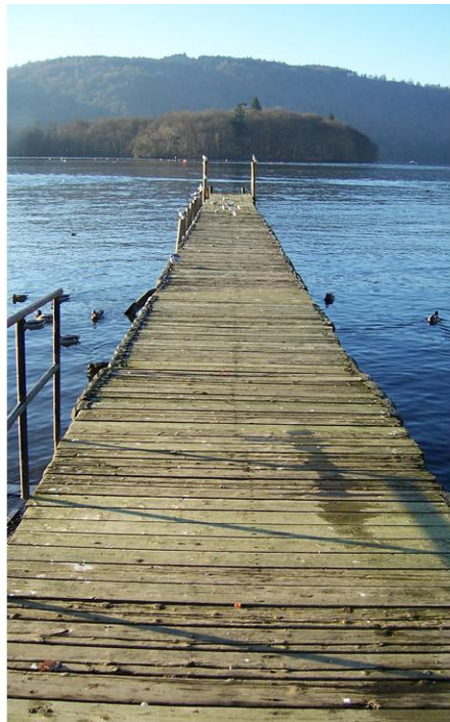


## United Utilities

# Strategic Environmental Assessment of Draft Water Resources Management Plan

## Environmental Report



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## Document Revisions

No.	Details	Date
1	Draft Environmental Report	03.03.13
2	Final Draft Environmental Report	19.03.13
3	Final Environmental Report	21.03.13

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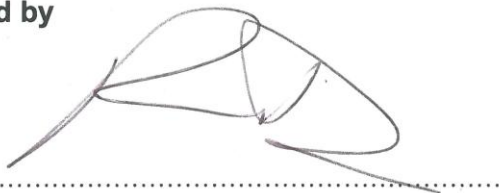
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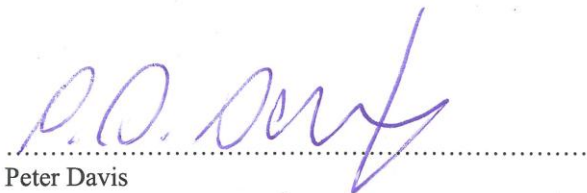
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## United Utilities

# Strategic Environmental Assessment of Draft Water Resources Management Plan

## Environmental Report

AMEC Environment & Infrastructure  
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March 2013



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# Non Technical Summary

This Non-Technical Summary presents the findings of the Strategic Environmental Assessment of the United Utilities draft Water Resources Management Plan contained in the accompanying Environmental Report. The assessment, Environmental Report and Non-Technical Summary have been completed by AMEC E&I UK Ltd on behalf of United Utilities.

## The Strategic Environmental Assessment and Water Resources Management Plan

United Utilities supplies water to some 6.9 million people and 0.2 million non-household customers in Cumbria, Lancashire, Greater Manchester, Merseyside, most of Cheshire and a small part of Derbyshire. More than 90% of the water supplied by United Utilities comes from rivers and reservoirs, with the remainder from groundwater. United Utilities' region is split into four water resource zones (WRZs).

Along with all water companies in England and Wales, there is a statutory requirement for United Utilities to prepare, maintain and publish a Water Resources Management Plan (WRMP). A WRMP 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. WRMPs are reviewed annually and are fully updated every five years. United Utilities is currently preparing its WRMP for adoption in 2014, the first stage of which is to prepare a draft WRMP (dWRMP) for consultation.

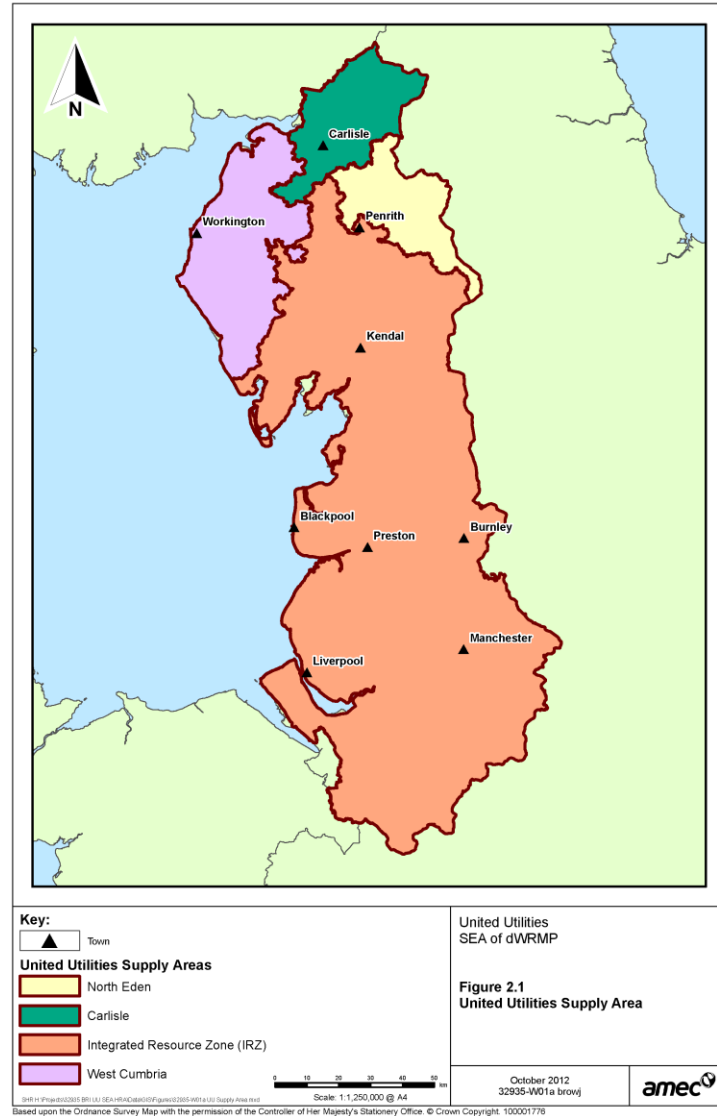
The WRMP process identifies potential shortages in the future availability of water and sets out the possible solutions required to maintain the balance between water supply and future demand. The process initially reviews as many potential solutions as possible (the 'unconstrained list' of options) to identify 'feasible' options for each WRZ where deficits are predicted. These 'feasible' options are reviewed to identify 'preferred options' to resolve any supply deficits in relation to financial, environmental and social costing. This preferred list is based on standard assessment methodologies set out in the WRMP and is informed by the findings of the Strategic Environmental Assessment (SEA) and Habitats Regulations Assessment (HRA).

The SEA (and HRA) of United Utilities' dWRMP, which have been undertaken in accordance with relevant regulations<sup>1</sup>, have assessed the likely economic, social and environmental effects of proposed water management options in the West Cumbria WRZ and have identified ways in which adverse effects can be minimised and positive effects enhanced. The other WRZs that comprise the United Utilities supply area (the Integrated, Carlisle and North Eden WRZs) are expected to have sufficient supplies of water to meet demand over the next 25 years and therefore do not form part of the assessment. The WRZs that comprise the United Utilities supply area including the West Cumbria zone are shown in Figure S.1.

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<sup>1</sup> *The Environmental Assessment of Plans and Programmes Regulations 2004 (SI2004/1633)* and *The Conservation of Habitats and Species Regulations 2010 (SI2010/490)*

**Figure S.1 United Utilities Supply Area**



## Characterisation of United Utilities’ Supply Area

It is important that any plan, including the WRMP, takes into account the environmental, social and economic circumstances in which it is to be implemented. This is to ensure that unintended effects are avoided as well as to identify the potential for contributions towards other complementary public strategic objectives.

Based on an analysis of recent relevant information, the key environmental, social and economic issues (summarised as sustainability issues) in the United Utilities supply area (and, where appropriate, source areas) have been identified and are summarised in Table S.1.

**Table S1 Summary of the Key Sustainability Issues Identified in the Strategic Environmental Assessment**

Topic Area	Key Economic, Social and Environmental Issues
Biodiversity	<p>The need to protect and enhance the protected sites designated for nature conservation.</p> <p>The need to protect and enhance non-designated sites.</p> <p>The need to reverse the fragmentation of biodiversity in the lowlands of the North West region, especially in the south.</p> <p>The need to continue to improve the condition of priority habitats to support increases in wildlife, biodiversity and important protected species.</p> <p>The need to maintain/enhance ecological connectivity.</p> <p>The need to work within environmental limits and capacities.</p>
Geology and Soils	<p>The need to maintain or improve the quality of soils/agricultural land.</p> <p>The need to protect and enhance sites designated for their geological interest.</p> <p>The need to protect peatlands in the North West.</p> <p>The need to make use of previously developed land, and to reduce the prevalence of derelict land in the region.</p> <p>The need to maintain soil function.</p>
Water	<p>The need to maintain and improve water quality.</p> <p>The need to maintain seasonal flows in groundwater and surface water.</p> <p>The need to ensure the continued risk of flooding is mitigated effectively.</p> <p>The need to improve the ecological status of water bodies.</p>
Air Quality	<p>The need to minimise emissions of pollutant gases and particulates and enhance air quality.</p> <p>The need to reduce the need to travel and promote sustainable modes of transport.</p>
Climate Change	<p>The need to reduce greenhouse gas emissions arising from implementation of the WRMP.</p> <p>The need to take into account and where possible adapt to the potential effects of climate change.</p> <p>The need to increase environmental resilience to the effects of climate change.</p>
Human Environment	<p>The need to ensure that water resource requirements of people and visitors can be met at all times, in a sustainable way.</p> <p>The need to ensure that water resources remain affordable.</p> <p>The need to ensure that the WRMP measures do not impact on the health and well-being of all members of the community.</p> <p>The need to ensure that the WRMP measures do not adversely affect the economy.</p> <p>The need to ensure that vulnerable people are not affected by implementation of the WRMP measures.</p> <p>The need to ensure that WRMP measures do not have an adverse economic impact.</p> <p>The need to avoid disruption through effects on the transport network.</p> <p>The need to ensure resilience of water supply/treatment infrastructure against climate change effects.</p>
Material Assets and Resource Use	<p>The need to promote water efficiency measures (including metering).</p> <p>The need to ensure that leakage is managed at a sustainable economic level.</p> <p>The need to maintain the balance between supply and demand for water.</p> <p>The need to reduce energy consumption.</p> <p>The need to ensure the sustainable and efficient use of resources such as construction materials.</p> <p>The need to minimise waste arisings, promote reuse, recovery and recycling and minimise the impact of wastes on the environment and communities.</p>
Cultural Heritage	<p>The need to protect or enhance features, landscapes and sites of archaeological importance and cultural heritage interest.</p>
Landscape	<p>The need to protect the natural beauty of the area, especially within designated sites such as National Parks and AONBs.</p> <p>The need to protect and maintain the landscape distinctiveness of the area.</p>



## The Approach to Assessing the Potential Impacts of the Water Resources Management Plan

An assessment framework has been developed to assess the economic, social and environmental effects of the dWRMP. This framework sets out 12 assessment objectives relating to the key issues identified in Table S.1. 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 United Utilities supply/source areas. Indicative significance thresholds have also been developed for each assessment objective.

The performance of each of the feasible and preferred water resource management options within the dWRMP has been assessed against the 12 assessment objectives to ensure that each option is appraised in a robust and consistent manner. The assessment framework that has been used to assess the dWRMP options is shown in Table S.2.

**Table S.2. Assessment Objectives and Guide Questions**

Topic Area	SEA Objective	Guide Questions
<b>Biodiversity</b>	To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	<i>Will the option protect and enhance where possible the most important sites for nature conservation (e.g. internationally or nationally designated conservation sites such as SACs, SPAs, Ramsar and SSSIs)?</i>
		<i>Will the option protect and enhance non-designated sites and local biodiversity?</i>
		<i>Will the option provide opportunities for new habitat creation or restoration and link existing habitats as part of the development process?</i>
		<i>Will the option lead to a change in the ecological quality of habitats due to changes in groundwater/river water quality and/or quantity?</i>
<b>Geology and Soils</b>	To ensure the appropriate and efficient use of land and protect soil quality	<i>Will additional land be required for the development or implementation of the option or will the option require below ground works leading to land sterilisation?</i>
		<i>Will the option utilise previously developed land?</i>
		<i>Will the option protect and enhance protected sites designated for their geological interest and wider geodiversity?</i>
		<i>Will the option minimise the loss of best and most versatile soil?</i>
		<i>Will the option minimise conflict with existing land use patterns?</i>
		<i>Will the option minimise land contamination?</i>
<b>Water – Quantity and Quality</b>	To protect and enhance the quantity and quality of surface and groundwater resources and the ecological status of water bodies	<i>Will the option minimise the demand for water resources?</i>
		<i>Will the option protect and improve surface, groundwater, estuarine and coastal water quality?</i>
		<i>Will the option result in changes to river flows?</i>
		<i>Will the option result in changes to groundwater levels?</i>
<b>Water – Flood Risk</b>	To reduce the risk of flooding	<i>Will the option affect the ecological status of water bodies?</i>
		<i>Will the option have the potential to cause or exacerbate flooding in the catchment area now or in the future?</i>



Topic Area	SEA Objective	Guide Questions
<b>Air Quality</b>	To minimise emissions of pollutant gases and particulates and enhance air quality	<i>Will the option have the potential to help alleviate flooding in the catchment area now or in the future?</i>
		<i>Will the option be at risk of flooding now or in the future?</i>
		<i>Will the option adversely affect local air quality as a result of emissions of pollutant gases and particulates?</i>
		<i>Will the option exacerbate existing air quality issues (e.g. in Air Quality Management Areas)?</i>
		<i>Will the option maintain or enhance ambient air quality, keeping pollution below Local Air Quality Management thresholds?</i>
<b>Climate Change</b>	To limit the causes and potential consequences of climate change	<i>Will the option reduce the need to travel or encourage sustainable modes of transport?</i>
		<i>Will the option reduce or minimise greenhouse gas emissions?</i>
		<i>Will the option have new infrastructure that is energy efficient or make use of renewable energy sources?</i>
		<i>Will the option contribute positively to adaptation to climate change?</i>
<b>Human Environment - Health</b>	To ensure the protection and enhancement of human health	<i>Will the option increase environmental resilience to the effects of climate change?</i>
		<i>Will the option ensure the continuity of a safe and secure drinking water supply?</i>
		<i>Will the option affect opportunities for recreation and physical activity?</i>
		<i>Will the option maintain surface water and bathing water quality within statutory standards?</i>
<b>Human Environment - Social and Economic Well-Being</b>	To maintain and enhance the economic and social well-being of the local community	<i>Will the option adversely affect human health by resulting in increased nuisance and disruption (e.g. as a result of increased noise levels)?</i>
		<i>Will the option ensure sufficient infrastructure is in place for predicted population increases?</i>
		<i>Will the option ensure sufficient infrastructure is in place to sustain a seasonal influx of tourists?</i>
		<i>Will the option help to meet the employment needs of local people?</i>
		<i>Will the option ensure that an affordable supply of water is maintained and vulnerable customers protected?</i>
		<i>Will the option improve access to local services and facilities (e.g. sport and recreation)?</i>
		<i>Will the option contribute to sustaining and growing the local and regional economy?</i>
		<i>Will the option avoid disruption through effects on the transport network?</i>
		<i>Will the option be resilient to future changes in resources (both financial and human)?</i>
		<b>Material Assets and Resource Use - Water Resources</b>
<i>Will the option improve efficiency in water consumption?</i>		
<b>Material Assets and Resource Use - Resource Use</b>	To promote the efficient use of resources	<i>Will the option seek to minimise the demand for raw materials?</i>
		<i>Will the option reduce the total amount of waste produced and the proportion of waste sent to landfill?</i>

Topic Area	SEA Objective	Guide Questions
<b>Cultural Heritage</b>	To protect and enhance cultural and historic assets	<i>Will the option encourage the use of sustainable design and materials?</i>
		<i>Will the option reduce or minimise energy use?</i>
		<i>Will the option conserve or enhance historic buildings, places, conservation areas and spaces that enhance local distinctiveness, character and the appearance of the public realm?</i>
		<i>Will the option avoid or minimise damage to archaeologically important sites?</i>
<b>Landscape</b>	To protect and enhance landscape character	<i>Will the option affect public access to, or enjoyment of, features of cultural heritage?</i>
		<i>Will the option avoid adverse effects on, and enhance where possible, protected/designated landscapes (including woodlands) such as National Parks or AONBs?</i>
		<i>Will the option protect and enhance landscape character, townscape and seascape?</i>
		<i>Will the option affect public access to existing landscape features?</i>
		<i>Will the option minimise adverse visual impacts?</i>

The proposed approach to assessment was presented in the first output of the SEA of the dWRMP, a Scoping Report. The SEA Scoping Report was issued for consultation to a wide range of interested stakeholders (including the Environment Agency, Natural England, Environment Agency Wales, Countryside Council for Wales, the Welsh Government, Cadw and English Heritage) for a five week period beginning the 05 October 2012. The final 12 assessment objectives and guide questions were amended to take into account this consultation.

The SEA has assessed the effects of the dWRMP in two stages, complementary to the development of the plan itself. The first stage has been a high level assessment of all feasible options (including both supply and demand side options) against the 12 SEA assessment objectives with the findings presented in a summary matrix. A more detailed assessment has then been undertaken of the three candidate preferred options that could form United Utilities' final proposed planning solution for the West Cumbria WRZ. The potential effects (positive, negative or neutral) and the significance of the effects of each of these 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.

Both the feasible option and preferred option assessments have been informed by ongoing engagement with the statutory SEA consultation bodies. This engagement has included meetings with the Environment Agency and Natural England that were held on 31 January and 01 March 2013 and which provided an opportunity to present and discuss the emerging findings of the assessments.

## Habitats Regulations Assessment

The *Conservation of Habitats and Species Regulations 2010* (as amended) (the 'Habitats Regulations') require that competent authorities assess the potential impacts of plans and programmes on the Natura 2000 network of

European protected sites<sup>2</sup> 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)<sup>3</sup>. WRMPs are not explicitly included within this legislation, although Natural England and the Countryside Council for Wales have 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, AMEC has undertaken a HRA of the dWRMP. 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*. A copy of the HRA report, which contains further detail in relation to the findings of the assessment, is available via United Utilities’ website.

