small in scale.</p> <p>Overall, this option has been assessed as having a neutral effect on local community wellbeing (SEA Objective 6).</p> <p>Effects of Operation</p> <p>The adoption of proactive 'water restraint' behaviour by domestic and commercial customers together with leakage reduction would reduce water demand during periods of drought. This may help to ensure the continuity/availability of water supplies and support population and economic growth. In this context, this option would generate an estimated water saving of up to 4.3 Ml/d which has been assessed as having a positive effect on the local economy and local community wellbeing (SEA Objective 6).</p> <p>Mitigation</p> <ul style="list-style-type: none"> Where possible, Portsmouth Water and any contractors should seek to utilise local labour. Where possible, Portsmouth Water and any contractors should seek to appoint local contractors/sub-contractors and utilise locally sourced materials. HGV movements and pipeline works should, where possible, be timed so as to avoid peak traffic periods e.g. between 7am-9am and 4pm-6pm. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> The level of customer uptake of 'restraint' behaviour may vary from that predicted. The extent to which the construction of this option would benefit the local economy/local labour market is uncertain.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
7. To ensure the protection and enhancement of human health	<p>Will the option ensure the continuity of a safe and secure drinking water supply?</p> <p>Will the option ensure that surface water and bathing water quality are maintained within statutory standards?</p> <p>Will the option adversely affect human health by resulting in increased noise and/or adverse effects on air quality?</p> <p>Will the option affect opportunities for recreation and physical activity?</p>	-/?	+	<p>Effects of Construction</p> <p>The repair of pipelines associated with ALC would generate noise and emissions to air including dust which could have adverse impacts on human health, depending on the scale, duration and proximity of the works to sensitive receptors such as residential properties. Vehicle movements associated with the transportation of equipment, material and personnel may also have adverse impacts on receptors along transport routes. However, any impacts would be temporary, infrequent and not significant, although as the locations of pipelines to be repaired are not known, some uncertainty remains.</p> <p>Where works affect pipelines that cross open space, footpaths and other recreational uses, there may be temporary disruption/loss of amenity to users of these facilities. However, any impacts would be temporary and are not expected to be significant.</p> <p>During the period of pipeline repair, there may be temporary disruption to water supplies to customers depending on the severity of leakage and associated repair works required.</p> <p>Overall, this option has been assessed as having a negative effect on health, although some uncertainty remains.</p> <p>Effects of Operation</p> <p>Once the repair of network leakages is complete, there would be no further adverse effects on health associated with this option.</p> <p>The adoption of proactive 'water restraint' behaviour by domestic and commercial customers together with leakage reduction would reduce water demand during periods of drought. This may help to ensure the continuity/availability of water supplies. In this context, this option would generate an estimated water saving of up to 4.3 Ml/d which has been assessed as having a positive effect on health (SEA Objective 7).</p> <p>Mitigation</p> <ul style="list-style-type: none"> Where possible, pipeline works should be routed to avoid open space and recreational facilities/suitable diversions should be put in place. <p>Assumptions</p> <ul style="list-style-type: none"> It is assumed that construction would adopt practices which seek to reduce noise/air quality impacts (such as those practices outlined under the Considerate Constructors' Scheme). <p>Uncertainty</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<ul style="list-style-type: none"> The level of customer uptake of 'restraint' behaviour may vary from that predicted.
8. To promote the wise use of resources	<p>Will the option minimise the demand for raw materials?</p> <p>Will the option lead to reduced leakage from the supply network?</p> <p>Will the option improve efficiency in water consumption?</p> <p>Will the option seek to minimise the demand for raw materials?</p> <p>Will the option reduce or minimise energy use?</p> <p>Will the option promote the re-use and recycling of waste materials and reduce the proportion of waste sent to landfill?</p> <p>Will the option promote the use of sustainable design and materials?</p>	0	+	<p>Effects of Construction</p> <p>The delivery of public awareness campaigns and accelerated ALC would require raw materials and energy to implement. However, using estimated emissions associated with the embodied carbon within new piping in addition to vehicle movements as a proxy for resource use (7.7 tCO₂e/year), material use and energy requirements are expected to be very minor.</p> <p>This option would generate construction wastes which may include excavation waste and infrastructural waste (damaged piping). However, it would be expected that any soils displaced during the works would be reused during the reinstatement of land.</p> <p>Overall, this option has been assessed as having a neutral effect on sustainable resource use (SEA Objective 8).</p> <p>Effects of Operation</p> <p>Any additional resource use following implementation of the scheme would be negligible.</p> <p>This option would be expected to reduce the demand for water which in-turn would result in a reduction in energy use associated with the treatment and pumping of water (-5,730 kWh/a).</p> <p>The adoption of proactive 'water restraint' behaviour by domestic and commercial customers together with leakage reduction would assist in minimising water loss. In this context, this option would generate an estimated water saving of up to 4.3 Ml/d which has been assessed as having a positive effect on this objective.</p> <p>Overall, this option has been assessed as having a positive effect on SEA Objective 8.</p> <p>Mitigation</p> <ul style="list-style-type: none"> Opportunities to utilise reused/recycled materials during construction should be considered where appropriate. Construction and operational wastes should be reused/recycled where possible. Measures to reduce energy usage during construction should be considered including, for example, the use of low energy plant. <p>Assumptions</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> The level of customer uptake of 'restraint' behaviour may vary from that predicted. The exact resource requirements (e.g. volumes of specific materials) associated with the construction/operation of this option are unknown at this stage. The volume of waste generated under operation of this option is uncertain at this stage.
9. To conserve and enhance cultural and historic assets	<p>Will the option conserve or enhance the historic environment, including heritage assets such as historic buildings, conservation areas, features, places and spaces, and their settings?</p> <p>Will the option avoid or minimise damage to archaeologically important sites?</p> <p>Will the option affect public access to, or enjoyment of, features of cultural heritage?</p>	0	0	<p>Effects of Construction and Operation</p> <p>Works associated with ALC activities could be within, or in close proximity to, heritage assets including, for example, scheduled monuments and listed buildings. In consequence, there is the potential for both direct (e.g. loss of, or damage to, an asset) and indirect (e.g. effects on the settings of assets) impacts on cultural heritage including archaeological remains during the implementation phase of this option. However, construction sites would have been previously disturbed during the initial installation of the pipelines and it is expected that site-specific mitigation measures would manage any adverse impacts in this regard. In consequence, significant effects are not expected.</p> <p>Following the completion of pipeline repairs, excavated land would be reinstated and no further effects on cultural heritage would be anticipated.</p> <p>Overall, this option has been assessed as having a neutral effect on SEA Objective 9 during both construction and operation.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> It is assumed that construction would adopt practices which seek to reduce potentially adverse impacts to cultural and historic assets if redesign and/or rerouting is not possible in the context of the given setting. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
10. To conserve and enhance landscape character and other protected features	<p>Will the option avoid adverse effects on, and enhance where possible, protected/designated landscapes (including woodlands), townscapes or seascapes such as National Parks or AONBs be avoided?</p> <p>Will the option affect public access to existing landscape features?</p> <p>Will the option minimise adverse visual impacts?</p>	<p>0/?</p>	<p>0</p>	<p>Effects of Construction</p> <p>Works associated with ALC activities may have an impact on landscape character associated with the introduction of plant and machinery into landscapes. Where works are located in rural, greenfield settings, these effects may be more pronounced. There is also the potential for works to take place in designated landscapes which may affect their special qualities and result in substantial impacts on landscape character. However, landscape impacts associated with this option would be infrequent and temporary and following the completion of works, excavated land would be reinstated such that long term significant effects are unlikely. Nonetheless, as the location of works is unknown at this stage, some uncertainty remains.</p> <p>Works associated with this option may affect the visual amenity of receptors in close proximity to construction sites. The probability of adverse effects occurring and their magnitude would likely be increased where works take place in close proximity to large numbers of sensitive receptors such as in urban areas.</p> <p>Overall, this option has been assessed as having a neutral effect on landscape, although some uncertainty remains.</p> <p>Effects of Operation</p> <p>Following the completion of pipeline repairs, excavated land would be reinstated and no further effects on landscape would be anticipated.</p> <p>Mitigation</p> <ul style="list-style-type: none"> • None identified. <p>Assumptions</p> <ul style="list-style-type: none"> • None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> • None identified.

Option C079: Drought: Mandatory restraint

Option Summary

This option would involve the provision of a significant media campaign aimed at non-domestic commercial customers during periods of drought concerning the justification of mandatory restraint actions and how customers can achieve compliance. By permission of Drought Directions, implementation of this option would simultaneously prohibit: garden watering on commercial property; maintenance of commercial swimming pools and ponds; vehicle cleaning; washing of commercial premises windows; and industrial plant, suppressing dust, and operating unoccupied cisterns. The delivery of this option would require a partnership with relevant retail suppliers in order to ensure communication and monitoring processes are up to date.

Assessment

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
1. To ensure the protection and enhancement of biodiversity, priority habitats and species	<p>Will the option protect and enhance priority species, habitats and sites designated for their nature conservation value?</p> <p>Will the option protect and enhance non-designated sites and local biodiversity?</p> <p>Will the option provide opportunities for new habitat creation or restoration and link existing habitats as part of the development process?</p> <p>Will the option protect and enhance coastal and marine habitats and species?</p> <p>Will the option result in a change in the quality of habitats due to changes in groundwater/river water quality or quantity?</p> <p>Will the option affect riparian vegetation structure?</p>	0	0	<p>Effects of Construction</p> <p>There would be no physical construction associated with this option. Consequently, the option has been assessed as having a neutral effect on biodiversity (SEA Objective 1).</p> <p>Effects of Operation</p> <p>Mandatory restraint actions would reduce non-critical water consumption during times of drought which could benefit the water environment and the ecology it supports. However, effects are unlikely to be significant. Overall, this option has been assessed as having a neutral effect on SEA Objective 1.</p> <p>Mitigation</p> <ul style="list-style-type: none"> • None identified. <p>Assumptions</p> <ul style="list-style-type: none"> • None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> • None identified.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
2. To ensure the appropriate and efficient use of land and protect soil quality and geodiversity	<p>Will the option minimise the loss of best and most versatile agricultural land?</p> <p>Will the option protect and enhance soil health?</p> <p>Will the option minimise conflict with existing land use patterns?</p> <p>Will the option minimise land contamination?</p> <p>Will the option utilise previously developed (brownfield) land?</p> <p>Will the option protect and enhance protected sites designated for their geological interest and wider geodiversity?</p>	0	0	<p>Effects of Construction and Operation</p> <p>There would be no land take associated with this option and in consequence, neutral effects have been identified in respect of geology and soils during both construction and operation.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
3. To protect and enhance water quality and surface and groundwater resources and the ecological status of water bodies	<p>Will the option minimise the demand for water resources?</p> <p>Will the option protect and improve surface water, groundwater and coastal water quality?</p> <p>Will the option result in changes to river flows?</p> <p>Will the option result in changes to groundwater levels?</p> <p>Will the option prevent the deterioration of Water Framework Directive (WFD) waterbody status (or potential)?</p>	0	+	<p>Effects of Construction</p> <p>There would be no physical construction associated with this option as implementation of the scheme is contingent upon the provision of media awareness campaigns and mandatory restraint actions. Consequently, no effects on water quality/quantity (SEA Objective 3) are predicted.</p> <p>Effects of Operation</p> <p>Mandatory restraint actions would reduce non-critical water consumption during times of drought. The reduction in water demand (the option has a design capacity of 8.3 Ml/d) is likely to have benefits in respect of water quantity and, potentially, quality and in consequence, the option has been assessed as having a positive effect on this objective.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> The level of compliance by commercial customers to the mandatory water restrictions on targeted activities may vary from that predicted.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
4. To reduce the risk of flooding	<p>Will the option have the potential to cause or exacerbate flooding in the catchment area?</p> <p>Will the option have the potential to help alleviate flooding in the catchment area?</p> <p>Will the option enhance water infiltration and retention?</p> <p>Will the option be at risk of flooding or be affected by flooding, if it occurred?</p>	0	0	<p>Effects of Construction and Operation</p> <p>It is not expected that mandatory restraint actions would result in/exacerbate flooding. This option has therefore been assessed as having a neutral effect on SEA Objective 4 during both implementation and operation.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
5. To limit the causes and effects of climate change and increase resilience to the consequences of climate change	<p>Will the option reduce vulnerability to the effects of climate change by appropriate adaptation?</p> <p>Will the option increase environmental resilience to the effects of climate change?</p> <p>Will the option reduce or minimise greenhouse gas emissions?</p> <p>Will the option deliver new infrastructure that is energy efficient or makes use of renewable energy sources?</p>	0	+	<p>Effects of Construction</p> <p>The implementation of this option is not expected to generate a discernible volume carbon emissions. The provision of the media awareness campaign would require vehicle movements associated with the transportation of personnel over the 3 year implementation period which would generate greenhouse gas emissions, however, any effects on climate change in this regard would be negligible.</p> <p>Overall, this option has been assessed as having a neutral effect on SEA Objective 5.</p> <p>Effects of Operation</p> <p>The implementation of mandatory restraint actions would be expected to reduce the demand for water which, in-turn, would result in a reduction in energy associated with the treatment and pumping of water. However, emissions reductions associated with this option would be negligible.</p> <p>Lower demand for water during periods of drought may improve the resilience of the water supply network to the effects of climate change (drought) by increasing water availability.</p> <p>Overall, this option has been assessed as having a minor positive effect on climate change (SEA Objective 5).</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<ul style="list-style-type: none"> None identified. Uncertainty <ul style="list-style-type: none"> The level of compliance by commercial customers to the mandatory water restrictions on targeted activities may vary from that predicted.
6. To maintain and enhance the economic and social wellbeing of the local community	<p>Will the option ensure sufficient infrastructure is in place for predicted population increases?</p> <p>Will the option create local employment opportunities?</p> <p>Will the option support the local and regional economy?</p> <p>Will the option ensure that an affordable supply of water is maintained and vulnerable customers protected?</p> <p>Will the option avoid disruption through effects on the transport network?</p>	0	+	Effects of Construction <p>The implementation of this option would be unlikely to generate significant investment or employment opportunities (£0.57m). It is likely that any additional work would be accommodated in existing employees' or contractors'/partners' workloads. In consequence, this option has been assessed as having a neutral effect on SEA Objective 6.</p> Effects of Operation <p>Mandatory restraint actions would reduce non-critical water consumption during times of drought. This may help to ensure the continuity/availability of water supplies and support population and economic growth. In this context, this option would generate an estimated water saving of up to 8.3 MI/d.</p> <p>Mandatory restraint actions would be targeted at commercial customers and in consequence, there is the potential for associated restrictions in water use to affect some businesses (e.g. cleaning firms). However, any impacts would be infrequent and temporary and are not expected to be significant.</p> <p>Overall, this option has been assessed as having a positive effect on the local economy and local community wellbeing (SEA Objective 6).</p> Mitigation <ul style="list-style-type: none"> None identified. Assumptions <ul style="list-style-type: none"> None identified. Uncertainty <ul style="list-style-type: none"> The level of compliance by commercial customers to the mandatory water restrictions on targeted activities may vary from that predicted.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
7. To ensure the protection and enhancement of human health	<p>Will the option ensure the continuity of a safe and secure drinking water supply?</p> <p>Will the option ensure that surface water and bathing water quality are maintained within statutory standards?</p> <p>Will the option adversely affect human health by resulting in increased noise and/or adverse effects on air quality?</p> <p>Will the option affect opportunities for recreation and physical activity?</p>	0	+	<p>Effects of Construction</p> <p>It is not expected that the implementation of this option would have any discernible effects on health. This option has therefore been assessed as having a neutral effect on SEA Objective 7.</p> <p>Effects of Operation</p> <p>Mandatory restraint actions would reduce non-critical water consumption during times of drought. This may help to ensure the continuity/availability of water supplies. In this context, this option would generate an estimated water saving of up to 8.3 Ml/d.</p> <p>The restriction of filling/maintaining commercial swimming pools may temporarily impact recreational swimming, although this would be infrequent and effects in this regard are not expected to be significant.</p> <p>Overall, this option has been assessed as having a minor positive effect on health (SEA Objective 7).</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> The level of compliance by commercial customers to the mandatory water restrictions on targeted activities may vary from that predicted.
8. To promote the wise use of resources	<p>Will the option minimise the demand for raw materials?</p> <p>Will the option lead to reduced leakage from the supply network?</p> <p>Will the option improve efficiency in water consumption?</p> <p>Will the option seek to minimise the demand for raw materials?</p> <p>Will the option reduce or minimise energy use?</p>	0	++	<p>Effects of Construction</p> <p>The delivery of media awareness campaigns would not require a notable volume of raw materials and energy to implement. In consequence, this option has been assessed as having a neutral effect on resource use (SEA Objective 8).</p> <p>Effects of Operation</p> <p>Any additional resource use following implementation of the scheme would be negligible.</p> <p>This option would be expected to reduce the demand for water during periods of drought which in-turn would result in a reduction in energy use associated with the treatment and pumping of water (-3,724 kWh/a).</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
	<p>Will the option promote the re-use and recycling of waste materials and reduce the proportion of waste sent to landfill?</p> <p>Will the option promote the use of sustainable design and materials?</p>			<p>During periods of drought, mandatory restraint actions would reduce the demand for water. In this context, this option would generate an estimated water saving of up to 8.3 Ml/d which has been assessed as having a significant positive effect on this objective.</p> <p>Overall, this option has been assessed as having a significant positive effect on the sustainable use of resources (SEA Objective 8).</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> The level of compliance by commercial customers to the mandatory water restrictions on targeted activities may vary from that predicted.
9. To conserve and enhance cultural and historic assets	<p>Will the option conserve or enhance the historic environment, including heritage assets such as historic buildings, conservation areas, features, places and spaces, and their settings?</p> <p>Will the option avoid or minimise damage to archaeologically important sites?</p> <p>Will the option affect public access to, or enjoyment of, features of cultural heritage?</p>	0	0	<p>Effects of Construction and Operation</p> <p>There would no physical construction associated with this option. Consequently, there would be no effects on cultural heritage (SEA Objective 9) during both construction and operation.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
10. To conserve and enhance landscape character and other protected features	<p>Will the option avoid adverse effects on, and enhance where possible, protected/designated landscapes (including woodlands), townscapes or seascapes such as National Parks or AONBs be avoided?</p> <p>Will the option affect public access to existing landscape features?</p>	0	0	<p>Effects of Construction and Operation</p> <p>There would be no physical construction associated with this option. Consequently, there would be no effects on landscape (SEA Objective 10) during both construction and operation.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p>



Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
	Will the option minimise adverse visual impacts?			<ul style="list-style-type: none">• None identified. Uncertainty <ul style="list-style-type: none">• None identified.

Option C080: Imposition of Drought Direction restrictions (mandatory commercial restraint)

Option Summary

This option would involve the implementation of a mandatory restriction on non-critical water uses (as listed in the Drought Direction 2011) aimed at commercial customers during periods of severe drought (1 in 50 year occurrence). Public awareness campaigns would be provided through a partnership-based implementation programme involving relevant water retailers (in respect of commercial customers). In order to facilitate compliance with the water restrictions, telephone hotlines would be organised for customers to report banned usages in conjunction with active site monitoring by operational teams whilst undertaking ongoing business.

Assessment

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
1. To ensure the protection and enhancement of biodiversity, priority habitats and species	<p>Will the option protect and enhance priority species, habitats and sites designated for their nature conservation value?</p> <p>Will the option protect and enhance non-designated sites and local biodiversity?</p> <p>Will the option provide opportunities for new habitat creation or restoration and link existing habitats as part of the development process?</p> <p>Will the option protect and enhance coastal and marine habitats and species?</p> <p>Will the option result in a change in the quality of habitats due to changes in groundwater/river water quality or quantity?</p> <p>Will the option affect riparian vegetation structure?</p>	0	0	<p>Effects of Construction</p> <p>There would be no physical construction associated with this option. Consequently, the option has been assessed as having a neutral effect on biodiversity (SEA Objective 1).</p> <p>Effects of Operation</p> <p>Mandatory restrictions would reduce non-critical water consumption during times of drought which could benefit the water environment and the ecology it supports. However, effects are unlikely to be significant. Overall, this option has been assessed as having a neutral effect on SEA Objective 1.</p> <p>Mitigation</p> <ul style="list-style-type: none"> • None identified. <p>Assumptions</p> <ul style="list-style-type: none"> • None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> • None identified.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
2. To ensure the appropriate and efficient use of land and protect soil quality and geodiversity	<p>Will the option minimise the loss of best and most versatile agricultural land?</p> <p>Will the option protect and enhance soil health?</p> <p>Will the option minimise conflict with existing land use patterns?</p> <p>Will the option minimise land contamination?</p> <p>Will the option utilise previously developed (brownfield) land?</p> <p>Will the option protect and enhance protected sites designated for their geological interest and wider geodiversity?</p>	0	0	<p>Effects of Construction and Operation</p> <p>There would be no land take associated with this option and in consequence, neutral effects have been identified in respect of geology and soils during both construction and operation.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
3. To protect and enhance water quality and surface and groundwater resources and the ecological status of water bodies	<p>Will the option minimise the demand for water resources?</p> <p>Will the option protect and improve surface water, groundwater and coastal water quality?</p> <p>Will the option result in changes to river flows?</p> <p>Will the option result in changes to groundwater levels?</p> <p>Will the option prevent the deterioration of Water Framework Directive (WFD) waterbody status (or potential)?</p>	0	+	<p>Effects of Construction</p> <p>There would be no physical construction associated with this option as implementation of the scheme is contingent upon the provision of public awareness campaigns and mandatory restrictions. Consequently, no effects on water quality/quantity (SEA Objective 3) are predicted.</p> <p>Effects of Operation</p> <p>Mandatory restrictions would reduce non-critical water consumption during times of drought. The reduction in water demand (the option has a design capacity of 8.1 Ml/d) is likely to have benefits in respect of water quantity and, potentially, quality and in consequence, the option has been assessed as having a positive effect on this objective.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> The level of compliance by customers to the mandatory water restrictions on targeted activities may vary from that predicted.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
4. To reduce the risk of flooding	<p>Will the option have the potential to cause or exacerbate flooding in the catchment area?</p> <p>Will the option have the potential to help alleviate flooding in the catchment area?</p> <p>Will the option enhance water infiltration and retention?</p> <p>Will the option be at risk of flooding or be affected by flooding, if it occurred?</p>	0	0	<p>Effects of Construction and Operation</p> <p>It is not expected that mandatory restrictions would result in/exacerbate flooding. This option has therefore been assessed as having a neutral effect on SEA Objective 4 during both implementation and operation.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <p>None identified.</p>
5. To limit the causes and effects of climate change and increase resilience to the consequences of climate change	<p>Will the option reduce vulnerability to the effects of climate change by appropriate adaptation?</p> <p>Will the option increase environmental resilience to the effects of climate change?</p> <p>Will the option reduce or minimise greenhouse gas emissions?</p> <p>Will the option deliver new infrastructure that is energy efficient or makes use of renewable energy sources?</p>	0	+	<p>Effects of Construction</p> <p>The implementation of this option is not expected to generate significant carbon emissions throughout the implementation period. The enforcement of mandatory bans via site monitoring by operational teams may generate additional vehicle movements; however, associated greenhouse gas emissions would be very minor, if not negligible. Overall, it is not expected that implementation would result in a substantial increase in greenhouse gas emissions and consequently, this option has been assessed as having a neutral effect on climate change (SEA Objective 5).</p> <p>Effects of Operation</p> <p>The implementation of mandatory restrictions would be expected to reduce the demand for water which, in-turn, would result in a reduction in energy use associated with the treatment and pumping of water. However, emissions reductions associated with this option would be negligible.</p> <p>Lower demand for water during periods of drought may improve the resilience of the water supply network to the effects of climate change (drought) by increasing water availability.</p> <p>Overall, this option has been assessed as having a minor positive effect on climate change (SEA Objective 5).</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<ul style="list-style-type: none"> None identified. Uncertainty <ul style="list-style-type: none"> The level of compliance by customers to the mandatory water restrictions on targeted activities may vary from that predicted.