## The Potential Effects of the Feasible Options

Each feasible option was assessed against the SEA objectives (and for supply side options, through the HRA) to identify its potential effects during both construction/implementation and operation. The feasible options were assessed based on the nature of the effect, its timing and geographic scale, the sensitivity of the human or environmental receptor that could be affected, and how long any effect might last. Where quantified information was available for the feasible option from United Utilities<sup>4</sup>, the assessment was also informed by reference to threshold values set out in the definitions of significance. The results were assessed based on the following scale:

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<sup>2</sup> 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.

<sup>3</sup> ‘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 the specific stage of HRA.

<sup>4</sup> Where quantitative information has been used to inform the assessment, this has been based on information provided to AMEC by United Utilities and is assumed to be the most up-to-date information available at the time of writing this report.

Key to the Symbols to be used in the Relationship Column:	
++	Significant positive effect of the Water Resources Management Plan option on this objective
+	Positive effect of the Water Resources Management Plan option on this objective
0	Overall neutral or insignificant effect of the Water Resources Management Plan option on this objective
-	Negative effect of the Water Resources Management Plan option on this objective
--	Significant negative effect of the Water Resources Management Plan option on this objective
?	Uncertain effect of the Water Resources Management Plan option on this objective
++/-	Combination of positive and negative effects of the Water Resources Management Plan option on this objective

Feasible options included supply side measures (e.g. increasing capacity at an existing groundwater source), demand management (e.g. water metering or household visits to install water efficiency measures) and leakage reduction and network metering measures (e.g. repairing pipes).

### Supply Side Options

A table summarising the assessments of the 16 supply side feasible options for the West Cumbria WRZ is presented in Table S3.

**Table S3 Summary of the Supply Side Feasible Options Assessment**

Ref	Option Name	Design Capacity (MI/d)	Construction (C) or Operation (O)	Biodiversity	Land Use/Soils	Water Quantity and Quality	Flooding	Air Quality	Climate Change	Human Health	Economic and Social Well-being	Water Resource Use	Use of Resources	Heritage	Landscape
WC01	Thirlmere Transfer into West Cumbria	80	C	--	-	0	-	-	--	-	++/-	0	--	-	--
			O	++	0	++	-	0	--	++	++	0	--	0	-
WC02	River Derwent Abstraction	4	C	--	+	0	-	-	--	-	++	0	--	-	-
			O	--	0	-	-	0	-	0	+	0	-	0	-
WC04	Wastewater (negotiate part abstraction licence)	10	C	--	+	0	-	-	--	0	++	0	-	0	-
			O	?	0	-	-	0	0	+	+	0	0	0	0
WC05	Development of New boreholes in West Cumbria Aquifer	6	C	--	-	0	-	-	--	-	++	0	--	-	-
			O	?	0	-	0	0	--	+	+	0	--	-	-
WC05a	Development of New boreholes in West Cumbria Aquifer (10 MI/d)	10	C	--	-	0	-	-	--	-	++	0	--	-	-
			O	?	0	-	0	0	--	+	+	0	--	-	-
WC06a	Roughton Gill Mine Adit (Option 1)	1.4	C	--	-	0	-	-	--	-	++/-	0	--	-	--
			O	0	0	-	0	0	-	0	+	0	-	0	-

Ref	Option Name	Design Capacity (Ml/d)	Construction (C) or Operation (O)	Biodiversity	Land Use/Soils	Water Quantity and Quality	Flooding	Air Quality	Climate Change	Human Health	Economic and Social Well-being	Water Resource Use	Use of Resources	Heritage	Landscape
WC06b	Roughton Gill Mine Adit (Option 2)	1.4	C	--	0	0	-	-	--	-	++/-	0	--	-	--
			O	0	0	-	0	0	-	0	+	0	-	0	0
WC07	Kirklington Borehole Development	5	C	--	-	0	-	-	--	-	++/-	0	--	--	-
			O	--	0	-	0	0	--	+	+	0	--	0	-
WC09	Development of Boreholes in North Cumbria Aquifer	4.5	C	--	-	0	-	-	--	-	++/-	0	--	-	-
			O	?	0	-	0	0	--	0	+	0	--	0	-
WC10	Desalination, Workington	20	C	--	0	0	-	-	--	-	++/-	0	--	-	--
			O	--	0	-	-	0	--	++	++	0	--	0	-
WC14d	Kielder Water Transfer to West Cumbria (Cumwhinton Treated)	80	C	--	-	0	-	-	--	-	++	0	--	-	-
			O	++	0	++	0	0	-	++	++	0	--	0	-
WC19	Crummock Automated Compensation Control	2.7	C	--	+	0	-	-	-	-	++	0	-	-	-
			O	?	0	0	0	0	0	-	0	+	0	-	0

Ref	Option Name	Design Capacity (Ml/d)	Construction (C) or Operation (O)	Biodiversity	Land Use/Soils	Water Quantity and Quality	Flooding	Air Quality	Climate Change	Human Health	Economic and Social Well-being	Water Resource Use	Use of Resources	Heritage	Landscape
WC23a	Supply of Final Effluent to Non-household Customers	0.5	C	?	0	0	?	-	-	-	0	0	-	0	0
			O	?	0	+	?	0	0	0	+	+	0	0	0
WC23b	Supply of Final Effluent to Non-household Customers	1	C	?	0	0	?	-	-	-	0	0	-	0	0
			O	?	0	+	?	0	0	0	+	+	0	0	0
WC23c	Supply of Final Effluent to Non-household Customers	2	C	?	0	0	?	-	-	-	0	0	-	0	0
			O	?	0	+	?	0	0	0	+	+	0	0	0
WC72	Raw Water Losses	0.08	C	?	0	0	0	0	0	0	++	0	-	0	0
			O	0	0	+	0	0	0	0	0	+	0	0	0



### *Construction Effects*

Significant effects were identified against biodiversity, climate change, economic and social well-being, use of resources and landscape. Significant positive effects were identified for economic and social well-being with the remaining effects assessed as being negative. The majority of the significant effects would occur during the construction phase of the supply side options.

The construction of the majority of options would represent a large capital investment which is likely to generate a number of employment opportunities and supply chain benefits as well as increased spend in the local economy by contractors and construction workers. This was assessed as having a significant positive effect on economic and social well-being across the majority of options, although HGV movements and large scale pipeline works associated with seven feasible options (WC01, WC06a, WC06b, WC07, WC09, WC10 and WC14d) were considered to have the potential to cause traffic disruption, generating a minor negative effect on economic and social well-being. For the remaining options, investments would be less and therefore positive effects on this objective were assessed as minor.

No further significant positive effects were identified during the assessment. Three options were assessed as having a minor positive effect on land use/soils (Options WC02, WC04 and WC19) as new infrastructure associated with these schemes would be located at existing sites and therefore there would be no long term loss of greenfield land.

The majority of the supply side feasible options were assessed as having a significant negative effect on biodiversity during the construction phase. This principally reflects the environmental sensitivity of the West Cumbria WRZ and potential for pipeline works in particular to affect several European designated sites including (but not limited to) the River Ehen SAC and River Derwent and Bassenthwaite Lake SAC. However, it should be noted that in most cases the HRA has identified that potential effects on these sites could be avoided or mitigated by using existing road crossings and through scheme specific mitigation.

Reflecting the scale of construction activity associated with the feasible supply side options, most were assessed as having a significant negative effect on climate change as a result of associated greenhouse gas emissions from HGV movements, construction plant and embodied carbon in raw materials. Material use and energy requirements would also be substantial and therefore these options were also assessed as having a significant negative effect on resource use.

Those options involving more substantial development (e.g. new water treatment works) within the Lake District National Park were assessed as having a significant negative effect on landscape during the construction phase. The remaining options were generally assessed as having minor negative effects on this objective due to the potential for localised landscape/visual impacts associated with construction activity. One feasible option was assessed as having a significant negative effect on cultural heritage (Option WC07) due to potential impacts associated with pipeline works on designated heritage sites including Hadrian's Wall World Heritage Site and

Scheduled Monument. Due to potential impacts on the settings of cultural heritage assets such as listed buildings, 10 supply side options were assessed as having a minor negative effect on this objective during construction.

No further significant negative effects were identified during the assessment. Emissions to air from HGV movements and construction plant were considered likely to have a minor negative effect on air quality and, together with noise/vibration, human health in most cases. Further minor negative effects were identified in respect of land use/soils (due to the loss of greenfield land associated with around half of the supply side options) and flooding (given the location of some development sites and pipeline works within Flood Zones 2 and 3).

### *Operational Effects*

Significant effects were identified against biodiversity, water quantity/quality, climate change, human health, economic and social well-being, use of resources and landscape. Significant positive effects were identified for biodiversity, water quantity/quality, human health and economic and social well-being with the remaining effects assessed as being negative.

Options WC01 (Thirlmere Transfer into West Cumbria) and WC14d (Kielder Water Transfer to West Cumbria (Cumwhinton Treated)) were assessed as having a significant positive effect on the biodiversity objective during operation due to potential benefits in respect of the River Ehen SAC and River Derwent and Bassenthwaite Lake SAC related to the abandonment of Ennerdale, Corn How and Quarry Hill water treatment works and associated abstraction reductions. The decommissioning of these water treatment works may also generate significant positive effects on water quantity and quality due to increases in flows in the catchments in which associated abstractions are located (Dash Beck, Bassenthwaite/Derwent, Ellen, Ehen and Cocker).

These larger scale options, together with Option WC10 (Desalination, Workington), were also assessed as having a significant positive on health (in helping to ensure the continuity of a safe and secure drinking water supply) and economic and social well-being (given the potential for additional supply to support economic/population growth), reflecting their substantial design capacities. Design capacities associated with the remaining options are lower and positive effects on these objectives related to their operation have therefore been assessed a minor or neutral.

No further significant positive operational effects were identified. Options WC23a-23c and Option WC72 were assessed as having a minor positive effect in respect of water quantity/quality and resource use due to the potential for these options (through effluent reuse and reductions in raw water losses) to deliver increased capacity without the need for additional abstraction.

A total of three feasible supply side options were assessed as having significant negative operational effects on biodiversity (Options WC02, WC07 and WC10) due to potential impacts on designated European sites. Several options were also considered likely to have significant negative effects on climate change and resource use SEA objectives during operation, reflecting the additional energy requirements (and related greenhouse gas emissions) associated with the treatment and pumping of water.

No further significant negative effects associated with the operation of the feasible options were identified during the assessment. Minor negative effects were identified for a number of options in respect of water quantity, due to associated reductions in surface and groundwater levels, and flood risk, due to the location of new infrastructure in Flood Zones 2/3. There may also be minor negative effects on cultural heritage and landscape which principally reflects the potential for adverse landscape/visual impacts associated with new above ground infrastructure.

### Demand Management Options

There are a total of 15 water efficiency and six metering options for the West Cumbria WRZ. Table S4 provides a summary of the assessments of these options.

**Table S4 Summary of the Demand Management Feasible Options Assessment**

Ref	Option Name	Design Capacity (Ml/d)	Construction (C) or Operation (O)	Biodiversity	Land Use/Soils	Water Quantity and Quality	Flooding	Air Quality	Climate Change	Human Health	Economic and Social Well-being	Water Resource Use	Use of Resources	Heritage	Landscape
WC WE01	Domestic Rainwater Harvesting	0.01	C	0	0	0	0	0	0	0	0	0	0	0	0
			O	0	0	+	0	0	0	0	0	+	0	0	0
WC WE02	Domestic Partnership Retrofit Install	0.026	C	0	0	0	0	0	0	0	0	0	-	0	0
			O	0	0	+	0	0	0	0	0	+	0	0	0
WC WE03	Domestic Visit and Fix	0.026	C	0	0	0	0	0	0	0	0	0	-	0	0
			O	0	0	+	0	0	0	0	0	+	0	0	0
WC WE04	Combi Boiler Saving Device - installation through Housing Associations	0.039	C	0	0	0	0	0	0	0	0	0	-	0	0
			O	0	0	+	0	0	0	0	0	+	+	0	0

Ref	Option Name	Design Capacity (MI/d)	Construction (C) or Operation (O)	Biodiversity	Land Use/Soils	Water Quantity and Quality	Flooding	Air Quality	Climate Change	Human Health	Economic and Social Well-being	Water Resource Use	Use of Resources	Heritage	Landscape
WC WE05	Combi Boiler Saving Device - installation by United Utilities	0.049	C	0	0	0	0	0	0	0	0	0	-	0	0
			O	0	0	+	0	0	+	0	0	+	+	0	0
WC WE06	Retrofit Dual Flush Toilets	0.004	C	0	0	0	0	0	0	0	0	0	-	0	0
			O	0	0	+	0	0	0	0	0	+	0	0	0
WC WE07	Leaky Loos	0.036	C	0	0	0	0	0	0	0	0	0	-	0	0
			O	0	0	+	0	0	0	0	0	+	0	0	0
WC WE08	Subsidised Water Efficiency Products Sold via Website - vouchers	0.001	C	0	0	0	0	0	0	0	0	0	0	0	0
			O	0	0	+	0	0	0	0	0	+	0	0	0

Ref	Option Name	Design Capacity (MI/d)	Construction (C) or Operation (O)	Biodiversity	Land Use/Soils	Water Quantity and Quality	Flooding	Air Quality	Climate Change	Human Health	Economic and Social Well-being	Water Resource Use	Use of Resources	Heritage	Landscape
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WC WE09	Showerhead Giveaways	0.214	C	0	0	0	0	0	0	0	0	0	-	0	0
			O	0	0	+	0	0	+	0	0	+	+	0	0
WC WE10	Tourist Sites - promotion and retrofit	0.049	C	0	0	0	0	0	0	0	0	0	0	0	0
			O	0	0	+	0	0	0	0	0	+	0	0	0
WC WE11	Waterless Car Washing Giveaways	0.026	C	0	0	0	0	0	0	0	0	0	0	0	0
			O	0	0	+	0	0	0	0	0	+	0	0	0
WC WE12	Free Water Butt Distribution	0.001	C	0	0	0	0	0	0	0	0	0	-	0	0
			O	0	0	+	0	0	0	0	0	+	0	0	0
WC	Free Showerhead	0.007	C	0	0	0	0	0	0	0	0	0	-	0	0

Ref	Option Name	Design Capacity (MI/d)	Construction (C) or Operation (O)	Biodiversity	Land Use/Soils	Water Quantity and Quality	Flooding	Air Quality	Climate Change	Human Health	Economic and Social Well-being	Water Resource Use	Use of Resources	Heritage	Landscape
WE13	Distribution		O	0	0	+	0	0	0	0	0	+	0	0	0
WC WE14	Subsidised Water Efficiency Products Sold via Website - shower heads	0.007	C	0	0	0	0	0	0	0	0	0	-	0	0
			O	0	0	+	0	0	0	0	0	+	0	0	0
WC WE15	Enhanced Water Savers Pack Distribution	0.058	C	0	0	0	0	0	0	0	0	0	-	0	0
			O	0	0	+	0	0	0	0	0	+	0	0	0
WC Met-001	Metering on Customer Contact	0.026	C	0	0	0	0	0	-	0	0	0	-	0	0
			O	0	0	+	0	0	0	0	0	+	0	0	0
WC Met-002a	Enhanced Promotion 5 Year	0.38	C	0	0	0	0	0	-	0	0	0	-	0	0
			O	0	0	+	0	0	+	0	0	+	+	0	0



Ref	Option Name	Design Capacity (MI/d)	Construction (C) or Operation (O)	Biodiversity	Land Use/Soils	Water Quantity and Quality	Flooding	Air Quality	Climate Change	Human Health	Economic and Social Well-being	Water Resource Use	Use of Resources	Heritage	Landscape
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WC Met-002b	Enhanced Promotion 10 Year	0.14	C	0	0	0	0	0	-	0	0	0	-	0	0
			O	0	0	+	0	0	0	0	0	+	0	0	0
WC Met-003	Enhanced Home Water Efficiency Visits	0.08	C	0	0	0	0	0	-	0	0	0	-	0	0
			O	0	0	+	0	0	0	0	0	+	0	0	0
WC Met-004	Blanket Promotion	0.32	C	0	0	0	0	0	-	0	0	0	-	0	0
			O	0	0	+	0	0	+	0	0	+	+	0	0
WC Met-005	Metering on Change of Occupier	0.75	C	0	0	0	0	0	--	0	0	0	--	0	0
			O	0	0	+	0	0	+	0	0	+	+	0	0

### *Construction Effects*

With the exception of one option (WC Met 005) of the 21 assessed, no significant effects have been identified for the construction phase of the demand management feasible options.

In general, the environmental effects of each of the feasible demand management options were considered to be very similar. Implementation of water efficiency devices and activities and metering options would all take place within domestic or commercial properties and none would have effects on biodiversity, soils/land use, water quantity/quality, flooding, air quality, human health, water resource use, heritage or landscape. For devices and activities that require home visits, there is a possibility of creating jobs although economic benefits are unlikely to be substantial and it is more likely that the additional work would be accommodated in existing employees' or contractors'/partners' workloads.

All of the efficiency and metering options would require different amounts of raw materials, energy and carbon depending on the need for manufacturing and means of distribution. Those elements which are customer-fit can be sent out by post and be distributed along with the other mail, reducing the need for a specific trip to deliver a particular item but those which need United Utilities' engineers to fit or audit will require an individual journey with higher carbon emissions. In this context, the majority of metering and efficiency options were assessed as having a minor negative effect on the use of resources objective although only the metering options were considered likely to generate negative effects in relation to climate change (principally due to associated vehicle movements). One option (WC Met 005: Metering on Change of Occupier) was assessed as having a significant negative effect on resource use and climate change which reflects the relatively large number of meters that would be installed under this option and associated vehicle movements.