6. To maintain and enhance the economic and social wellbeing of the local community	<p>Will the option ensure sufficient infrastructure is in place for predicted population increases?</p> <p>Will the option create local employment opportunities?</p> <p>Will the option support the local and regional economy?</p> <p>Will the option ensure that an affordable supply of water is maintained and vulnerable customers protected?</p> <p>Will the option avoid disruption through effects on the transport network?</p>	0	+	Effects of Construction <p>The implementation of this option would be unlikely to generate significant investment or employment opportunities (£0.18m). It is likely that any additional work would be accommodated in existing employees' or contractors'/partners' workloads. In consequence, this option has been assessed as having a neutral effect on SEA Objective 6.</p> Effects of Operation <p>Mandatory restrictions would reduce non-critical water consumption during times of drought. This may help to ensure the continuity/availability of water supplies and support population and economic growth. In this context, this option would generate an estimated water saving of up to 8.1 ML/d.</p> <p>Mandatory restrictions would be targeted at commercial customers and in consequence, there is the potential for associated restrictions in water use to affect some businesses (e.g. cleaning firms). However, any impacts would be infrequent and temporary and are not expected to be significant.</p> <p>Overall, this option has been assessed as having a positive effect on the local economy and local community wellbeing (SEA Objective 6).</p> Mitigation <ul style="list-style-type: none"> None identified. Assumptions <ul style="list-style-type: none"> None identified. Uncertainty <ul style="list-style-type: none"> The level of compliance by customers to the mandatory water restrictions on targeted activities may vary from that predicted.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
7. To ensure the protection and enhancement of human health	<p>Will the option ensure the continuity of a safe and secure drinking water supply?</p> <p>Will the option ensure that surface water and bathing water quality are maintained within statutory standards?</p> <p>Will the option adversely affect human health by resulting in increased noise and/or adverse effects on air quality?</p> <p>Will the option affect opportunities for recreation and physical activity?</p>	0	+	<p>Effects of Construction</p> <p>It is not expected that the implementation of this option would have any discernible effects on health. This option has therefore been assessed as having a neutral effect on SEA Objective 7.</p> <p>Effects of Operation</p> <p>Mandatory restrictions would reduce non-critical water consumption during times of drought. This may help to ensure the continuity/availability of water supplies. In this context, this option would generate an estimated water saving of up to 8.1 ML/d.</p> <p>The restriction of filling/maintaining commercial swimming pools may temporarily impact recreational swimming, although this would be infrequent and effects in this regard are not expected to be significant.</p> <p>Overall, this option has been assessed as having a minor positive effect on health (SEA Objective 7).</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> The level of compliance by customers to the mandatory water restrictions on targeted activities may vary from that predicted.
8. To promote the wise use of resources	<p>Will the option minimise the demand for raw materials?</p> <p>Will the option lead to reduced leakage from the supply network?</p> <p>Will the option improve efficiency in water consumption?</p> <p>Will the option seek to minimise the demand for raw materials?</p> <p>Will the option reduce or minimise energy use?</p>	0	++	<p>Effects of Construction</p> <p>The delivery of public awareness campaigns would not require a notable volume of raw materials and energy to implement. In consequence, this option has been assessed as having a neutral effect on resource use (SEA Objective 8).</p> <p>Effects of Operation</p> <p>Any additional resource use following implementation of the scheme would be negligible.</p> <p>This option would be expected to reduce the demand for water during periods of drought which in-turn would result in a reduction in energy use associated with the treatment and pumping of water (-1,867 kWh/a).</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
	<p>Will the option promote the re-use and recycling of waste materials and reduce the proportion of waste sent to landfill?</p> <p>Will the option promote the use of sustainable design and materials?</p>			<p>During periods of drought, mandatory restrictions would reduce the demand for water. In this context, this option would generate an estimated water saving of up to 8.1 Ml/d which has been assessed as having a significant positive effect on this objective.</p> <p>Overall, this option has been assessed as having a significant positive effect on the sustainable use of resources (SEA Objective 8).</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> The level of compliance by customers to the mandatory water restrictions on targeted activities may vary from that predicted.
9. To conserve and enhance cultural and historic assets	<p>Will the option conserve or enhance the historic environment, including heritage assets such as historic buildings, conservation areas, features, places and spaces, and their settings?</p> <p>Will the option avoid or minimise damage to archaeologically important sites?</p> <p>Will the option affect public access to, or enjoyment of, features of cultural heritage?</p>	0	0	<p>Effects of Construction and Operation</p> <p>There would be no physical construction associated with this option. Consequently, there would be no effects on cultural heritage (SEA Objective 9) during both construction and operation.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
10. To conserve and enhance landscape character and other protected features	<p>Will the option avoid adverse effects on, and enhance where possible, protected/designated landscapes (including woodlands), townscapes or seascapes such as National Parks or AONBs be avoided?</p> <p>Will the option affect public access to existing landscape features?</p>	0	0	<p>Effects of Construction and Operation</p> <p>There would be no physical construction associated with this option. Consequently, there would be no effects on landscape (SEA Objective 10) during both construction and operation.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p>



Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
	Will the option minimise adverse visual impacts?			<ul style="list-style-type: none">• None identified. Uncertainty <ul style="list-style-type: none">• None identified.

Revised Preferred Leakage Options

Option D004a: Permanent Noise Loggers (Phase 1)

Option Summary

This option would involve the installation of telemetered magnetic noise loggers within the water network which would, following a period of calibration, detect and pinpoint any emerging leakages within the network in order to reduce detection costs, leak run times and safety hazards for personnel. This would focus on leakage 'hotspot' areas. Access for the installation of noise loggers would be via existing mains access and it is assumed that no excavation works would be required. It is assumed that 3,975 telemetered noise loggers will be all installed in 2020/21 with resulting leaks identified and fixed in the remainder of AMP7. Assumes that 450 repairs will have been carried out by 2024/25 with an average of 2,160 km travelled per year.

Assessment

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
1. To ensure the protection and enhancement of biodiversity, priority habitats and species	<p>Will the option protect and enhance priority species, habitats and sites designated for their nature conservation value?</p> <p>Will the option protect and enhance non-designated sites and local biodiversity?</p> <p>Will the option provide opportunities for new habitat creation or restoration and link existing habitats as part of the development process?</p> <p>Will the option protect and enhance coastal and marine habitats and species?</p> <p>Will the option result in a change in the quality of habitats due to changes in groundwater/river water quality or quantity?</p> <p>Will the option affect riparian vegetation structure?</p>	0/?	0	<p>Effects of Construction</p> <p>The installation of the telemetered noise loggers would have no effects on biodiversity. It is possible that subsequent repair works would be undertaken within or in close proximity to locations important for biodiversity (including designated sites) which may impact on priority habitats and protected species (through short term, temporary disturbance caused by excavation) in these instances. However, areas affected will have been previously disturbed and it would be expected that adverse effects would be reduced where possible using best practice construction techniques. Overall, given that the location of leaks to be repaired is unknown, an uncertain effect on biodiversity is identified at this stage (SEA Objective 1).</p> <p>Effects of Operation</p> <p>Once a leak has been repaired, the option is not expected to have any effects on biodiversity and this option has been assessed as having a neutral effect on biodiversity.</p> <p>Mitigation</p> <ul style="list-style-type: none"> • None identified. <p>Assumptions</p> <ul style="list-style-type: none"> • None identified.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				Uncertainty <ul style="list-style-type: none"> None identified.
2. To ensure the appropriate and efficient use of land and protect soil quality and geodiversity	<p>Will the option minimise the loss of best and most versatile agricultural land?</p> <p>Will the option protect and enhance soil health?</p> <p>Will the option minimise conflict with existing land use patterns?</p> <p>Will the option minimise land contamination?</p> <p>Will the option utilise previously developed (brownfield) land?</p> <p>Will the option protect and enhance protected sites designated for their geological interest and wider geodiversity?</p>	0	0	Effects of Construction and Operation <p>Works associated with this option would not require any new land take.</p> <p>Further, all excavated land arising from subsequent leakage works would be reinstated following the construction period such that any disruption to land use would be temporary.</p> <p>Overall, the option has been assessed as having a neutral effect on this objective during construction and operation.</p> Mitigation <ul style="list-style-type: none"> None identified. Assumptions <ul style="list-style-type: none"> None identified. Uncertainty <ul style="list-style-type: none"> None identified.
3. To protect and enhance water quality and surface and groundwater resources and the ecological status of water bodies	<p>Will the option minimise the demand for water resources?</p> <p>Will the option protect and improve surface water, groundwater and coastal water quality?</p> <p>Will the option result in changes to river flows?</p> <p>Will the option result in changes to groundwater levels?</p> <p>Will the option prevent the deterioration of Water Framework Directive (WFD) waterbody status (or potential)?</p>	0	+	Effects of Construction <p>Water quantity and quality are unlikely to be affected by the process of logger installation, monitoring and subsequent leakage repair and in consequence there would be no effects (SEA Objective 3).</p> Effects of Operation <p>Operation of this option will result in a reduction in demand for water (5.4 Ml/d) as a result of reduced leakage. This has been assessed as having a positive effect on water quantity and quality (SEA Objective 3).</p> Mitigation <ul style="list-style-type: none"> None identified. Assumptions

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<ul style="list-style-type: none"> None identified. Uncertainty <ul style="list-style-type: none"> None identified.
4. To reduce the risk of flooding	<p>Will the option have the potential to cause or exacerbate flooding in the catchment area?</p> <p>Will the option have the potential to help alleviate flooding in the catchment area?</p> <p>Will the option enhance water infiltration and retention?</p> <p>Will the option be at risk of flooding or be affected by flooding, if it occurred?</p>	0	0	Effects of Construction and Operation <p>The installation of the magnetic noise logger would have no effects on flood risk. The exact location of leakage repairs is not yet known and therefore it cannot be determined whether repair work would be located in areas at risk of flooding. However, it is assumed that works could be scheduled to avoid periods of flooding and construction work is not expected to cause or exacerbate flooding elsewhere.</p> <p>Once pipeline works have been completed, no effects on flood risk would be anticipated.</p> <p>Overall, this option has been assessed as having a neutral effect on Objective 4 during both construction and operation.</p> Mitigation <ul style="list-style-type: none"> None identified. Assumptions <ul style="list-style-type: none"> It is assumed that works could be scheduled to avoid periods of flooding. Uncertainty <ul style="list-style-type: none"> None identified.
5. To limit the causes and effects of climate change and increase resilience to the consequences of climate change	<p>Will the option reduce vulnerability to the effects of climate change by appropriate adaptation?</p> <p>Will the option increase environmental resilience to the effects of climate change?</p> <p>Will the option reduce or minimise greenhouse gas emissions?</p> <p>Will the option deliver new infrastructure that is energy efficient or makes use of renewable energy sources?</p>	0/?	+	Effects of Construction <p>The implementation of this option would result in an increase in greenhouse gas emissions arising from embodied carbon associated with new pipeline and emissions from plant and vehicle movements to find and repair leaking mains. Embodied and construction carbon emissions are estimated at 81 tonnes CO₂e for the loggers, with a further emissions associated with vehicle movements (estimated to be 6,942km in 20/21, falling to 2,160km in remaining 4 years). The embodied carbon associated with repairs and any mains replacement have not been quantified at this stage. Due to the scale of the quantified emissions, overall the effects have been assessed as a neutral, although some uncertainty remains (SEA Objective 5).</p> Effects of Operation