### *Operational Effects*

Once installed, the feasible demand management options are unlikely to have any adverse environmental effects. Demand reductions associated with these options was assessed as having a minor positive effect in respect of water quantity/quality and water resource use. Demand reductions may in-turn reduce greenhouse gas emissions and energy use associated with reduced treatment and pumping of water. However, net savings associated with the majority of options would be negligible. Ongoing maintenance/meter reading activities may help to sustain current employment levels and generate a limited number of jobs, although in general economic benefits are not expected to be substantial.

### *Leakage and Network Metering Options*

Table S5 summarises the assessments of the 10 feasible leakage and network metering options for the West Cumbria WRZ.

**Table S5 Summary of the Leakage and Network Metering Feasible Options Assessment**

Ref	Option Name	Design Capacity (Ml/d)	Construction (C) or Operation (O)	Biodiversity	Land Use/Soils	Water Quantity and Quality	Flooding	Air Quality	Climate Change	Human Health	Economic and Social Well-being	Water Resource Use	Use of Resources	Heritage	Landscape
WC-LEA01	Leakage Detection Stage 1	1.70	C	?	0	0	0	0	-	0	0	0	-	0	0
			O	0	0	+	0	0	+	0	+	+	+	0	0
WC-LEA02	Leakage Detection Stage 2	2.70	C	?	0	0	0	0	-	0	+	0	-	0	0
			O	0	0	+	0	0	+	0	+	+	+	0	0
WC-LEA03	Infrastructure Replacement Stage 1	0.11	C	?	0	0	0	0	-	0	0	0	-	0	0
			O	0	0	+	0	0	0	0	0	+	0	0	0
WC-LEA04	Pressure Management Stage 1	0.44	C	?	0	0	0	0	-	0	0	0	-	0	0
			O	0	0	+	0	0	0	+	0	+	0	0	0

Ref	Option Name	Design Capacity (MI/d)	Construction (C) or Operation (O)	Biodiversity	Land Use/Soils	Water Quantity and Quality	Flooding	Air Quality	Climate Change	Human Health	Economic and Social Well-being	Water Resource Use	Use of Resources	Heritage	Landscape
WC-LEA05	Increased Verification of Existing Meters	0.06	C	0	0	0	0	0	0	0	0	0	-	0	0
			O	0	0	+	0	0	0	0	0	+	0	0	0
WC-LEA06	Increased Number of Continuously Logged Meters	0.01	C	0	0	0	0	0	0	0	0	0	-	0	0
			O	0	0	+	0	0	0	0	0	+	0	0	0
WC-LEA08	Widespread Metering Using AMR	0.94	C	0	0	0	0	0	-	0	++	0	-	0	0
			O	0	0	+	0	0	0	0	0	+	0	0	0
WC-LEA09	Splitting DMAs	0.02	C	?	0	0	0	0	0	0	0	0	-	0	0
			O	0	0	+	0	0	0	0	0	+	0	0	0
WC-LEA10	Splitting Large Upstream Tiles	0.13	C	?	0	0	0	0	0	0	0	0	-	0	0
			O	0	0	+	0	0	0	0	0	+	0	0	0

Ref	Option Name	Design Capacity (MI/d)	Construction (C) or Operation (O)	Biodiversity	Land Use/Soils	Water Quantity and Quality	Flooding	Air Quality	Climate Change	Human Health	Economic and Social Well-being	Water Resource Use	Use of Resources	Heritage	Landscape
WC-LEA11	Establishing Water Balance Areas	0.00	C	0	0	0	0	0	0	0	0	0	0	0	0
			O	0	0	0	0	0	0	0	0	0	0	0	0

### *Construction Effects*

No significant effects were identified during the construction phase of eight of 10 leakage feasible options assessed. For the remaining two feasible options, significant effects were assessed against climate change, use of resources and economic and social well-being.

In general the construction-related effects of each of the leakage and network metering options were considered to be very similar with few environmental effects anticipated (reflecting the scale of works under these options and the likelihood that any potential adverse effects would be managed). There would be additional resource use and carbon emissions as a result of replacing pipes or in the manufacture and installation of meters. However, only one option (WC-LEA03) was assessed as having a significant negative effect on climate change and resource use, reflecting the scale of works anticipated under this option (i.e. mains replacement as opposed to repair or metering).

No further significant negative or minor negative construction-related effects were identified during the assessment. Construction activity associated with repairing leaks or replacing sections of pipeline may impact on biodiversity, priority habitats or protected species if existing pipelines pass through ecologically sensitive areas. If this is the case, these areas would be previously disturbed but may be subject to extensive excavation and disruption depending on the location. However, as the location of pipeline to be repaired is currently unknown, effects on biodiversity were assessed as uncertain.

Employment opportunities and supply chain benefits may be generated by the implementation of leakage options. For most options, these benefits are unlikely to be substantial although the scale of investment associated with Option WC-LEA08 is considered to be potentially significant. No further significant or minor positive construction-related effects were identified during the assessment.

### *Operational Effects*

For all leakage and network metering options, there would be no effects on biodiversity, soils/land use, air quality, flood risk, cultural heritage or landscape once works have been completed and no significant positive or significant negative effects have been identified. However, in most cases the operation of these options would result in less water being lost due to leakage and therefore lower demand for water abstraction which would benefit the water environment. Demand reductions may, in-turn, reduce greenhouse gas emissions and energy use associated with reduced treatment and pumping of water, although only Options WC-LEA01 and WC-LEA02 were expected to have a minor positive effect on climate change and resource use objectives. These same options were also assessed as having a minor positive effect on economic and social well-being as their design capacities may help to support economic/population growth.

## The Potential Effects of the Preferred Option and Alternatives

A total of three options to help address the deficit in the West Cumbria WRZ (one of which comprise a combination of the feasible options presented above) were taken forward for more detailed consideration as candidate preferred options. These options were:

- WC01: Thirlmere Transfer into West Cumbria.
- WC14d: Kielder Water Transfer to West Cumbria (Cumwhinton Treated).
- Lower Cost Option, comprising the implementation of **all** of the following options: Wastewater (negotiate part abstraction licence) (WC04); Development of New Boreholes in West Cumbria Aquifer (10Ml/d) (WC05a); Development of Boreholes in North Cumbria Aquifer (WC09); and Crummock Automated Compensation Control (WC19). Due to the relatively low design capacities of each component option, it is not possible to consider these options as preferred options individually as the amount of additional water supplied is insufficient to address the deficit in the WRZ.

Using a standard industry method that includes consideration of technical feasibility, financial costs and benefits, and quantified impacts on the environment and community, together with the emerging findings of the SEA and HRA, United Utilities identified Option WC01: Thirlmere Transfer into West Cumbria as the preferred option for the dWRMP.

Both the preferred option and the alternatives listed above were subject to more detailed assessment through the SEA. The findings of the detailed assessments are presented in Table S6 and are discussed in more detail in the following sections.



Table S6 Summary of the Preferred Option and Alternatives Assessment

Ref	Option Name	Design Capacity (Ml/d)	Construction (C) or Operation (O)	Biodiversity	Land Use/Soils	Water Quantity and Quality	Flooding	Air Quality	Climate Change	Human Health	Economic and Social Well-being	Water Resource Use	Use of Resources	Heritage	Landscape
WC01	Thirlmere Transfer into West Cumbria	80	C	-	-	0	-	-	∴	-	++/-	0	∴	-	∴
			O	++	0	++	-	0	∴	++	++	0	∴	0	-
WC14d	Kielder Water Transfer to West Cumbria (Cumwhinton Treated)	80	C	-	-	0	-	-	∴	-	++/-	0	∴	-	-
			O	++	0	++	0	0	∴	++	++	0	∴	0	-
WC04, WC05a, WC09, WC19	Lower Cost Option	27.2	C	-	-	0	-	-	∴	-	++/-	0	∴	-	-
			O	?	0	-	-	0	∴	++	++	0	∴	0	-

## Preferred Option: Thirlmere Transfer into West Cumbria

The preferred dWRMP option involves increasing abstraction from Thirlmere reservoir within current licence conditions by enhancing infrastructure capacity. This option represents a large scale scheme comprising several infrastructure components including one new service reservoir and upgrades to existing service reservoirs, a water treatment works, pumping stations and over 100km of new pipeline together with the decommissioning of three existing water treatment works (Ennerdale, Corn How and Quarry Hill).

### *Construction Effects*

Reflecting the scale of construction activity associated with this option, significant negative effects were identified in respect of climate change (as a result of associated greenhouse gas emissions from HGV movements, construction plant and embodied carbon in raw materials) and resource use. The majority of development sites and approximately half of the new pipeline would be within the Lake District National Park and therefore there was considered to be potential for significant adverse landscape effects associated with construction activity.

The construction of this option would represent a large capital investment which is likely to generate a number of employment opportunities and supply chain benefits as well as increased spend in the local economy by contractors and construction workers. However, HGV movements and pipeline works of the proposed scale may cause traffic disruption. The option was therefore assessed as having a mixed significant positive and minor negative effect on economic and social well-being.

The assessment did not identify any further significant negative or significant positive effects. The HRA identifies that there is potential for significant construction effects on the River Derwent and Bassenthwaite Lake SAC, Clints Quarry SAC, Lake District High Fells SAC and River Ehen SAC, primarily due to pipeline works. However, taking into account scheme specific mitigation, and a commitment for pipeline works to be within existing roads (or suitable alternatives identified in discussion with Natural England and the Environment Agency), no significant construction-related effects would be anticipated. Notwithstanding, this option would result in the loss of greenfield land at several development sites and in consequence there is potential for localised loss of habitat and, in conjunction with decommissioning works, disturbance which has been assessed as having a minor negative effect on biodiversity. The option may also generate minor negative effects in respect of land use/soils (due to additional lank take required under this option), flood risk (as some sites and sections of pipeline are situated within Flood Zones 2/3) and cultural heritage (due to potential effects on the settings of listed buildings and scheduled monuments). Emissions to air from HGV movements and construction plant may also have a minor negative effect on air quality and, together with noise/vibration, human health.

### *Operational Effects*

Similar to the construction phase, the option is likely to have significant negative effects on climate change and resource use SEA objectives. This principally reflects net additional energy requirements (and related greenhouse gas emissions) associated with the treatment and pumping of water.

The scheme is designed to relieve pressure on the River Ehen SAC. Abstraction from Ennerdale Water, which discharges into the Ehen, has been identified for amendments under the Review of Consents programme due to the impact of abstraction on interest features in the SAC (primarily fresh water pearl mussels). The decommissioning of Ennerdale water treatment works and associated abstraction from Ennerdale Water under this option may therefore generate benefits in respect of these features due to increased flows. Additionally, the decommissioning of Quarry Hill water treatment works would result in a reduction in abstraction from Dash Beck and Hause Gill, sources that have been investigated under the Review of Consents programme due to impacts on salmon which are interest features of the River Derwent and Tributaries Site of Special Scientific Interest (SSSI) and River Derwent and Bassenthwaite Lake SAC. Taking into account the potential operational benefits in respect of the River Ehen SAC and River Derwent and Bassenthwaite Lake SAC in particular, this option was assessed as having a significant positive effect on biodiversity. The decommissioning of the three water treatment works has also been assessed as having a significant positive effect on water quantity and quality due to increases in flows in the catchments in which associated abstractions are located (Dash Beck, Bassenthwaite/Derwent, Ellen, Ehen and Cocker).

The option has a design capacity of 80 Ml/d, serving to address deficit within the West Cumbria WRZ. Further, the decommissioning of existing sources may benefit downstream abstractors (where hands off flow constraints are in place) or present opportunities for new abstractions (subject to licensing). This has been assessed as having a significant positive effect on health (in helping to ensure the continuity of a safe and secure drinking water supply) and economic and social well-being (given the potential for additional supply to support economic/population growth).

No further significant negative or significant positive operational effects were identified during the assessment although the option is expected to have minor negative effects on flood risk (owing to the location of assets within Flood Zones 2/3) and landscape (principally reflecting the requirement for new above ground infrastructure within the Lake District National Park).

## Alternatives

The alternatives included the transfer of water from Kielder Water in the Northumbrian Water supply region to the West Cumbria WRZ (Option WC14d) and the Lower Cost Option that would involve the collective implementation of individual smaller scale schemes assessed at the feasible options stage.

## Construction Effects

Construction related effects across the alternatives were considered to be broadly similar to those identified in respect of the preferred option with significant negative effects assessed against climate change and resource use and significant positive effects identified in respect of economic and social well-being. As with the preferred option, it was assumed that pipeline works would be within existing roads (or suitable alternatives identified in discussion with Natural England and the Environment Agency) such that no significant construction-related effects on designated European sites would be anticipated.

### Operational Effects

Similar to the preferred option, significant negative operational effects were identified in respect of climate change and resource use objectives for both alternative options, due to additional energy requirements (and related greenhouse gas emissions) associated with the treatment and pumping of water. Both options were also assessed as having a significant positive effect on health and economic and social well-being, reflecting the substantial additional capacity each would deliver. However, there was a marked difference in effects against the biodiversity and water quantity/quality SEA objectives. Like the preferred option, Kielder Water Transfer to West Cumbria (Cumwhinton Treated) (Option WC14d) would involve the decommissioning of Ennerdale, Corn How and Quarry Hill water treatment works. As with Option WC01, this was assessed as having a significant positive effect on biodiversity and water quantity/quality objectives. The operational effects of the Lower Cost Option on biodiversity meanwhile were considered to be more uncertain. Effects on biodiversity have been assessed as uncertain at this stage. Whilst the majority of the scheme components are unlikely to have any significant adverse effects on European designated sites, the findings of the HRA in respect of the operation of the new West Cumbria aquifer boreholes, Wastwater transfer and Crummock automated compensation control indicate that effects on several European designated sites are uncertain. Further, new borehole abstractions at Waverton and Thursby have the potential to impact on the nearby River Waverly and River Wampool and may affect water dependent SSSIs downstream of the borehole sites although no readily available flow data could be found for the River Waverley or Wampool to contextualise the abstraction volumes and current flow. Effects on water quantity/quality associated with the operation of this option were assessed as being negative.

### Conclusion and Reasons for Selection of the Preferred Option

United Utilities preferred solution is to dedicate a greater proportion of the water available in Thirlmere reservoir to meet the needs of Cumbria. This would require a new water treatment works and a pipeline to transfer the water into West Cumbria. The population of West Cumbria would then benefit from being part of the UK's largest interconnected water resource zone. This transfer would be of sufficient size to meet all the demand for West Cumbria and brings a number of benefits for the region, such as:

- increased confidence in long term supplies in meeting changing demands;
- support for the developing Britain's Energy Coast economic strategy as it would allow for more water to be available than is currently forecast;
- allows abstraction from existing sources in West Cumbria to cease and return the habitats to more natural conditions;
- protects internationally important SACs;
- future climate change resilience;
- removes the vulnerability to short duration droughts; and

- longer-term cost savings as these existing treatment works can be closed.

## Using the Findings of the Assessments

The assessments have helped to highlight the range of potential environmental and social effects associated with the dWRMP, including those that had been quantified and those that could only be identified qualitatively. The assessments outlined in this report did highlight in particular the potential for significant adverse effects on European designated sites that were subsequently considered in selecting and refining the preferred option. 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.

## Going Forward

The dWRMP, HRA and the Environmental Report have been issued for consultation, as outlined below. Once comments have been received through this consultation, United Utilities may make changes to the dWRMP, and these changes will also be assessed using the approach to SEA set out in this report before the Final Water Resources Management Plan is issued in 2014. As the plan is implemented, United Utilities will monitor its effects on the environment through their existing processes, helping to ensure that the potential impacts identified in the SEA (and HRA) are considered in practice.

## Consultation

This Environmental Report is being issued as part of the consultation for the dWRMP and we are keen to hear your thoughts. The consultation on the Environmental Report seeks your feedback on the way in which we have considered the potential environmental and social impacts of the options in the dWRMP. While we are keen to hear any comments you might have relating to the SEA of the dWRMP, we are particularly interested in your responses to the questions in the box below.

- Q1. Does the assessment set out in this SEA Environmental Report describe the likely significant environmental effects of the feasible and preferred options?
- 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?

Please provide comments by post or email to:

**Secretary of State for Environment, Food and Rural Affairs**  
**Water Resources Management Plan Consultation**  
**3<sup>rd</sup> Floor**  
**17 Smith Square**  
**London**  
**SW1P 3JR**

**Email: [water.resources@defra.gsi.gov.uk](mailto:water.resources@defra.gsi.gov.uk)**





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# 1. Introduction

## 1.1 Purpose of this Report

This Environmental Report has been produced as part of the process of developing United Utilities' Draft Water Resources Management Plan (dWRMP). It complies with the requirements of the Strategic Environmental Assessment (SEA) Directive as implemented 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 effects, and the assessment process aims to identify where there are potential effects and how any negative effects might be mitigated. The assessment has been used to inform the choice of options within the dWRMP to manage the supply and demand of water in the United Utilities area over the 25 year planning period (2015-2040).

The assessment and Environmental Report have been completed by AMEC E & I UK Ltd (AMEC) on behalf of United Utilities.

## 1.2 Context

United Utilities provides water and sewerage services to customers throughout the North West of England. United Utilities' supplies come primarily from upland reservoirs and lowland rivers but are supported from groundwater and upland streams. Many water sources are located in environmentally important areas that are designated for their ecology, landscape or other environmental features.

Since 2007, all water companies have had a statutory duty to prepare, maintain and publish a Water Resources Management Plan (WRMP) under the Water Industry Act 1991, as amended by the Water Act 2003 (although informal water resources planning has been a fundamental activity for water companies for decades). A WRMP sets out how the water company intends to maintain the balance between water supply and demand to ensure the security of supply over the coming 25 years in a way that is economically, socially and environmentally sustainable. WRMPs are reviewed annually and fully updated every five years. United Utilities is currently preparing its dWRMP for public consultation in spring 2013. More information about Water Resources Management Planning is provided in section 1.3 of this report.