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<p>Ongoing carbon emissions associated with this option would be negligible. Lower levels of leakage may, however, reduce greenhouse gas emissions and energy use associated with reduced treatment and pumping of water. Reductions in greenhouse gas emissions associated with this option would, however, be small (-28 tCO₂e per year).</p> <p>Reduced leakage may improve the resilience of the water supply network to the effects of climate change (drought) by increasing water availability, which given the size of the yield is considered substantial.</p> <p>Overall, this option has been assessed as having a minor positive effect on climate change (SEA Objective 5).</p> <p>Mitigation</p> <ul style="list-style-type: none"> Measures to reduce greenhouse gas emissions during construction should be considered including, for example, the use of low emission plant. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
<p>6. To maintain and enhance the economic and social wellbeing of the local community</p>	<p>Will the option ensure sufficient infrastructure is in place for predicted population increases?</p> <p>Will the option create local employment opportunities?</p> <p>Will the option support the local and regional economy?</p> <p>Will the option ensure that an affordable supply of water is maintained and vulnerable customers protected?</p> <p>Will the option avoid disruption through effects on the transport network?</p>	+	+	<p>Effects of Construction</p> <p>The implementation of this option would be unlikely to generate significant investment or employment opportunities and is classified as a medium level of investment in the definitions of significance (£5.68m). It is likely that a limited number of local employment and supply chain benefits could arise. In consequence, this option has been assessed as having a minor positive effect on SEA Objective 6.</p> <p>Works may take place within and/or utilise road networks which, together with associated vehicle movements, could result in increases in localised congestion and disruption/driver delay throughout the implementation phase. However, any effects in this regard would be temporary and small in scale.</p> <p>Effects of Operation</p> <p>Leakage reduction would lower demand for water abstraction and could help to ensure the continuity/availability of water supplies and support population and economic growth. In this context, this option would generate an estimated water saving of up to 5.4 Ml/d which has been assessed as having a positive effect on wellbeing.</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<p>Mitigation</p> <ul style="list-style-type: none"> Where possible, Portsmouth Water and any contractors should seek to utilise local labour. Where possible, Portsmouth Water and any contractors should seek to appoint local contractors/sub-contractors and utilise locally sourced materials. HGV movements and pipeline works should, where possible, be timed so as to avoid peak traffic periods e.g. between 7am-9am and 4pm-6pm. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> The extent to which the construction of this option would benefit the local economy/local labour market is uncertain.
<p>7. To ensure the protection and enhancement of human health</p>	<p>Will the option ensure the continuity of a safe and secure drinking water supply?</p> <p>Will the option ensure that surface water and bathing water quality are maintained within statutory standards?</p> <p>Will the option adversely affect human health by resulting in increased noise and/or adverse effects on air quality?</p> <p>Will the option affect opportunities for recreation and physical activity?</p>	0	+	<p>Effects of Construction</p> <p>The impacts of noise/vibration disturbance and nuisance resulting from the installation of the noise loggers is not expected to result in any discernible effects on human health due to the scale and brevity of installation.</p> <p>Overall, implementation of this scheme is not expected to affect drinking water supply, surface water and bathing water quality, or recreation. This option has therefore been assessed as having a neutral effect on health (SEA Objective 7).</p> <p>Effects of Operation</p> <p>Once noise loggers are installed and repair of network leakages completed, there would be no further adverse effects on health associated with this option.</p> <p>Leakage reduction would lower demand for water abstraction and could help to ensure the continuity of water supplies. In this context, this option would generate an estimated water saving of up to 5.4 Ml/d which has been assessed as having a positive effect on health.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<ul style="list-style-type: none"> None identified.
8. To promote the wise use of resources	<p>Will the option minimise the demand for raw materials?</p> <p>Will the option lead to reduced leakage from the supply network?</p> <p>Will the option improve efficiency in water consumption?</p> <p>Will the option seek to minimise the demand for raw materials?</p> <p>Will the option reduce or minimise energy use?</p> <p>Will the option promote the re-use and recycling of waste materials and reduce the proportion of waste sent to landfill?</p> <p>Will the option promote the use of sustainable design and materials?</p>	0	++	<p>Effects of Construction</p> <p>The provision of noise loggers would require a minor volume of raw materials and energy to implement. Using the estimated embodied carbon within the data loggers in addition to HGV greenhouse gas emissions as a proxy, material use and energy requirements are considered to be negligible, and the option has therefore been assessed as having a neutral effect on this objective. Furthermore, this option would generate small quantities of wastes associated with leakage repair. Overall, this option has been assessed as having a neutral effect on sustainable resource use (SEA Objective 8).</p> <p>Overall, this option has been assessed as having a neutral effect on resource use</p> <p>Effects of Operation</p> <p>Any additional resource use following implementation of the scheme would be negligible.</p> <p>This option would be expected to reduce the demand for water which in-turn would result in a reduction in energy use associated with the treatment and pumping of water (which using the carbon saving as a proxy (25tCO₂e/a is small).</p> <p>The identification and repair pipelines would assist in minimising water loss. In this context, this option would generate an estimated water saving of up to 5.4 Ml/d which has been assessed as having a significant positive effect on this objective.</p> <p>Overall, this option has been assessed as having a significant positive effect on SEA Objective 8.</p> <p>Mitigation</p> <ul style="list-style-type: none"> Opportunities to utilise reused/recycled materials during construction should be considered where appropriate. Construction and operational wastes should be reused/recycled where possible. Measures to reduce energy usage during construction should be considered including, for example, the use of low energy plant. <p>Assumptions</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<ul style="list-style-type: none"> None identified. Uncertainty <ul style="list-style-type: none"> The exact resource requirements (e.g. volumes of specific materials) associated with the construction/operation of this option are unknown at this stage. The volume of waste generated under operation of this option is uncertain at this stage.
9. To conserve and enhance cultural and historic assets	<p>Will the option conserve or enhance the historic environment, including heritage assets such as historic buildings, conservation areas, features, places and spaces, and their settings?</p> <p>Will the option avoid or minimise damage to archaeologically important sites?</p> <p>Will the option affect public access to, or enjoyment of, features of cultural heritage?</p>	0	0	Effects of Construction and Operation <p>The installation of noise loggers is not expected to have any effects on historic assets. The repair of pipes may involve carrying out works in the curtilage or grounds of heritage assets but this would be temporary and managed through appropriate mitigation. Overall, this option has been assessed as having a neutral effect on cultural and historic assets (SEA Objective 9).</p> Mitigation <ul style="list-style-type: none"> None identified. Assumptions <ul style="list-style-type: none"> It is assumed that construction would adopt practices which seek to reduce potentially adverse impacts to cultural and historic assets if redesign and/or rerouting is not possible in the context of the given setting. Uncertainty <ul style="list-style-type: none"> None identified.
10. To conserve and enhance landscape character and other protected features	<p>Will the option avoid adverse effects on, and enhance where possible, protected/designated landscapes (including woodlands), townscapes or seascapes such as National Parks or AONBs be avoided?</p> <p>Will the option affect public access to existing landscape features?</p> <p>Will the option minimise adverse visual impacts?</p>	0	0	Effects of Construction <p>The installation of noise loggers is not expected to have any effects on historic assets. The repair of pipes should not result in any adverse impacts to the visual or landscape amenity of protected or local settings, e.g. designated national parks, townscapes, seascapes, or AONBs in respect to the confined nature of these sites within the structural footprints of domestic dwellings. Overall, this option has been assessed as having a neutral effect on landscape (SEA Objective 10).</p> Effects of Operation <p>Following the completion of pipeline repairs, excavated land would be reinstated and no further effects on landscape would be anticipated.</p> Mitigation



Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<ul style="list-style-type: none">• None identified. Assumptions <ul style="list-style-type: none">• None identified. Uncertainty <ul style="list-style-type: none">• None identified.

Option D004b: Permanent Noise Loggers (Phase 1)

Option Summary

This option would involve the installation of telemetered noise loggers within the water network which would, following a period of calibration, detect and pinpoint any emerging leakages within the network in order to reduce detection costs, leak run times and safety hazards for personnel. It is assumed that 5,080 telemetered noise loggers will be all installed in 2025/26 with resulting leaks identified and fixed in the period to 2044/45. Assumes that 1,350 repairs will have been carried out by 2024/25 with an average of 1,620 km travelled per year.

Assessment

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
1. To ensure the protection and enhancement of biodiversity, priority habitats and species	<p>Will the option protect and enhance priority species, habitats and sites designated for their nature conservation value?</p> <p>Will the option protect and enhance non-designated sites and local biodiversity?</p> <p>Will the option provide opportunities for new habitat creation or restoration and link existing habitats as part of the development process?</p> <p>Will the option protect and enhance coastal and marine habitats and species?</p> <p>Will the option result in a change in the quality of habitats due to changes in groundwater/river water quality or quantity?</p> <p>Will the option affect riparian vegetation structure?</p>	0/?	0	<p>Effects of Construction</p> <p>The installation of the telemetered noise loggers would have no effects on biodiversity. It is possible that subsequent repair works would be undertaken within or in close proximity to locations important for biodiversity (including designated sites) which may impact on priority habitats and protected species (through short term, temporary disturbance caused by excavation) in these instances. However, areas affected will have been previously disturbed and it would be expected that adverse effects would be reduced where possible using best practice construction techniques. Overall, given that the location of leaks to be repaired is unknown, an uncertain effect on biodiversity is identified at this stage (SEA Objective 1).</p> <p>Effects of Operation</p> <p>Once a leak has been repaired, the option is not expected to have any effects on biodiversity and this option has been assessed as having a neutral effect on biodiversity.</p> <p>Mitigation</p> <ul style="list-style-type: none"> • None identified. <p>Assumptions</p> <ul style="list-style-type: none"> • None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> • None identified.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
2. To ensure the appropriate and efficient use of land and protect soil quality and geodiversity	<p>Will the option minimise the loss of best and most versatile agricultural land?</p> <p>Will the option protect and enhance soil health?</p> <p>Will the option minimise conflict with existing land use patterns?</p> <p>Will the option minimise land contamination?</p> <p>Will the option utilise previously developed (brownfield) land?</p> <p>Will the option protect and enhance protected sites designated for their geological interest and wider geodiversity?</p>	0	0	<p>Effects of Construction and Operation</p> <p>Works associated with this option would not require any new land take.</p> <p>Further, all excavated land arising from subsequent leakage works would be reinstated following the construction period such that any disruption to land use would be temporary.</p> <p>Overall, the option has been assessed as having a neutral effect on this objective during construction and operation.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
3. To protect and enhance water quality and surface and groundwater resources and the ecological status of water bodies	<p>Will the option minimise the demand for water resources?</p> <p>Will the option protect and improve surface water, groundwater and coastal water quality?</p> <p>Will the option result in changes to river flows?</p> <p>Will the option result in changes to groundwater levels?</p> <p>Will the option prevent the deterioration of Water Framework Directive (WFD) waterbody status (or potential)?</p>	0	+	<p>Effects of Construction</p> <p>Water quantity and quality are unlikely to be affected by the process of logger installation, monitoring and subsequent leakage repair and in consequence there would be no effects (SEA Objective 3).</p> <p>Effects of Operation</p> <p>Operation of this option will result in a reduction in demand for water (5.4 Ml/d) as a result of reduced leakage. This has been assessed as having a positive effect on water quantity and quality (SEA Objective 3).</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
4. To reduce the risk of flooding	<p>Will the option have the potential to cause or exacerbate flooding in the catchment area?</p> <p>Will the option have the potential to help alleviate flooding in the catchment area?</p> <p>Will the option enhance water infiltration and retention?</p> <p>Will the option be at risk of flooding or be affected by flooding, if it occurred?</p>	0	0	<p>Effects of Construction and Operation</p> <p>The installation of the magnetic noise logger would have no effects on flood risk. The exact location of leakage repairs is not yet known and therefore it cannot be determined whether repair work would be located in areas at risk of flooding. However, it is assumed that works could be scheduled to avoid periods of flooding and construction work is not expected to cause or exacerbate flooding elsewhere.</p> <p>Once pipeline works have been completed, no effects on flood risk would be anticipated.</p> <p>Overall, this option has been assessed as having a neutral effect on Objective 4 during both construction and operation.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> It is assumed that works could be scheduled to avoid periods of flooding. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
5. To limit the causes and effects of climate change and increase resilience to the consequences of climate change	<p>Will the option reduce vulnerability to the effects of climate change by appropriate adaptation?</p> <p>Will the option increase environmental resilience to the effects of climate change?</p> <p>Will the option reduce or minimise greenhouse gas emissions?</p> <p>Will the option deliver new infrastructure that is energy efficient or makes use of renewable energy sources?</p>	0/?	+	<p>Effects of Construction</p> <p>The implementation of this option would result in an increase in greenhouse gas emissions arising from embodied carbon associated with new pipeline and emissions from plant and vehicle movements to find and repair leaking mains. Embodied and construction carbon emissions are estimated at 98 tonnes CO₂e for the 5,080 loggers, with a further emissions associated with vehicle movements (estimated to be 6,545km in 25/26 falling to 1,620km/a in remaining years). The embodied carbon associated with repairs and any mains replacement have not been quantified at this stage. Due to the scale of the quantified emissions, overall the effects have been assessed as a neutral, although some uncertainty remains (SEA Objective 5).</p> <p>Effects of Operation</p> <p>Ongoing carbon emissions associated with this option would be negligible. Lower levels of leakage may, however, reduce greenhouse gas emissions and energy use associated with reduced treatment and pumping of water. Reductions in greenhouse gas emissions associated with this option would, however, be small (-16 tCO₂e per year).</p>