SEA is a statutory requirement<sup>5</sup> for plans and programmes that could have significant environmental effects. The SEA process identifies, describes, and evaluates potential effects; proposing where appropriate, mitigation and/or enhancement measures. Government, industry and regulator guidance indicates 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. United Utilities has concluded that an SEA of the dWRMP is required based on the scope of the potential effects that could arise, particularly given the number and area covered by European designated conservation sites in the North West. In addition, it is noted that the latest Water

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<sup>5</sup> *Statutory Instrument 2004 No 1633 – The Environmental Assessment of Plans and Programmes Regulations 2004.*

Resources Planning Guideline states that “water companies operating wholly or mainly in Wales are required to carry out a SEA”<sup>6</sup>. Whilst United Utilities operates mainly in the North West of England it does also operate in North Wales, and so undertaking an SEA is consistent with this guidance. United Utilities has appointed AMEC to undertake the work. More information about SEA and the rationale for applying it to United Utilities’ emerging WRMP is provided in section 1.4.

This Environmental Report is the second output of the SEA of the dWRMP. The first was the Scoping Report which summarised the environmental baseline, plans and programmes and the framework that would be used to assess environmental effects of the dWRMP. On the 05 October 2012, the Scoping Report was published for consultation, and was issued to all the statutory consultees<sup>7</sup> with a consultation period of five weeks (until the 09 November 2012). A total of six responses were received to this consultation. In support of the consultation, a meeting attended by the Environment Agency and Natural England was also held on 25 October 2012. The purpose of this meeting was to seek initial feedback on the content of the Scoping Report. Appendix A outlines how these comments and feedback have been taken into account in this Environmental Report.

## 1.3 Water Resources Management Planning

### 1.3.1 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 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.*

<sup>6</sup> Environment Agency (2012) *Water resources planning guideline – The technical methods and instructions*. June 2012

<sup>7</sup> English Heritage, Environment Agency, Natural England, Environment Agency Wales, Countryside Council for Wales, Cadw and the Welsh Government.

WRMPs are reviewed annually by the Environment Agency to ensure that companies are making adequate provision for their customers' needs in a way that is environmentally and economically sustainable. The Water Resources Planning Guideline<sup>8</sup> produced by the Environment Agency 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.

### 1.3.2 Water Resources Management Planning Stages

The Environment Agency provides guidance on the process for developing a WRMP<sup>9</sup>. This highlights the following key stages:

- **Pre-Plan consultation:** Water companies are required to consult prior to the preparation of the draft plan - Before preparing the draft WRMP the water company must consult with the Secretary of State, the Environment Agency, Ofwat and any licensed water supplier that supplies water to premises in the company's area via the company's supply system.
- **Prepare draft WRMP:** The draft WRMP is then prepared taking into account issues raised during consultation.
- **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. The Secretary of State passes it to the Environment Agency, in its role as the Government's environmental advisor as well as Ofwat, in its role as the independent financial regulator, for them to review.
- **Check draft WRMP for security and confidentiality issues:** The draft WRMP is checked for information contrary to national security and the Secretary of State notifies any persons whose information is included in case they raise objections to its publication for reasons of commercial confidentiality. The Secretary of State confirms with the water company whether any information needs to be removed following responses from notified persons and review of the dWRMP.
- **Draft WRMP consultation:** The draft WRMP is then published for formal public consultation with copies being sent to the Secretary of State, Environment Agency, local authorities, Natural England, English Heritage, any other water companies which supply, receive or share water resources with the water company and Ofwat. The Environment Agency recommends at least a 12 week consultation period.
- **Respond to consultation:** The water company is then required to provide a statement of response to the representations received during consultation and any forwarded by the Secretary of State. 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. The need for public hearings or inquiries would be determined on a case-by-case basis but is not expected to be required in normal circumstances.

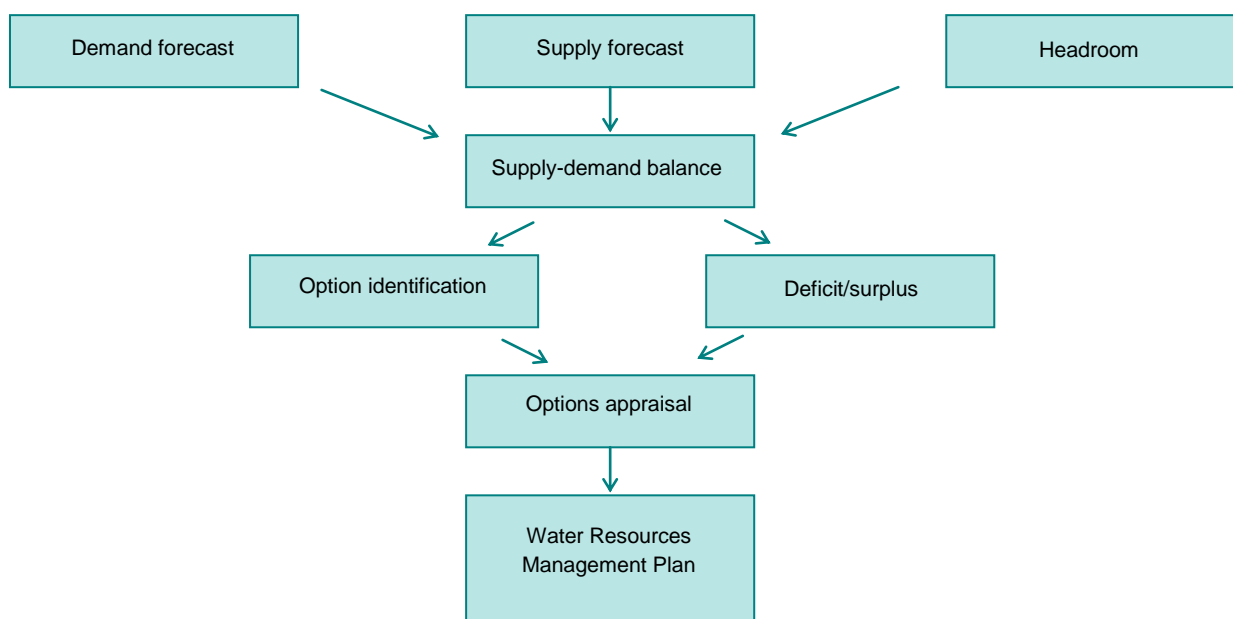
<sup>8</sup> Environment Agency (2012) *Water resources planning guideline: The technical methods and instructions*. June 2012.

<sup>9</sup> Environment Agency (2012) *Water Resources Planning Guidelines*, October 2012. Environment Agency, Bristol.

- Prepare and publish Final WRMP:** The water company then prepares their final WRMP taking account of the consultation responses, their statement of response and any directions from the Secretary of State and submits the final WRMP to the Secretary of State. The WRMP is checked once more by the Environment Agency to ensure that the plan follows any directions from the Secretary of State. It is then published when the Secretary of State directs the water company to do so.

Figure 1.1, adapted from the Water Resources Planning Guidelines produced by the Environment Agency, shows the key elements in developing a WRMP.

**Figure 1.1 Summary of the Water Resource Management Planning Stages**



The process of developing the plan requires an estimation of baseline supply forecast to be prepared, along with an estimation of baseline demand forecast. The uncertainties and target headroom required are 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 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 final planning solution for managing supply and demand to meet the required balance and target headroom is presented in the draft WRMP for formal consultation. The preferred options in the plan are presented with a justification of their inclusion and timing for implementation.

## 1.4 United Utilities' Draft Water Resources Management Plan

United Utilities supplies water to some 6.9 million people and 0.2 million non-household customers in Cumbria, Lancashire, Greater Manchester, Merseyside, most of Cheshire and a small part of Derbyshire. More than 90% of the water supplied by United Utilities comes from rivers and reservoirs, with the remainder from groundwater.

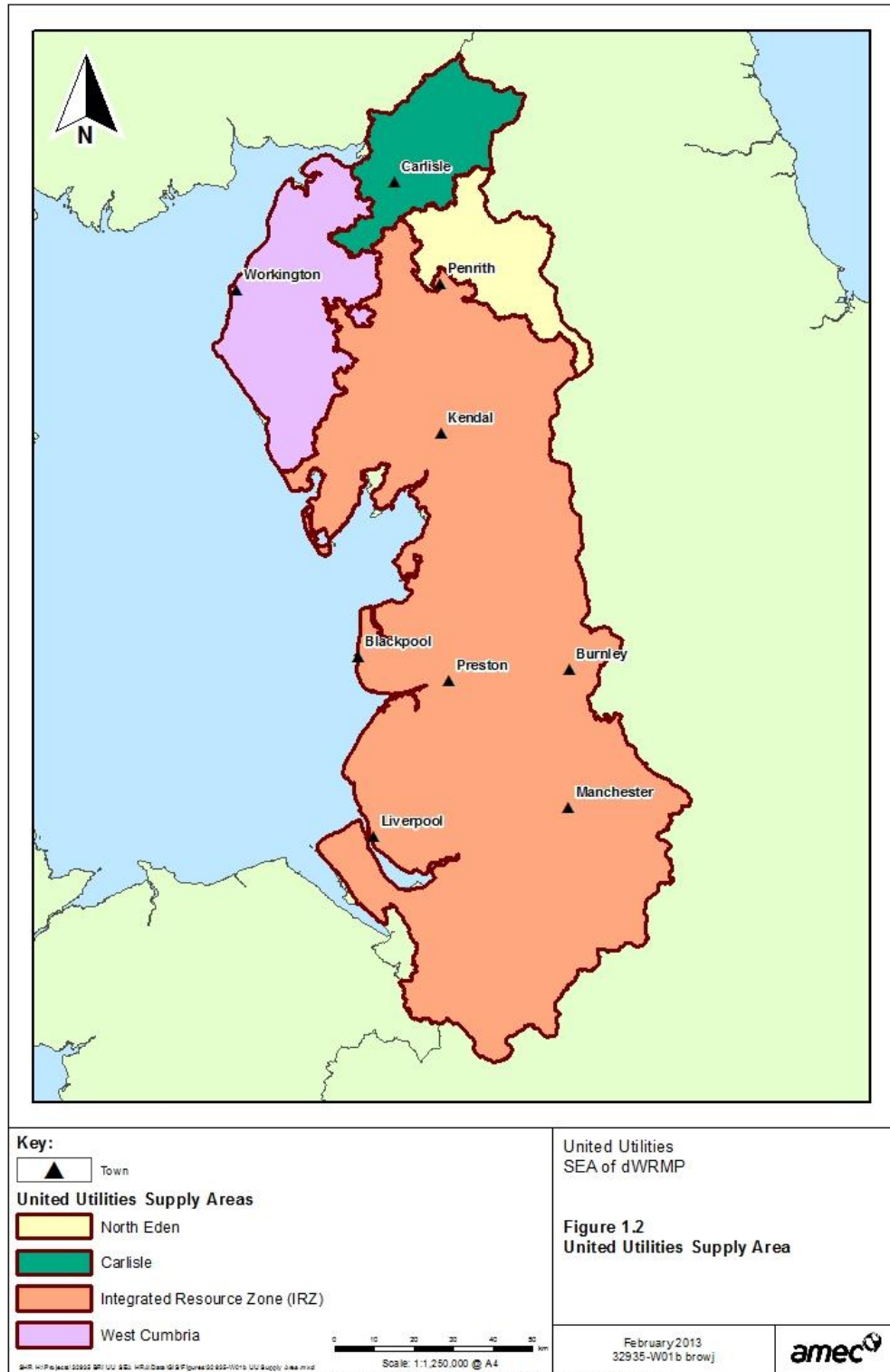
The dWRMP details how United Utilities will maintain the balance between demand for water from its customers and the resources available to it over the next 25 years. The dWRMP presents management options by water resource zone (WRZ). WRZs are defined in the Water Resources Planning Guideline<sup>6</sup> as “*the largest possible zone in which all resources, including external transfers, can be shared and hence the zone in which all customers experience the same risk of supply failure from a resource shortfall*”. United Utilities’ region is split into four WRZs, shown in Figure 1.2.

Ninety five per cent of the population served by United Utilities are within the Integrated WRZ, which covers south Cumbria, Lancashire, Greater Manchester, Merseyside and most of Cheshire. The Integrated Zone supplies around 1,700Ml/d of drinking water, of which about 500Ml/d comes from water sources in Wales, about 600Ml/d comes from water sources in Cumbria and the rest from sources in other parts of North West England. The remaining WRZs are served from sources in other parts of the region<sup>10</sup>.

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<sup>10</sup> United Utilities (2009) *Final Water Resources Management Plan*. September 2009. Warrington. United Utilities.

Figure 1.2 United Utilities Supply Area



The dWRMP identifies that there will be an imbalance between water supply and demand during the 25 year period up to 2040 within the West Cumbria WRZ. To ensure that adequate water is available, the dWRMP sets out a strategy to restore the supply demand balance in this WRZ. Options were identified as part of the preparation of the dWRMP to address any identified potential deficit within the other WRZs that comprise the United Utilities supply area (the Integrated, Carlisle and North Eden WRZs) and these were also subject to initial, high level assessment. However, the subsequent calculation of the supply demand balance has shown that these WRZs are expected to have sufficient supplies of water to meet demand over the next 25 years and will therefore not require intervention options. In consequence, these options do not form part of the assessment but initial assessment work may be used by United Utilities to inform future reviews of the WRMP should forecasts indicate that these zones would be in deficit.

To ascertain which schemes would be best placed to restore the supply demand balance, United Utilities first considered an ‘unconstrained’ list of options. These options were deliberately selected to cover as wide a range of measures as possible and represent all of the ways in which United Utilities could manage supply and demand. The type of unconstrained option considered is shown Table 1.1. Further details are set out in the dWRMP.

**Table 1.1 Unconstrained List of Options**

<b>Production Management Options</b>	<b>Examples</b>
Diagnostic studies	Verification of metered flows on major water supply pipes. This is considered a business as usual activity and no specific options have been developed.
Improved leakage detection and reduction on raw water mains	Leakage on raw water pipes that feed water treatment works.
Reduce treatment works losses	Changes that make our water treatment works more efficient. We have not considered this option specifically as this is a business as usual activity.
<b>Customer Management Options</b>	<b>Examples</b>
Water use audit and inspection/identification of household and non-household water efficiency opportunities	Checks of water usage and fitting of water saving devices, such as retro-fit dual flush toilets.
Targeted water conservation information	Working with our customers so that they can become more water efficient. We will continue to implement extensive water conservation and education programmes and therefore no specific options have been developed.
Promotion of water saving devices	Showerheads, save-a-flushes, waterless car washing kits given away at customer events.
Water recycling	Rainwater harvesting systems in domestic properties.
Water efficiency enabling activities	Offering free and subsidised water butts to customers.
Advice and information on direct abstraction and irrigation techniques	There is negligible use of drinking water for irrigation in our region. No specific options have been developed.
Advice and information on leakage detection and fixing techniques	We already provide such advice and information and will continue to provide such information. No specific options have been developed.

Change in level of service to enhance water available for use	Reducing the level of service to impose more frequent water use restrictions (e.g. hose pipe ban).
Compulsory metering	Household and non-household compulsory metering has not been considered as a specific option as this is not considered appropriate.
Enhanced/smart metering	We have considered promotion to all customers who would benefit financially from having a meter.
Meter installation policy	This has not been considered as a specific option.
Metering of sewerage flow	This has not been considered as a specific option.
Introduction of special fees	We do not charge special fees to customers, e.g. those that use swimming pools and we have no plans to implement. No specific options have been developed.
Changes to existing measured tariffs	Changes to existing measured tariffs have been considered and are either not feasible or are already implemented as fully as practicable at the present time. No specific options have been developed.
Introduction of special tariffs for specific users	We already consider such tariffs and will continue to consider them for some of our commercial customers to better service their requirements. No specific options have been developed.
Other options (e.g. use of non-potable water, improving the enforcement of water regulations)	<p>We have included extra options for:</p> <ul style="list-style-type: none"> <li>• metering on change of occupier</li> <li>• blanket promotion to all customers about metered supply benefits</li> <li>• water efficiency visits to customers with free meter options being promoted</li> <li>• each time a customer contacts us we offer a free meter option</li> </ul>
<b>Distribution Management Options</b>	<b>Examples</b>
Customer supply pipe leakage reduction	Identification and fixing of water supply pipe leaks. This is an on-going activity and so no specific options have been developed.
Leakage reduction	Fixing of reported leaks on water mains and pipes to customers. This is an on-going activity and so no specific options have been developed.
Leak detection	Data collection and analysis of metered flows in water mains to detect leaks.
Pressure reduction programmes	Understanding whether reducing the pressure in water mains can reduce leakage
Advanced replacement of infrastructure for leakage reasons	Understanding the condition of our water mains and whether these should be replaced proactively.
Distribution capacity expansion	The increase of the capacity of the water mains does not provide any benefit and therefore no specific options have been developed.
<b>Resource Management Options</b>	<b>Examples</b>
Direct river abstraction	New abstraction sites on rivers
New reservoir storage	New impounding reservoirs or pumped-storage reservoirs
Reservoir raising	Increasing the height of dams to provide more water storage
Groundwater wells (boreholes)	New abstraction sites or utilising existing sources

Infiltration galleries	These systems have no additional benefit above and beyond direct river abstractions and groundwater wells and so no specific options have been developed.
Artificial storage and recovery wells	Pumping water into aquifers during the winter for re-abstraction in the summer. No specific options have been developed.
Aquifer recharge	Pumping water into aquifers during the winter for re-abstraction in the summer. No specific options have been developed.
Desalination	Removal of sea water and treating to supply to customers
Reclaimed water	Effluent reuse from waste water treatment works
Bulk transfers	Transfers from sources both inside and outside the United Utilities supply area.
Tankering of water	No specific options have been developed as this would not satisfy operational requirements and customers' expectations.
Improved/sophisticated conjunctive management	Consideration of further improvements in the connectivity within our supply system

Source: United Utilities (2013) *United Utilities Draft Water Resources Management Plan*

These unconstrained options were screened to identify a list of feasible options, i.e. options that could realistically be implemented in the next 25 years. The feasible options were assessed in terms of their financial, environmental and social costs. These costs were compared using a standard water industry method that allows quantified information about environmental and social effects of options to be compared with financial data. The feasible options were then ranked based on their combined costs. Informed by this assessment, ongoing discussion with stakeholders, and the outcomes of the SEA and Habitats Regulations Assessment (HRA), this list was refined and three alternative options were taken forward for further consideration. The preferred option ultimately chosen depended on the option's availability; financial, environmental and social costs; the design capacity in terms of the amount of water it could add to the water supply; and the outcomes of the SEA and HRA. Further information on the process of identifying options is contained within the dWRMP.