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<p>Reduced leakage may improve the resilience of the water supply network to the effects of climate change (drought) by increasing water availability, which given the size of the yield is considered substantial.</p> <p>Overall, this option has been assessed as having a minor positive effect on climate change (SEA Objective 5).</p> <p>Mitigation</p> <ul style="list-style-type: none"> Measures to reduce greenhouse gas emissions during construction should be considered including, for example, the use of low emission plant. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
<p>6. To maintain and enhance the economic and social wellbeing of the local community</p>	<p>Will the option ensure sufficient infrastructure is in place for predicted population increases?</p> <p>Will the option create local employment opportunities?</p> <p>Will the option support the local and regional economy?</p> <p>Will the option ensure that an affordable supply of water is maintained and vulnerable customers protected?</p> <p>Will the option avoid disruption through effects on the transport network?</p>	+	+	<p>Effects of Construction</p> <p>The implementation of this option would be unlikely to generate significant investment or employment opportunities and is classified as a medium level of investment in the definitions of significance (£6.98m). It is likely that a limited number of local employment and supply chain benefits could arise. In consequence, this option has been assessed as having a minor positive effect on SEA Objective 6.</p> <p>Works may take place within and/or utilise road networks which, together with associated vehicle movements, could result in increases in localised congestion and disruption/driver delay throughout the implementation phase. However, any effects in this regard would be temporary and small in scale.</p> <p>Effects of Operation</p> <p>Leakage reduction would lower demand for water abstraction and could help to ensure the continuity/availability of water supplies and support population and economic growth. In this context, this option would generate an estimated water saving of up to 5.4 Ml/d which has been assessed as having a positive effect on wellbeing.</p> <p>Mitigation</p> <ul style="list-style-type: none"> Where possible, Portsmouth Water and any contractors should seek to utilise local labour.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<ul style="list-style-type: none"> Where possible, Portsmouth Water and any contractors should seek to appoint local contractors/sub-contractors and utilise locally sourced materials. HGV movements and pipeline works should, where possible, be timed so as to avoid peak traffic periods e.g. between 7am-9am and 4pm-6pm. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> The extent to which the construction of this option would benefit the local economy/local labour market is uncertain.
7. To ensure the protection and enhancement of human health	<p>Will the option ensure the continuity of a safe and secure drinking water supply?</p> <p>Will the option ensure that surface water and bathing water quality are maintained within statutory standards?</p> <p>Will the option adversely affect human health by resulting in increased noise and/or adverse effects on air quality?</p> <p>Will the option affect opportunities for recreation and physical activity?</p>	0	+	<p>Effects of Construction</p> <p>The impacts of noise/vibration disturbance and nuisance resulting from the installation of the noise loggers is not expected to result in any discernible effects on human health due to the scale and brevity of installation.</p> <p>Overall, implementation of this scheme is not expected to affect drinking water supply, surface water and bathing water quality, or recreation. This option has therefore been assessed as having a neutral effect on health (SEA Objective 7).</p> <p>Effects of Operation</p> <p>Once noise loggers are installed and repair of network leakages completed, there would be no further adverse effects on health associated with this option.</p> <p>Leakage reduction would lower demand for water abstraction and could help to ensure the continuity of water supplies. In this context, this option would generate an estimated water saving of up to 5.4 MI/d which has been assessed as having a positive effect on health.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
8. To promote the wise use of resources	<p>Will the option minimise the demand for raw materials?</p> <p>Will the option lead to reduced leakage from the supply network?</p> <p>Will the option improve efficiency in water consumption?</p> <p>Will the option seek to minimise the demand for raw materials?</p> <p>Will the option reduce or minimise energy use?</p> <p>Will the option promote the re-use and recycling of waste materials and reduce the proportion of waste sent to landfill?</p> <p>Will the option promote the use of sustainable design and materials?</p>	0	++	<p>Effects of Construction</p> <p>The provision of noise loggers would require a minor volume of raw materials and energy to implement. Using the estimated embodied carbon within the data loggers in addition to HGV greenhouse gas emissions as a proxy, material use and energy requirements are considered to be negligible, and the option has therefore been assessed as having a neutral effect on this objective. Furthermore, this option would generate small quantities of wastes associated with leakage repair. Overall, this option has been assessed as having a neutral effect on sustainable resource use (SEA Objective 8).</p> <p>Overall, this option has been assessed as having a neutral effect on resource use</p> <p>Effects of Operation</p> <p>Any additional resource use following implementation of the scheme would be negligible.</p> <p>This option would be expected to reduce the demand for water which in-turn would result in a reduction in energy use associated with the treatment and pumping of water (which using the carbon saving as a proxy (16tCO₂e/a is small).</p> <p>The identification and repair pipelines would assist in minimising water loss. In this context, this option would generate an estimated water saving of up to 5.4 Ml/d which has been assessed as having a significant positive effect on this objective.</p> <p>Overall, this option has been assessed as having a significant positive effect on SEA Objective 8.</p> <p>Mitigation</p> <ul style="list-style-type: none"> • Opportunities to utilise reused/recycled materials during construction should be considered where appropriate. • Construction and operational wastes should be reused/recycled where possible. • Measures to reduce energy usage during construction should be considered including, for example, the use of low energy plant. <p>Assumptions</p> <ul style="list-style-type: none"> • None identified. <p>Uncertainty</p> <ul style="list-style-type: none"> • The exact resource requirements (e.g. volumes of specific materials) associated with the construction/operation of this option are unknown at this stage.

Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				<ul style="list-style-type: none"> The volume of waste generated under operation of this option is uncertain at this stage.
9. To conserve and enhance cultural and historic assets	<p>Will the option conserve or enhance the historic environment, including heritage assets such as historic buildings, conservation areas, features, places and spaces, and their settings?</p> <p>Will the option avoid or minimise damage to archaeologically important sites?</p> <p>Will the option affect public access to, or enjoyment of, features of cultural heritage?</p>	0	0	<p>Effects of Construction and Operation</p> <p>The installation of noise loggers is not expected to have any effects on historic assets. The repair of pipes may involve carrying out works in the curtilage or grounds of heritage assets but this would be temporary and managed through appropriate mitigation. Overall, this option has been assessed as having a neutral effect on cultural and historic assets (SEA Objective 9).</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified. <p>Assumptions</p> <ul style="list-style-type: none"> It is assumed that construction would adopt practices which seek to reduce potentially adverse impacts to cultural and historic assets if redesign and/or rerouting is not possible in the context of the given setting. <p>Uncertainty</p> <ul style="list-style-type: none"> None identified.
10. To conserve and enhance landscape character and other protected features	<p>Will the option avoid adverse effects on, and enhance where possible, protected/designated landscapes (including woodlands), townscapes or seascapes such as National Parks or AONBs be avoided?</p> <p>Will the option affect public access to existing landscape features?</p> <p>Will the option minimise adverse visual impacts?</p>	0	0	<p>Effects of Construction</p> <p>The installation of noise loggers is not expected to have any effects on historic assets. The repair of pipes should not result in any adverse impacts to the visual or landscape amenity of protected or local settings, e.g. designated national parks, townscapes, seascapes, or AONBs in respect to the confined nature of these sites within the structural footprints of domestic dwellings. Overall, this option has been assessed as having a neutral effect on landscape (SEA Objective 10).</p> <p>Effects of Operation</p> <p>Following the completion of pipeline repairs, excavated land would be reinstated and no further effects on landscape would be anticipated.</p> <p>Mitigation</p> <ul style="list-style-type: none"> None identified.



Objective	Key Questions	Relationship		Commentary
		Construction	Operation	
				Assumptions <ul style="list-style-type: none">• None identified. Uncertainty <ul style="list-style-type: none">• None identified.