The feasible and preferred options are outlined in the dWRMP itself and are also summarised in section 4 and section 5 of this report, which consider their potential environmental effects.

## 1.5 Strategic Environmental Assessment

### 1.5.1 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, policies or programmes, 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.

### 1.5.2 Applying SEA to Water Resources Management Planning

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 EU 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. As noted previously, 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).

As a number of the feasible and preferred options fall within these definitions, it is considered that United Utilities' dWRMP should be considered as potentially having significant effects on the environment.

Guidance produced by United Kingdom Water Industry Research (UKWIR) on the application of SEA to WRMPs<sup>11</sup> also suggests that an assessment should be undertaken. Finally, as has been noted previously, the latest Water Resources Planning Guideline states that “*water companies operating wholly or mainly in Wales are required to carry out a SEA*”<sup>12</sup>. Whilst United Utilities operates mainly in the North West of England it does also operate in North Wales, and so undertaking an SEA is consistent with the expectation of this guidance.

### 1.5.3 Stages of Strategic Environmental Assessment

There are a number of stages to SEA. The processes and interrelationships between SEA and 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. The SEA Scoping Report for United Utilities’ dWRMP was published in October 2012 and was issued for consultation to statutory consultees. Responses to the SEA Scoping Report resulted in amendments to the baseline information and assessment framework that was used to assess the options (see Appendix A).

The dWRMP has been subject to assessment using the amended assessment framework (**Stage B**) and the findings of the assessment are presented in this SEA Environmental Report (**Stage C**). The assessment has been informed by further, ongoing engagement with the statutory SEA consultation bodies. This engagement has included meetings with the Environment Agency and Natural England that were held on 31 January and 01 March 2013 and which provided an opportunity to present and discuss the emerging findings of the assessments. The dWRMP is now being consulted on alongside the SEA Environmental Report (**Stage D**).

Following consultation on the dWRMP, United Utilities will prepare a Statement of Response that sets out the company’s responses to the representations received during the consultation period and how and why the dWRMP has or has not been subsequently revised to take account of the consultation responses. The finalised WRMP will then be submitted to the Secretary of State for publication and once directed to do so, United Utilities will publish and implement the WRMP accordingly. United Utilities will also issue a Post Adoption Statement as soon as reasonably practicable after the publication of the Final WRMP. This will set out the results of the consultation and SEA processes and the extent to which the findings of the SEA have been accommodated in the Final WRMP.

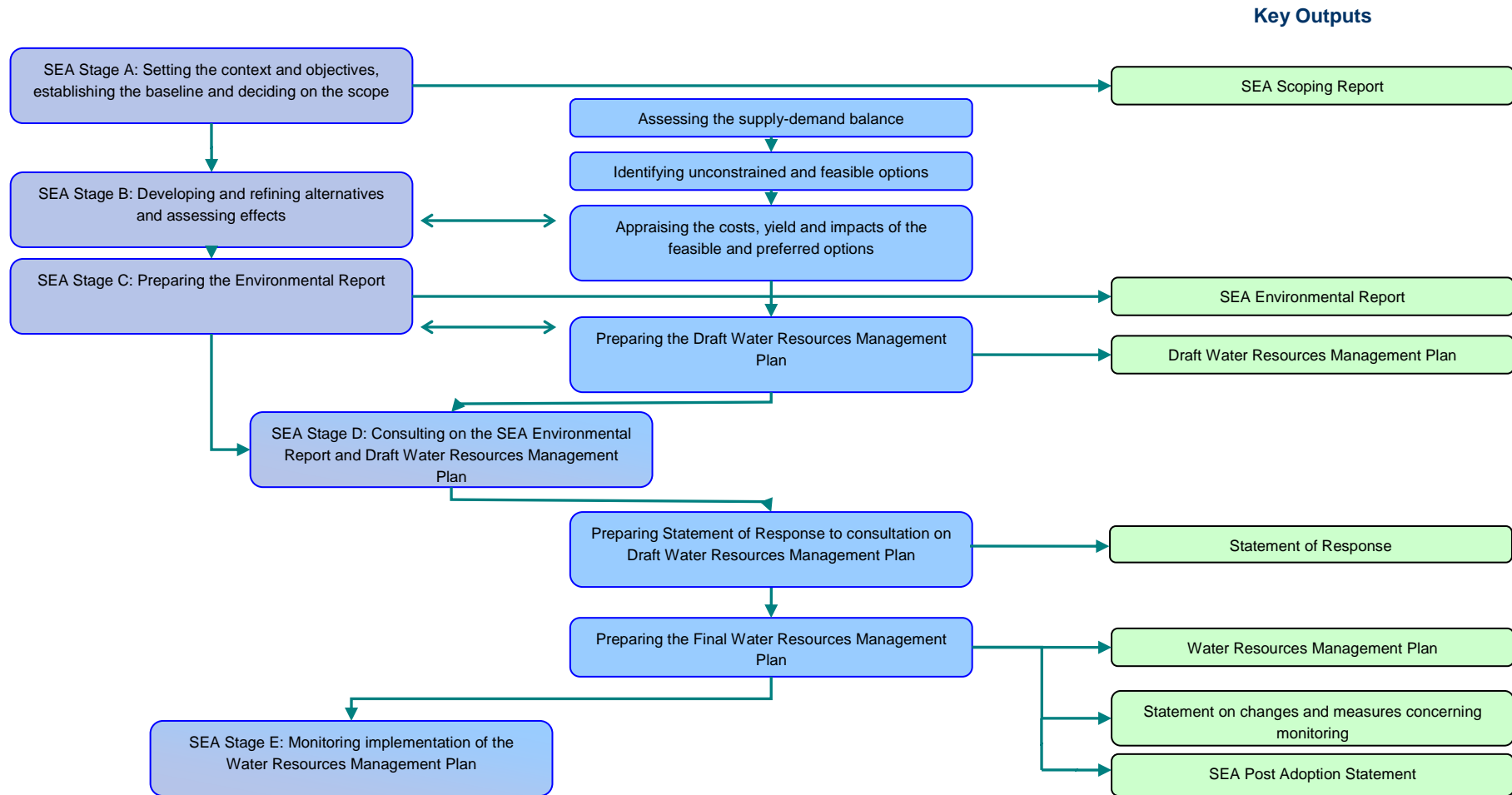
During the period of the WRMP, United Utilities will monitor the implementation and the environmental effects of the Plan (**Stage E**).

<sup>11</sup> UKWIR (2012) *Strategic Environmental Assessment and Habitats Regulations Assessment - Guidance for Water Resources Management Plans and Drought Plans*. Report ref. no. 12/wr/02/7. London. UKWIR.

<sup>12</sup> Environment Agency (2012) *Water resources planning guideline – The technical methods and instructions*. June 2012



Figure 1.3 Linking the SEA and WRMP





### 1.5.4 Compliance with the SEA Regulations

This Environmental Report has been prepared in accordance with The Environmental Assessment of Plans and Programmes Regulations 2004. Table 1.2 indicates the location in this report of the relevant information required under these regulations.

**Table 1.2 Information Provided in this Report to Meet the Requirements of the SEA Regulations**

SEA Requirement	Section of this Report where Relevant Information is Presented
An outline of the contents and main objectives of the plan or programme, and of its relationship with other relevant plans and programmes.	1.4, 2.1, 3.2, Appendix B
The relevant aspects of the current state of the environment and how it will change without implementation of the plan or programme.	2.2, 3.2
The environmental characteristics of areas likely to be significantly affected.	2.2
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 and the Habitats Directive.	2.2, 3.2 (see also HRA Report)
The environmental protection objectives, established at International, 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.	2.1, 3.2, Appendix B
The likely significant effects on the environment, including short, medium and long-term effects, permanent and temporary effects, positive and negative effects, and secondary, cumulative and synergistic effects, on issues such as biodiversity, population, human health, flora, soil, water, air, climatic factors, material assets, cultural heritage including architectural and archaeological heritage, landscape and the inter-relationship between these issues.	Feasible Options: 4.2-4.5, Appendix C Preferred Option and Alternatives: 5.2, 5.3, Appendix E
The measures envisaged to prevent, reduce and as fully as possible offset any significant adverse effects on the environment of implementing the plan or programme.	5.4, Appendix E
An outline of the reasons for selecting the alternatives dealt with, and a description of how the assessment was undertaken including any difficulties (such as technical deficiencies or lack of know-how) encountered in compiling the required information.	1.4, 3.2-3.5, 5.1
A description of the measures envisaged concerning monitoring.	6.3
A non-technical summary of the information provided.	Non-technical summary

### 1.5.5 Habitats Regulations Assessment

The *Conservation of Habitats and Species Regulations 2010* (as amended) (the 'Habitats Regulations') require that competent authorities assess the potential impacts of plans and programmes on the Natura 2000 network of

European protected sites<sup>13</sup> 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)<sup>14</sup>. WRMPs are not explicitly included within this legislation, although Natural England and the Countryside Council for Wales have 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, AMEC has undertaken a HRA of the dWRMP. The findings of the HRA have been used to inform the assessment of options as part of the SEA process (as summarised in section 4 and section 5 of this report), 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*. A copy of the HRA report, which contains further detail in relation to the findings of the assessment, is available via United Utilities’ website.

## 1.6 Report Structure

The remainder of this SEA Environmental Report of the dWRMP presents:

- the baseline information that sets the context for the assessment (section 2);
- details of the methods employed in undertaking the assessment (section 3);
- the potential effects of feasible options for balancing water demand and supply in the West Cumbria WRZ (section 4);
- a more detailed assessment of the preferred option (including cumulative effects) and alternatives for balancing water demand and supply in the West Cumbria WRZ, together with mitigation measures and reasons for the selection of the preferred option (section 5); and
- information about the WRMP process going forward, including proposed monitoring measures and how to comment on this report (section 6).

<sup>13</sup> 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.

<sup>14</sup> ‘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 the specific stage of HRA.

## 2. Baseline and Context

### 2.1 Review of Plans and Programmes

#### 2.1.1 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 is therefore to identify and review other relevant plans, programmes, policies and strategies (hereinafter referred to as ‘plans and programmes’) which could influence the dWRMP. These may be plans and programmes at an international (European), national, regional or sub-regional level, commensurate with the scope of the dWRMP. The review aims to identify the relationships between the dWRMP and these other documents i.e. how the dWRMP 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. An understanding of these plans and programmes is important in developing a baseline approach to the assessment. It is also a valuable source of information to support the completion of the social, economic and environmental baseline and to determine the key issues. The completed review of plans and programmes is also used to provide the policy context for the subsequent appraisal process and helps to inform the development of objectives that comprise the SEA framework.

The SEA Scoping Report included a review of plans and programmes, consistent with the requirements of the SEA Directive. Consultation responses to the Scoping Report identified a range of additional plans and programmes for consideration in the review which have been subsequently included in this Environmental Report. A total of 93 international and national plans and programmes have been reviewed in addition to a number of regional, sub-regional and local level plans and programmes. These are listed in Table 2.1, with the results of the review provided in Appendix B. The information from the review is used in section 2.2 to provide baseline information on the current environmental and social characteristics of the United Utilities’ area, and in section 3 to help to develop proposed objectives for the SEA.

**Table 2.1 Plans and Programmes Examined for the SEA of the dWRMP**

Plan/Programme
<b>International/European Plans and Programmes</b>
<p>The Aarhus Convention United Nations Economic Commission for Europe (1998) Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters</p> <p>The Bathing Waters Directives Council Directive 76/160/EEC of 8 December 1975 concerning the quality of bathing water and Directive 2006/7/EC of the European Parliament and of the Council of 15 February 2006 concerning the management of bathing water quality and repealing Directive 76/160/EEC</p> <p>The Bern Convention Council Decision 82/72/EEC of 3 December 1981 concerning the conclusion of the Convention on the conservation of European wildlife and natural habitats</p> <p>EU Birds Directive (2009/147/EC)</p> <p>The Bonn Convention (or CMS) The Convention on the Conservation of Migratory Species of Wild Animals</p> <p>The Cancun Agreement (2011) Council Directive 76/464/EEC of 4 May 1976 on pollution caused by certain dangerous substances discharged into the aquatic environment of the Community</p> <p>Council of Europe (2000) European Landscape Convention</p> <p>Council of Europe (2003) European Soils Charter</p> <p>The Drinking Water Directive Council Directive 98/83/EC of 3 November 1998 on the quality of water intended for human consumption EU (1998) Biodiversity Strategy European Commission (2006) Thematic Strategy for Soil Protection European Commission (2008) Ambient Air Quality and Cleaner Air for Europe (Directive 2008/50/EC)</p> <p>The Environmental Liability Directive Directive 2004/35/CE of the European Parliament and of the Council of 21 April 2004 on environmental liability with regard to the prevention and remedying of environmental damage</p> <p>European Commission (2005) Second Climate Change Programme ECCPii</p> <p>European Commission (2007) Addressing the challenge of water scarcity and droughts in the European Union. Communication from the Commission to the European Parliament and the Council (COM/2007/0414)</p> <p>European Commission (2008) Waste Framework Directive (Directive 2008/98/EC)</p> <p>European Union (2006) Sustainable Development Strategy</p> <p>The Environmental Noise Directive (Directive 2002/49/EC)</p> <p>The Floods Directive Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risks</p> <p>The Freshwater Fish Directive Directive 2006/44/EC of the European Parliament and of the Council of 6 September 2006 on the quality of fresh waters needing protection or improvement in order to support fish life</p> <p>The Groundwater Directive Council Directive 80/68/EEC of 17 December 1979 on the protection of groundwater against pollution caused by certain dangerous substances</p>

### Plan/Programme

The Habitats Directive

Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora

The Integrated Pollution Prevention and Control Directive 2008/1/EC

The Kyoto Protocol (1997)

Landfill of Waste Directive (99/31/EC)

The Nitrates Directive

Council Directive of 12 December 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources (91/676/EEC)

The Ramsar Convention on Wetlands

Renewable Energy Directive (2009/28/EC)

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)

The Shellfish Waters Directive

Directive 2006/113/EC of the European Parliament and of the Council of 12 December 2006 on the quality required of shellfish waters

The Sixth Community Environment Action Programme

Decision No 1600/2002/EC of the European Parliament and of the Council of 22 July 2002 laying down the Sixth Community Environment Action Programme

United Nations (UN) Millennium Declaration (2000)

UN Millennium Development Goals (2002)

The Urban Waste Water Directive

Council Directive 91/271/EEC of 21 May 1991 concerning urban wastewater treatment

The Water Framework Directive

Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy

The Wild Birds Directive

Council Directive of 2 April 1979 on the conservation of wild birds (79/409/EEC)

The World Summit on Sustainable Development, Johannesburg (September 2002)

The EU Biodiversity Strategy to 2020 (2011)

### National Plans and Programmes

Department of Energy and Climate Change (DECC) (2010) CRC Energy Efficiency Scheme

DECC (2011) National Policy Statements for Energy Infrastructure

Department for Environment, Food and Rural Affairs (Defra) (2000) Waterways for Tomorrow

Defra (2004) Rural Strategy

Defra (2005) Making Space for Water: Taking forward a new Government strategy for flood and coastal erosion risk management in England (first Government response to 2004 consultation)

Defra (2006) Shoreline Management Plan Guidance

Defra (2007) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland

Defra (2009) The Groundwater (England and Wales) Regulations 2009

Defra (2011) Safeguarding our Soils – A Strategy for England

Defra (2011) Biodiversity 2020: A Strategy for England's Wildlife and Ecosystem Services

## Plan/Programme

Defra (2012) National Policy Statement for Waste Water

Environment Agency (2005) Cleaner Coasts, Healthier Seas: EA Marine Strategy

Environment Agency (2008) Better Sea Trout and Salmon Fisheries: Our Strategy for 2008-2021

Environment Agency (2009) Corporate Strategy 2010-2015: Creating a better place

Environment Agency (2009) Water for People and the Environment: Water Resource Strategy for England and Wales

Environment Agency (2011) Environment Agency Corporate Plan 2011-2015

Environment Agency Wales (2011) Environment Agency Wales Corporate Plan 2011-2015: Working together for a better environment

Environment Agency (2012) Water Resources Planning Guideline

Environment Agency (undated) Restoring Sustainable Abstraction Programme

Environment Agency (various) Drought Plans

HM Government (1979) Reservoirs Act

HM Government (1981) Wildlife and Countryside Act

HM Government (1991) Water Resources Act

HM Government (1994) UK Biodiversity Action Plan

HM Government (2000) Countryside Rights of Way Act 2000

HM Government (2003) Water Act 2003

HM Government (2005) UK Sustainable Development Strategy

HM Government (2006) Climate Change and Sustainable Energy Act 2006

HM Government (2006) Natural Environment and Rural Communities Act 2006

HM Government (2008) Climate Change Act 2008

HM Government (2009) Marine and Coastal Access Act 2009

HM Government (2010) Conservation of Habitats & Species Regulations 2010 (as amended in 2011)

HM Government (2010) Environmental Permitting (England and Wales) Regulations 2010 SI 675

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) Natural Environment White Paper

Ofwat (2008) Water Supply and Demand Policy

DCLG (2011) Planning Policy Statement 10: Planning for Sustainable Waste Management

DCLG (2012) National Planning Policy Framework

Welsh Government (2004) Technical Advice Note 15: Development and Flood Risk

Welsh Government (2008) One Wales One Planet: The Sustainable Development Scheme for Wales

Welsh Government (2008) People, Places, Futures: The Wales Spatial Plan 2008 Update

Welsh Government (2008) Wales Environment Strategy Action Plan 2008 - 2011

Welsh Government (2009) Technical Advice Note 5: Nature Conservation and Planning

Welsh Government (2010) Climate Change Strategy for Wales and First Annual Progress Report (2012)

Welsh Government (2010) Flood and Coastal Erosion Risk Management: Development of a National Strategy for Wales – Consultation Document

Welsh Government (2010) A Living Wales – A New Framework for Our Environment, Our Countryside and Our Seas (Consultation Document)

Welsh Government (2010) A Low Carbon Revolution: The Welsh Assembly Government Energy Policy Statement

<b>Plan/Programme</b>
<p>Welsh Government (2011) Planning Policy Wales (Edition 4)</p> <p>Welsh Government (2011) Strategic Policy Position Statement on Water</p> <p>Welsh Government (2011) Water Policy in Wales (Written Statement)</p> <p>Welsh Government (2011) Welsh Government Policy Statement: Preparing for a Changing Climate</p> <p>Welsh Government (2012) Proposals for a Sustainable Development Bill</p> <p>Welsh Government (2012) Sustaining a Living Wales: A Green Paper on a New Approach to Natural Resource Management in Wales</p>
<b>Regional Plans and Programmes</b>
<p>Water Company (various) Drought Plans:</p> <ul style="list-style-type: none"> <li>• United Utilities draft Drought Plan;</li> <li>• Dee Valley draft Drought Plan;</li> <li>• Welsh Water Drought Plan;</li> <li>• Severn Trent Drought Plan;</li> <li>• Yorkshire Water Drought Plan; and</li> <li>• Northumbrian Water Drought Plan.</li> </ul> <p>Water Company (various) Water Resources Management Plans:</p> <ul style="list-style-type: none"> <li>• Dee Valley draft Water Resources Management Plan;</li> <li>• Severn Trent final Water Resources Management Plan;</li> <li>• Yorkshire Water final Water Resources Management Plan;</li> <li>• Northumbrian Water final Water Resources Management Plan; and</li> <li>• Welsh Water final Water Resources Management Plan.</li> </ul> <p>Environment Agency (2012) Managing Drought in the North West</p> <p>Environment Agency (2009) Water for People and the Environment: Water Resources Regional Action Plan for the North West</p> <p>Government Office for the North West (2008) North West England Plan: Regional Spatial Strategy to 2012</p> <p>4 NW (2010) Future North West: Our Shared Priorities</p> <p>Climate Change North West (undated) Rising to the Challenge: A North West Climate Change Action Plan for England's North West 2010-2012</p> <p>Government Office for the North West (2006) North West Regional Economic Strategy</p> <p>Government Office for the North West (2004) Action for Sustainability – Regional Sustainability Framework</p> <p>North West Development Agency (2006) North West Sustainable Energy Strategy</p> <p>4NW (2010) The Updated Regional Waste Strategy for North West England</p>
<b>Sub-regional/Local Plans and Programmes</b>
<p>AONB Management Units (various) AONB Management Plans</p> <p>Environment Agency (2011) North West of England and North Wales Shoreline Management Plan (SMP) 2011</p> <p>Environment Agency (various) Catchment Abstraction Management Strategies</p> <p>Environment Agency (various) Catchment Flood Management Plans</p> <p>Environmental Agency (various) River Basin Management Plans</p> <p>Environment Agency (various) Salmon Action Plans</p> <p>Local Biodiversity Action Plans (LBAPs), including Species and Habitats Action Plans (various)</p> <p>Local Planning Authority (various) Land Use Plans</p> <p>Local Planning Authority (various) Water Cycle Studies</p> <p>National Park Management Plans (various)</p>



## 2.2 Baseline Information

### 2.2.1 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)).

This section of the report identifies and characterises current environmental baseline conditions, along with how these are likely to change in the future. The data has been drawn from a variety of sources, including a number of the plans and programmes reviewed as part of the SEA process (see section 2.1 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 baseline assessment has drawn on data for the North West, as this region is closely related to United Utilities’ operating boundaries. The importance of the water supplies derived from North East Wales has also been acknowledged, and appropriate baseline information from this area has also been included.

### 2.2.2 Biodiversity

#### 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 United Utilities supply area there are a large number of sites that are designated as internationally, nationally or locally important for biodiversity. There are four categories of protected areas:

- 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 European Union Directives of other European Initiatives (including Special Protection Areas (SPAs) and Special Areas of Conservation (SACs));
- protected areas that are established under national legislation (Sites of Special Scientific Interest (SSSIs) and National Nature Reserves)); and
- Marine Protected Areas.



The distribution of designated sites is shown in Figures 2.1 to 2.4.

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). In the North West there are 65 Natura 2000 sites including 41 SACs, 12 SPAs and 12 Ramsar Sites<sup>15</sup>.

The North West has the largest area of land in England designated as SSSI (208,000 hectares) equating to 18% of the entire region of which 13% is also designated as SPA, SAC or Ramsar Site. The largest SSSIs cover intertidal or high moorland areas; elsewhere sites tend to be small and fragmented, particularly in the south of the region. At August 2012, 96.2% of the region's SSSI land area was in 'favourable' or 'unfavourable recovering' condition whilst a total of 3.8% was classified as being in 'unfavourable no change' or 'unfavourable declining' condition<sup>16</sup>.

The North West has the greatest extent of designated rivers and open waters of all the English regions, for example in Cumbria 644 km of river is designated SAC and many of the major lakes are SSSIs with rare freshwater fish species such as Arctic Char. Two Cumbrian rivers remain a stronghold for the declining native white clawed crayfish. These habitats are important for many other species including otters, water voles, amphibians and invertebrates. More than 80% of freshwater SSSIs in the region are in unfavourable condition mainly due to water quality and abstraction, invasive species, flood defence works and channel modifications, however there have been improvements in water quality in SAC designated rivers as sewage works have been upgraded.

The region's coasts and estuaries are also internationally important for wildlife with over 80% of the coastline's length designated as SPA, SAC or Ramsar Site, including all the major estuaries (Dee, Mersey, Ribble and Alt, Morecambe Bay, Duddon and Solway Firth). Morecambe Bay is also a Marine SAC. These sites support internationally important populations of wildfowl and wading birds and include five out of the top 10 estuaries in the UK for numbers of wintering waterfowl. The coast also contains 20% of the English resource for sand dune habitats and over 30% of that for coastal saltmarsh and intertidal mudflats. Rare species include the sand lizard and natterjack toad. By area, 97% of coastal SSSI is in favourable or recovering condition.<sup>17</sup>

In the North West there are 31 National Nature Reserves. The region also contains the Lake District National Park in Cumbria, which is a striking combination of upland fells, complex river systems and lakes and contains a large variety of species and habitats. Two other National Parks also fall partly within the region - the Yorkshire Dales and the Peak District. The region has three Areas of Outstanding Natural Beauty (AONB) which lie wholly or mainly in the region (Solway Coast, Arncliffe and Silverdale and Forest of Bowland). The North Pennines AONB also straddles Cumbria's eastern border.

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<sup>15</sup> Natural England (undated) *European Site List*, available from [http://www.naturalengland.org.uk/Images/european-sites-list\\_tcm6-31772.pdf](http://www.naturalengland.org.uk/Images/european-sites-list_tcm6-31772.pdf) [Accessed August 2012]

<sup>16</sup> Natural England (2012) *Sites of Special Scientific Interest: Reports and Statistics*, available from <http://www.sssi.naturalengland.org.uk/Special/sssi/reportAction.cfm?Report=sdrt18&Category=R&Reference=North+West> [Accessed August 2012]

<sup>17</sup> Northwest Regional Development Agency (2010) *Environment Evidence Base RS2010*, available from [http://www.4nw.org.uk/downloads/documents/aug\\_10/4nw\\_1280991230\\_Environment\\_Evidence\\_Base.pdf](http://www.4nw.org.uk/downloads/documents/aug_10/4nw_1280991230_Environment_Evidence_Base.pdf) [Accessed August 2012]

United Utilities owns some 57,260 hectares (ha) of land in the North West of England. With nearly half in three National Parks, much of the land is high value in terms of nature conservation and recreational use (see Table 2.2 for a full breakdown of the land designations). The percentage of SSSIs that are in favourable or recovering condition in the United Utilities supply area has increased from 83% to 98% between 2007/08 and 2010/11.<sup>18</sup>

**Table 2.2 Land Designations within the United Utilities Supply Area**

Designated Site Classification	Area (hectares)	Description
National Parks	25,820	In three National parks, mainly in the Peak District and Lake District but also a small amount in the Yorkshire Dales
Area of Outstanding Natural Beauty (AONB)	11,120	Land in 3 AONB's, mainly the Forest of Bowland but also in North Pennines and the Solway Coast
Special Area of Conservation (SAC)	11,040	Including land in 16 SACs
Site of Special Scientific Interest (SSSI)	17,343	Including land in 53 SSSIs
Special Protection Areas (SPA)	14,453	Including land in 6 SPAs
Ramsars	2	Including land in 3 Ramsar sites
Countryside and Rights of Way access (CRoW)	35,208	Designated as open access or registered common land.

Source: United Utilities (2011) *United Utilities Corporate Responsibility Report 2011*, available from <http://corporateresponsibility2011.unitedutilities.com/> [Accessed August 2012]

<sup>18</sup> United Utilities (2011) *Corporate Responsibility Report 2011*, available from <http://corporateresponsibility2011.unitedutilities.com/> [Accessed August 2012]

Figure 2.1 SACs in the United Utilities Supply Area and North Wales

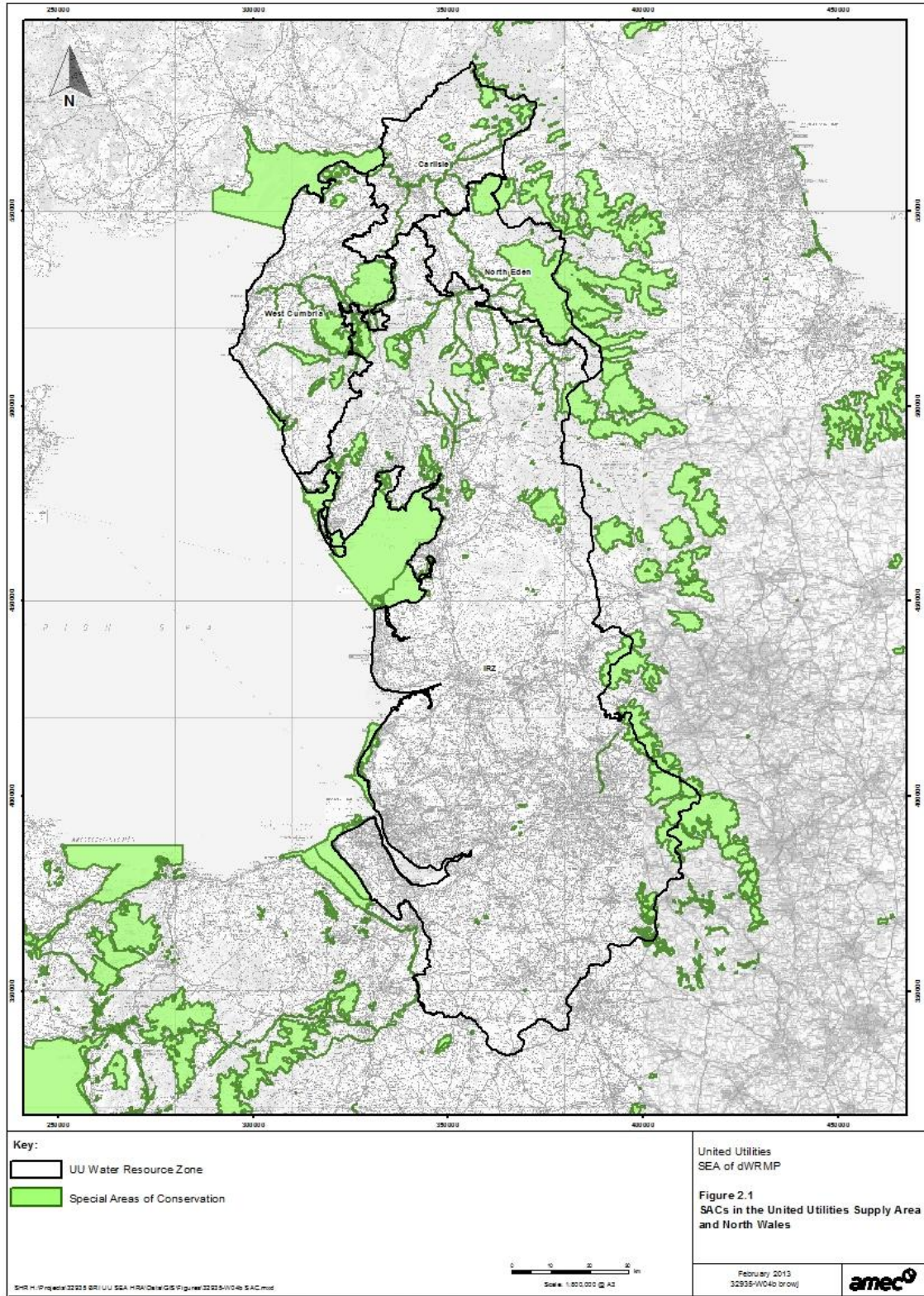




Figure 2.2 SPAs in the United Utilities Supply Area and North Wales

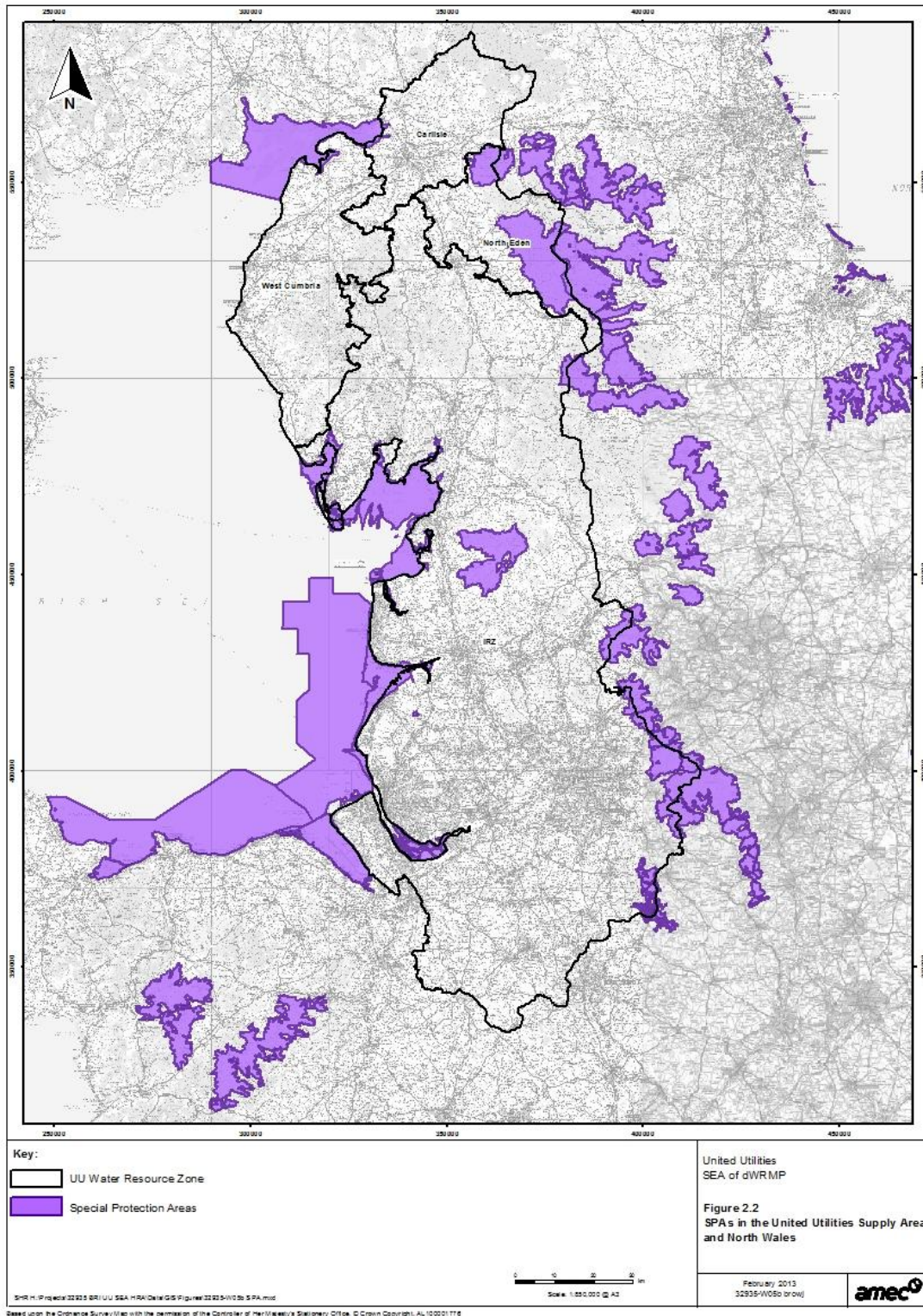




Figure 2.3 RAMSAR Sites in the United Utilities Supply Area and North Wales

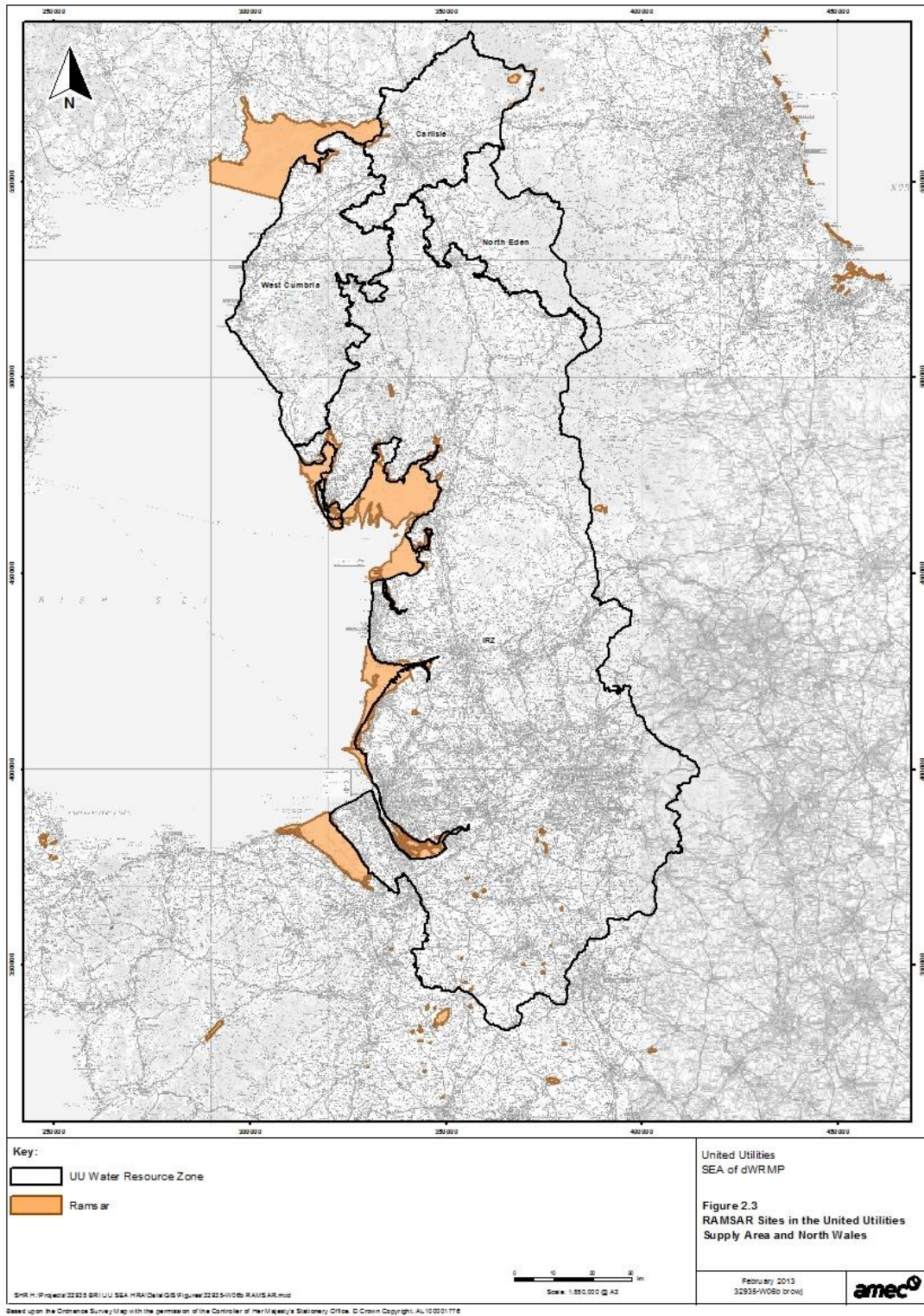
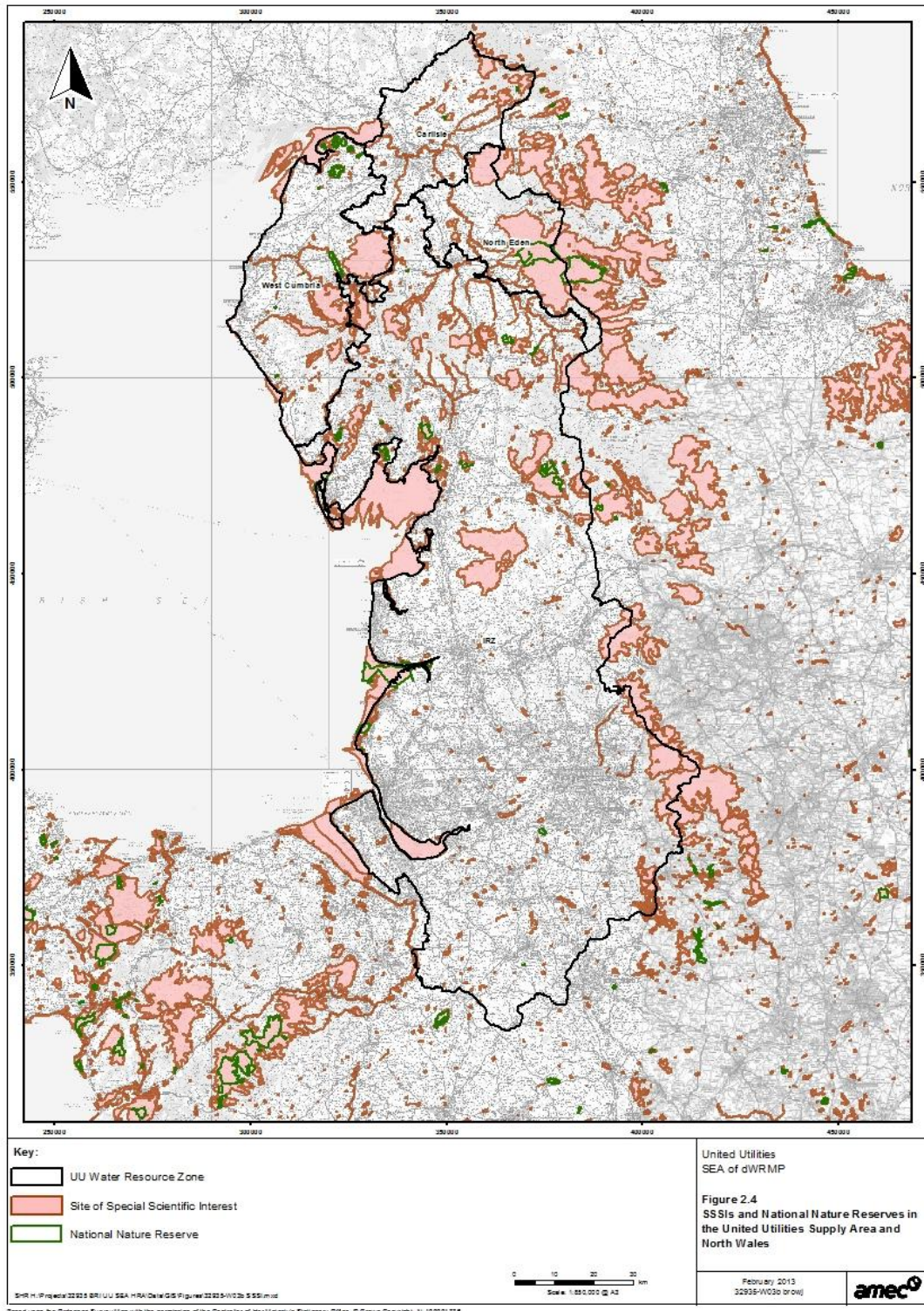




Figure 2.4 SSSIs and National Nature Reserves in the United Utilities Supply Area and North Wales



To the west of United Utilities' water supply area, the West Cheshire and North East Wales area contains some significant areas that are protected nationally or internationally. This includes eight SACs, four SPAs and three Ramsar Sites including the Dee Estuary, which is of particular significance for its total populations of internationally important wintering waterfowl and waders, and the River Dee and Bala Lake SAC. There are also several designated sites in the vicinity of Lake Vyrnwy, including Berwyn SPA and SSSI, the Berwyn and South Clwyd Mountains SAC and Y Berwyn National Nature Reserve.

### *Non-statutory Protected Sites and Other Biodiversity*

The 'State of the Natural Environment in the North West' report published by Natural England<sup>19</sup> highlights that the region contains 35 out of the 40 different Biodiversity Action Plan (BAP) habitat classifications, one of the most diverse in the country. There are significant proportions of the English resource for some habitats in the region, particularly those found in upland areas, as shown in Table 2.3.

**Table 2.3 Percentage of Total English Habitats within North West England**

Habitat	% of total English Resource
Upland heath land	18%
Blanket Bog	25
Sand Dunes	20
Intertidal mudflats and saltmarsh	34
Lowland raised bog	56

Source: Natural England (2009) *State of the Environment in the North West*, available from <http://publications.naturalengland.org.uk/publication/30044?category=118044> [Assessed August 2012]

The UKBAP Priority Species Accounts<sup>20</sup> list 505 priority species within Wales comprising:

- 183 terrestrial invertebrates;
- 89 fungi lichens;
- 67 vascular plants;
- 49 birds;
- 48 marine species;
- 35 non-vascular plants;
- 16 terrestrial mammals;
- 10 fish; and

<sup>19</sup> Natural England (2009) *State of the Natural Environment in the North West*, available from <http://publications.naturalengland.org.uk/publication/30044?category=118044> [Assessed August 2012]

<sup>20</sup> JNCC (2011) *UK BAP Priority Species Accounts*. Available at: <http://jncc.defra.gov.uk/page-5161>, [Accessed June 2012]

- 8 amphibians and reptiles.

In total, 67 priority species (13%) are classified as internationally threatened whilst 188 priority species (37%) have suffered a marked decline in the UK.

United Utilities has a number of statutory duties towards biodiversity under the following legislation:

- **International sites:** Regulation 9(5) of the Conservation of Habitats and Species Regulations 2010 ('Habitats Regulations') (as amended) requires every competent authority, in the exercise of any of its functions, to have regard to the requirements of the Habitats Directive. As referred to in section 1.5 of this report, United Utilities is the competent authority for HRA.
- **SSSI:** Section 28G of the Wildlife and Countryside Act 1981, as inserted by Section 75 of and Schedule 9 to the Countryside and Rights of Way Act 2000, places a duty on public authorities, including water companies, to take reasonable steps consistent with the proper exercise of their functions to further the conservation and enhancement of SSSIs.
- **Biodiversity and Protected Species:** Under Section 40 of the Natural Environment and Rural Communities Act 2006 every public authority, including statutory undertakers, must in the exercise of its functions have regard so far as is consistent with the proper exercise of those functions to the purpose of conserving biodiversity. Conserving biodiversity in this context includes restoring or enhancing a population or habitat.

United Utilities understands the impacts that its operations can have on biodiversity and the company aims to manage its sites in a responsible manner with a policy that commits them to:

- complying with biodiversity legislation;
- integrating biodiversity into business procedures and operations;
- protecting biodiversity and enhancing it where possible on all land in the company's ownership;
- communicating best practice in biodiversity; and
- working with external partners and stakeholders.

Actions taken by United Utilities to improve biodiversity on the company's sites include introducing Dormouse nesting areas and bat boxes in woodlands around reservoirs. At a larger scale, the condition of Helvellyn and Fairfield SSSI was improved with a major landscape-scale grazing restoration project which involved Natural England, the National Farmers Union, commoners, the Lake District National Park Authority and the National Trust<sup>21</sup>.

## Future Trends

Key pressures and risks to biodiversity include:

<sup>21</sup> United Utilities (2011) *Biodiversity*, available from <http://corporate.unitedutilities.com/biodiversity.aspx> [Accessed August 2012]



- Habitat loss and fragmentation from development, agricultural intensification, water abstraction and drainage, water pollution, recreational pressure and human disturbance especially in the 40% of biodiversity habitat that occurs outside designated sites. It should be noted that United Utilities has a target to achieve no net loss of biodiversity as a result of its schemes and has embarked on an extension to its Sustainable Catchment Management Programme (SCaMP) project, a landscape scale programme intended to improve water quality and the wider environment <sup>18</sup>.
- The fragmentation of biodiversity in the region's lowlands. This is particularly pertinent in the south of the region where areas of biodiversity interest are frequently small and fragmented. Species in these areas are more vulnerable to damage from external influences such as climate change.

## 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 the protected sites designated for nature conservation;
- the need to protect and enhance non-designated sites;
- the need to reverse the fragmentation of biodiversity in the lowlands of the North West region, especially in the south;
- 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.

### 2.2.3 Geology and Soils

#### Baseline Characteristics

##### *Geology*

There is a great diversity in the composition of geology across the North West region. The majority of the lowland Cheshire plains, Merseyside and western Lancashire are dominated largely by Triassic mudstone and sandstone. The uplands of Cumbria are partly made up of volcanic igneous rock from the Devonian period. Moving eastwards towards the Yorkshire Dales, the geology becomes dominated by distinctive carboniferous limestone, and south into Lancashire millstone grit and coal becomes abundant.

The majority of Wales is underlain by sedimentary rock beneath a suite of acid soils, characterised by a peaty surface horizon. As a broad overview, the following rock types exist in a progression from North West to South East (predominant rock types): Ordovician; Silurian; Devonian; and Carboniferous Peat (covers 3% to 4% of Wales and is predominantly acid blanket peat). There are small areas of raised bog and fen peat scattered in lowland

areas<sup>22</sup>. The Permo-Triassic sandstone forms an important groundwater resource in North Wales, whilst peat, sand and gravel deposits along river valleys support strategic local water supplies.

Within the North West region there are 188 Geological Conservation Review (GCR) Sites, i.e. sites that are often SSSIs and selected on the basis of their national and international importance<sup>23</sup>. Information obtained from Natural England indicates that 89% of SSSIs designated for one or more geodiversity features are in favourable or recovering condition<sup>17</sup>. Within Wales there are 351 GCR Sites.

### Soils

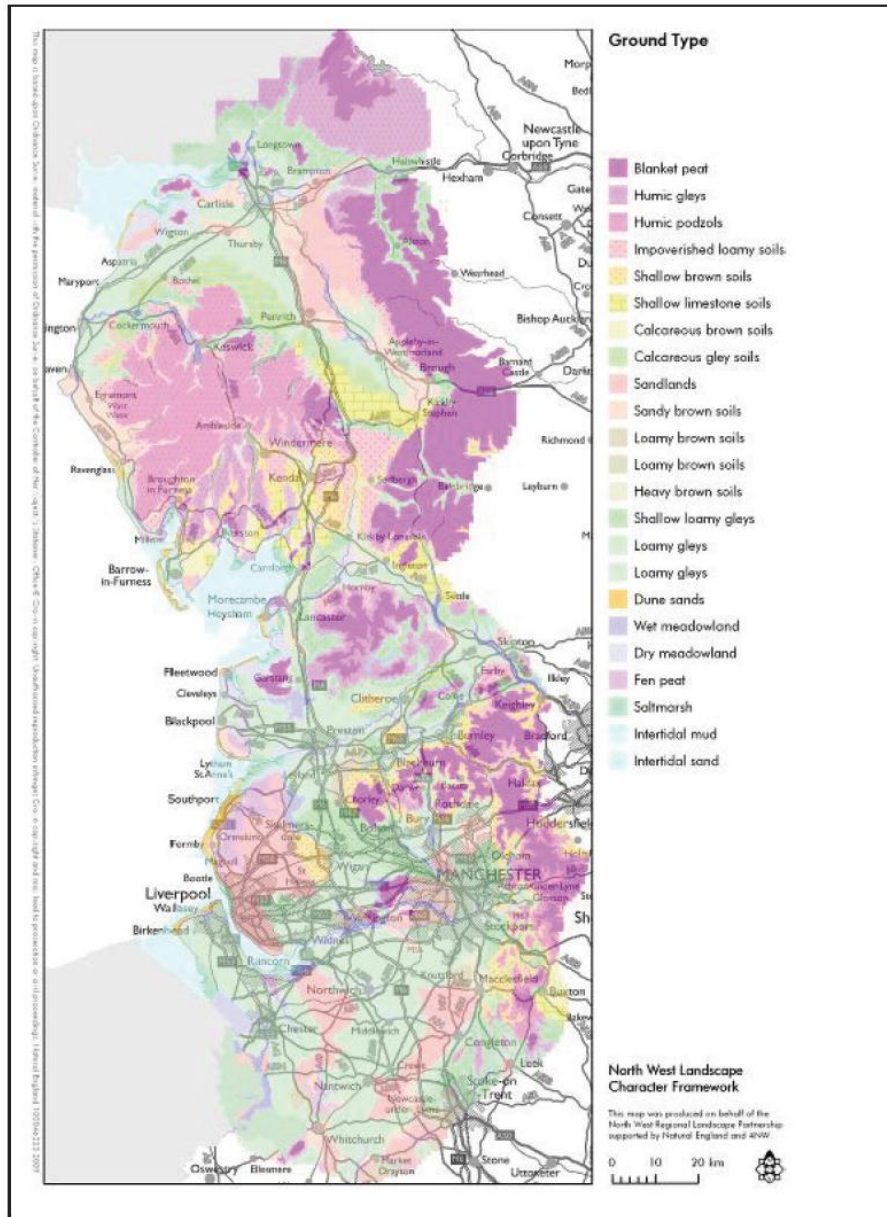
The variety of underlying geology in the North West region is reflected in its soils, the agricultural value of which varies (Figure 2.5 highlights the extent of regional soil types). Agricultural land covers 80% of the region and grassland is the predominant use of this land with the majority being permanent pasture more than five years old. Arable farming is confined mostly to the Lancashire Plain and Mersey Basin. Livestock farming is the major agricultural use of the uplands of the region and involves extensive grazing of semi-natural vegetation.

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<sup>22</sup> CCW (2005) *Strategic Environmental Assessment Guidance for Practitioners*. Available at: [www.ccg.gov.uk/landscape--wildlife/managing-land-and-sea/environmental-assessment/strategic-environmental-assess.aspx](http://www.ccg.gov.uk/landscape--wildlife/managing-land-and-sea/environmental-assessment/strategic-environmental-assess.aspx) [Accessed June 2012]

<sup>23</sup> Joint Nature Conservation Committee (2012) *Geological Conservation Review*, available from <http://jncc.defra.gov.uk/default.aspx?page=4177&authority=UKD22,UKD12,UKD32,UKD21,UKD43,UKD11,UKD54> [Accessed August 2012]

Figure 2.5 Soil and Ground Types in the North West



Source: Northwest Regional Development Agency (2010) *Environment Evidence Base RS2010*, available from [http://www.4nw.org.uk/downloads/documents/aug\\_10/4nw\\_1280991230\\_Environment\\_Evidence\\_Base.pdf](http://www.4nw.org.uk/downloads/documents/aug_10/4nw_1280991230_Environment_Evidence_Base.pdf) [Accessed August 2012]

The Agricultural Land Classification System developed by Defra provides a method for assessing the quality of farmland, principally for use in land use planning. The system divides the quality of land into five categories, as well as non-agricultural and urban. Data for the North West region and Wales from 2002 is summarised in Table 2.4.

**Table 2.4 Agricultural Land Grade (2002 data)**

	North West	Cumbria	Lancashire	Greater Manchester	Merseyside	Cheshire	Wales
Grades 1 and 2 – Excellent and Very Good	7.1%	1.5%	13.8%	3.9%	20.3%	12.5%	2.5%
Grade 3 – Good/Moderate	30.8%	26.8%	27.7%	16.1%	15.2%	59.2%	17.5%
Grade 4 – Poor	17.7%	20.7%	22.6%	16.1%	1.8%	8%	44.7%
Grade 5 – Very Poor	24.6%	39.4%	20%	7.6%	3.1%	2.8%	35.5%
Non agricultural	11.9%	9.5%	4.9%	9%	11.1%	5.7%	-
Urban	7.9%	2.1%	11%	47.3%	48.5%	11.8%	-

Source: MAGIC (2002) *Agricultural Land Classification*, available from <http://magic.defra.gov.uk/datadoc/metadata.asp?dataset=2> [Accessed August 2012]

The ‘best and most versatile land’ is generally defined as the agricultural land which falls into Grades 1, 2 and 3. The quality of agricultural land in the North West region is relatively poor compared to England as a whole with 37.9% of land being classified as Grade 1, 2 or 3 compared to a national average of 65.1%. Similarly, 42.3% of land is classed as ‘Poor’ (Grade 4) or ‘Very Poor’ (Grade 5), compared to a national average of 22.5%. This reflects the large proportion of upland area which generally has low agricultural quality due to exposure and poor soil cover. There is also an above average proportion of urban land. At the sub-regional level, Cheshire has the greatest percentage of best and most versatile land (Grades 1, 2 and 3) at 71.7% whilst Greater Manchester has the least (20.0%) although Merseyside has the highest proportion of urban land (48.5%).

The proportion of land area classified as either Grade 1 (‘Excellent’) or Grade 2 (‘Very Good’) in Wales is significantly lower than in England (2.5% compared to 16.9%) whilst over 80% of land in Wales is classified as either Grade 3 (‘Poor’) or Grade 4 (‘Very Poor’), significantly higher than in England (22.5%).

Peat is of great importance in the North West region and nationally, providing a rich habitat, water quality improvements (through filtration of water), flood management and carbon storage. The UK’s peatlands contain more carbon than all the forests in France and the UK combined. Over a quarter of England’s peatland lies in the north Pennines in an area that straddles parts of Cumbria. There is growing pressure on peatland in England and of the 17 raised bog sites with planning permission for commercial peat extraction (mostly for use as a growing medium), 28% are located in the North West region<sup>17</sup>.

Previously developed land (PDL) is defined as land that is or was occupied by a permanent structure (excluding agricultural or forestry buildings) and associated fixed surface infrastructure. In 2007 the North West had a total of 10,910ha of PDL that was unused or may be available for redevelopment; this was the highest of all the English regions (see Table 2.5). A third (3,640ha) of PDL in the region was considered to be suitable for housing.

**Table 2.5 Previously Developed Land Available for Redevelopment, 2007**

Region	All PDL that is Unused or may be Available for Redevelopment (ha)	Total Area Suitable for Housing (ha)
<b>North West</b>	<b>10,910</b>	<b>3,640</b>
South East	8,990	4,580
Yorkshire & the Humber	9,110	3,030
East of England	6,890	4,180
East Midlands	6,360	2,460
South West	5,960	2,600
West Midlands	5,930	2,480
North East	4,030	1,420
London	3,930	2,130
England	62,130	26,510

Source: CLG (2008) *Previously-developed land that may be available for development: England 2007*

Adopted and emerging local plans of the local planning authorities that comprise the region seek to maximise development of brownfield sites to meet housing and economic development needs; however, there is a recognised need that some greenfield land will need to be released to accommodate the new development provided for in these plans.

In 2010, 600,000 tonnes of sludge waste was produced by United Utilities' wastewater treatment processes, 84 % of this was recycled to land (as it is considered the best practice environmental option), with the remainder incinerated for energy recovery.<sup>24</sup>

United Utilities is helping to protect SSSI sites on its land as part of its obligation to conserve and enhance these areas. From 2005-2010 they worked with the Royal Society for the Protection of Birds (RSPB) on a Sustainable Catchment Management Programme (SCaMP) project to restore degraded bog and peat lands in their catchment area and bring SSSI sites back into prime condition<sup>25</sup>.

### Land Take

United Utilities operates a large network of infrastructure assets including:

- 381 service reservoirs;
- 96 water treatment works; and

<sup>24</sup> United Utilities (2011) *Sludge and Process Waste*, available from <http://corporateresponsibility2011.unitedutilities.com/processWaste.aspx> [Accessed August 2012]

<sup>25</sup> United Utilities (2006) *Protecting SSSIs*, available from <http://corporate.unitedutilities.com/documents/SCaMPnewsJune06.pdf> [Accessed August 2012]

- 575 waste water treatment works.<sup>26 18</sup>

United Utilities owns some 57,260 ha of land in the North West and a further 7.7ha of land in Wales, much of which is high value in terms of nature conservation and recreational use.

## Future Trends

- 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 and peatlands 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.
- It is expected that there will be increased opportunities to protect soils and improve water quality as agricultural practices and farm management are influenced by new sustainable land management schemes such as United Utilities' ScaMP project.
- 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:

- 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 protect peatlands in the North West;
- the need to make use of PDL, and to reduce the prevalence of derelict land; and
- the need to maintain soil function.

<sup>26</sup> Water Guide (2012) *United Utilities Water*, available from <http://www.water-guide.org.uk/providers/united-utilities-water.html> [Accessed August 2012]

## 2.2.4 Water

### Baseline Characteristics

The North West's exposure to westerly maritime air masses and extensive areas of high ground make the region one of the wettest in the UK. However, the large geographical differences across the region result in considerable variation in annual rainfall, for example higher parts of the Lake District receive 2,300mm of rain each year, while parts of the Eden Valley in Cumbria receive less than 800mm annually. Rainfall patterns combined with sources of demand drive the nature of the water resource system operated by United Utilities<sup>27 28</sup>.

The high proportion of upland landscape in the region means many of the rivers and streams in the North West are short and steep and often flow over impermeable rock, which results in large variations in flow especially during periods of heavy rain. Around 85% of the region's water supply is collected and stored in upland reservoirs.

United Utilities supplies water to some 6.9 million people and 0.2 million non-household customers in Cumbria, Lancashire, Greater Manchester, Merseyside, most of Cheshire and a small part of Derbyshire. More than 90% of the water supplied by United Utilities comes from rivers and reservoirs, with the remainder from groundwater. United Utilities' region is split into four WRZs:

- Integrated Resource Zone;
- Carlisle Resource Zone;
- North Eden Resource Zone; and
- West Cumbria Resource Zone.

The supply network within the Integrated Resource Zone has a high degree of inter-connection, and serves approximately 95% of the region's population. The other three zones are relatively small, and are remote from the regional network. A map of the WRZs is shown in Figure 2.6.

<sup>27</sup> Met office (2012) *North West England & Isle of Man: Climate*, available from <http://www.metoffice.gov.uk/climate/uk/nw/print.html> [Assessed August 2012]

<sup>28</sup> ONS (2011) *Portrait of the North West*, available from <http://www.ons.gov.uk/ons/rel/regional-trends/region-and-country-profiles/key-statistics-and-profiles---august-2012/key-statistics---north-west--august-2012.html> [Assessed August 2012]



Figure 2.6 United Utilities WRZs



Source: United Utilities (2012)

United Utilities has over 200 water sources and supplies around 1,750 million litres per day (Ml/d) of drinking water to approximately 3.2 million homes and businesses in the North West in a normal year (although this would be higher in a dry year). The Integrated Zone supplies around 1,700Ml/d of drinking water, of which about 500Ml/d comes from water sources in Wales, about 600Ml/d comes from water sources in Cumbria and the rest from sources in other parts of North West England. The remaining WRZs are served from sources in other parts of the region.<sup>29</sup>

<sup>29</sup> United Utilities (2009) *Final Water Resources Management Plan*, available from <http://corporate.unitedutilities.com/documents/WRMPMainReport.pdf> [Accessed August 2012]



### Water Availability

The Environment Agency has produced a series of Catchment Abstraction Management Strategies (CAMS) for the North West and other areas from which water is sourced to supply the United Utilities area (e.g. those sources in Wales). These CAMS set out how the Environment Agency will manage water resources in each catchment and provide information on how existing abstraction licenses are managed and the availability of water for further abstraction. Within each CAMS, data regarding long term flow duration curves and river flow objectives are assessed for Water Resources Management Units (WRMU) to determine whether or not further water is available for abstraction and if the WRMU is over abstracted or over-licensed. The water availability assessments for the CAMS particularly relevant to the dWRMP are summarised in Table 2.6 and defined below:

- **Water available:** Water likely to be available at all flows including low flows. Restrictions may apply.
- **No water available:** No water available for further licensing at low flows although water may be available at higher flows with appropriate restrictions.
- **Over-licensed:** Current actual abstraction is resulting in no water available at low flows. If existing licences were used to their full allocation they would have the potential to cause unacceptable environmental impact at low flows. Water may be available at high flows with appropriate restrictions.
- **Over-abstracted:** Existing abstraction is causing unacceptable environmental impact at low flows. Water may still be available at high flows with appropriate restrictions.

**Table 2.6 Summary of CAMS Water Availability Assessment**

Catchment Abstraction Management Strategy	Water Available	No Water Available	Over Licensed	Over Abstracted	Not Assessed	Total Number of Units
Derwent , West Cumbria and Duddon	5	3	4	0	0	12
Douglas	4	3	0	1	0	8
Eden and Esk	4	2	1	1	1	9
Kent	3	1	0	0	0	4
Leven and Crake	2	2	1	0	0	5
Lower Mersey and Alt	7	4	5	3	0	19
Lune	3	1	1	0	0	5
Mersey and Bollin	4	1	2	0	0	7
Northern Manchester	4	2	1	0	0	7
Ribble (including Crossens Catchment)	17	8	4	7	2	38
Sankey and Glaze	4	0	1	1	0	6
Severn Corridor	6	7	0	0	0	13
Tame, Goyt and Etherow	2	1	0	0	0	3
Tyne	6	0	0	0	2	8

Catchment Abstraction Management Strategy	Water Available	No Water Available	Over Licensed	Over Abstracted	Not Assessed	Total Number of Units
Weaver and Dane	5	4	0	0	0	9
Wyre	1	1	4	2	0	8
Dee	1	1	2	0	0	4
<b>Total</b>	<b>66</b>	<b>34</b>	<b>26</b>	<b>15</b>	<b>3</b>	<b>144</b>

### Sustainability Reductions - Review of Consents

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 in 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. The presence of a large number of SPAs and SACs in the United Utilities supply area mean that abstraction licences are affected by the RoC process because of impacts on the European designated sites, primarily riverine SACs.

Allowances for sustainability reductions totalling 46.1Ml/d were included in the Final WRMP 2009, shown in Table 2.7. Much of the water used to supply United Utilities' customers in the North West comes from catchment land that has a statutory designation. For example, 17,500 ha of the catchment land owned by United Utilities is designated SSSI. Data from the company indicates that a number of these sites are in an unfavourable condition. The Environment Agency is continuing to review United Utilities abstractions including those at Vyrnwy, Swindale Beck, the River Calder, compensation flows from Ennerdale Water to the River Ehen and lake levels at Overwater. These investigations may result in further sustainability reductions.

**Table 2.7 Allowances for Sustainability Reductions Included in the Final WRMP 2009**

Water Resource Zone	Site	Driver	Reduction included in Final WRMP 2009*
Integrated	Haweswater	Habitats Directive	18.6 Ml/d
	Thirlmere	Habitats Directive	
	Rivers Brennand and Whitendale	National (SSSI)	
Carlisle	River Gelt	Habitats Directive	3.8 Ml/d
West Cumbria	Ennerdale Water	Habitats Directive	9.0 Ml/d
	Dash Beck	Habitats Directive	0.4 Ml/d
North Eden			0 Ml/d
<b>Total</b>			<b>46.1 Ml/d</b>

\*Reductions implemented from 2014/15 onwards

United Utilities is currently undertaking Stage 3 of the Heavily Modified Water Bodies (HMWB) investigations as required as part of the Environment Agency's Water Framework Directive (WFD) River Basin Management Planning. In order to achieve Good Ecological Potential (GEP), water supply reservoirs and river water bodies influenced by those reservoirs (i.e. HMWBs) must have appropriate, technically feasible and cost-effective mitigation measures in place. United Utilities is currently leading Stage 3 Options Appraisal where mitigation measures are missing or not adequate. Mitigation measures are relevant to five environmentally-relevant drivers specific to HMWBs designated because of impoundments:

- Driver 1: Impacts on fish migration/passage.
- Driver 2: Impacts on downstream river flow.
- Driver 3: Impacts on downstream river habitat/morphology.
- Driver 4: Impacts on downstream water quality.
- Driver 5: Impacts on the level regime to maintain lake/loch habitats.

As of September 2012, United Utilities' Stage 3 HMWB investigation had identified the potential requirement for the following schemes<sup>30</sup> to be implemented in the period 2015-2020 (subject to cost-benefit analysis and technical feasibility assessment):

- fish passes and/or screens at 12 sites;
- flow management and/or alteration at 13 sites;
- site-specific sediment management plans at 11 sites and a generic sediment management plan at a further 26 sites; and
- lake-level management regime at 1 site.

### *Wastewater Treatment*

Wastewater from 3 million homes and 200,000 businesses across the North West is treated by United Utilities every day. The wastewater is carried down drains, into the underground sewer network which comprises 72,000km of sewers, and transported to one of 575 wastewater treatment works where, once it is treated, is returned to rivers and to the sea.

### *Water Quality Standards*

There are 866 surface water bodies covered by three River Basin Management Plans (RBMPs) that lie within the North West region (North West, Solway Tweed and Dee). Additionally, Lake Vyrnwy is a source to the United

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<sup>30</sup> It is important to note that this is an indicative view of the results of the Stage 3 investigation prior to its completion. It is expected that over the course of the investigation, a number of the above schemes will be assessed as not required or as requiring further investigation in the period 2015-2020.

Utilities supply area, which lies within the Severn RBMP. All the water bodies in the region have been classified for their ecological status and had objectives set for 2015, 2021 and 2027.

Table 2.8 shows the percentage of water bodies in each River Basin District that are achieving good ecological status or better. It also shows their target status by 2015 based on data contained within the RBMPs prepared under the WFD. Assessments in January 2011 (the latest available) showed that around a third of surface water bodies across all districts had good ecological status/potential. This is expected to increase to between 33% and 53% by 2015. Out of the areas with groundwater bodies, the Dee has the greatest percentage at good or better status (83%). The North West district has the lowest proportion of groundwater bodies at good status (61%). Table 2.8 also provides a summary of the key water management issues that need to be dealt with in each district.

**Table 2.8 Percentage of Water Bodies Achieving Good Ecological Status or Potential, 2010/2015**

River Basin District	Surface Water (% of water bodies at good or better ecological status/potential)		Groundwater (% of water bodies at good or better quantitative status)		Significant Pressures
	2010	2015	2010	2015	
North West	30	33	61	61	Diffuse pollution from rural areas; Urban and transport and pollution; Nitrate; Pesticides; Phosphate; Physical modification; and Abstraction and other artificial flow pressures.
Solway Tweed	45	53	80	80	Diffuse pollution from rural areas; Urban and transport and pollution; Nitrate; Pesticides; Phosphate; Physical modification; and Abstraction and other artificial flow pressures.
Severn	29	34	75	75	Abstraction and other artificial flow regulation; Non-native species; Nitrate; Pesticides; Phosphate; Physical modification; Sediment; and Urban and transport pollution.

River Basin District	Surface Water (% of water bodies at good or better ecological status/potential)		Groundwater (% of water bodies at good or better quantitative status)		Significant Pressures
	2010	2015	2010	2015	
Dee	28	37	83	83	Nitrate; Pesticides; Phosphate; Invasive non-native species; Commercial fisheries; Metals. Sediment; and Urban and transport pollution.

Source: Environment Agency classification status and environmental objectives, water bodies across England and Wales<sup>31</sup>.

Bathing water in the region is generally of a high quality. Data from 2010 shows that 27 of the 31 bathing waters in the North West achieved the mandatory standard, with three failures at Walney Sandy Gap, Heysham Half Moon Bay and St Annes (Blackpool North bathing water was closed). In 2011 six bathing waters failed to meet the mandatory standards: Heysham Half Moon Bay, St Annes, St Annes North, Blackpool Central, Blackpool South and Fleetwood.

**Table 2.9 Bathing Water Quality in North West England, 2010-2011**

Bathing Water	2011	2010
West Kirby	Pass (G)	Pass
Meols	Pass (G)	Pass (G)
Moreton	Pass (G)	Pass (G)
Wallasey**	Pass (G)	Pass (G)
Formby	Pass (G)	Pass (G)
Ainsdale	Pass	Pass
Southport	Pass (G)	Pass (G)
St Annes	Fail (2) (3)	Fail (1) (2)*
St Annes North	Fail (1) (3)	Pass*
Blackpool South	Fail (1) (2)	Pass*

<sup>31</sup> [http://www.environment-agency.gov.uk/static/documents/Research/Classification\\_objectives\\_for\\_WFD\\_cycle\\_1.xls](http://www.environment-agency.gov.uk/static/documents/Research/Classification_objectives_for_WFD_cycle_1.xls)  
[Accessed June 2012].

Bathing Water	2011	2010
Blackpool Central	Fail (1) (2)	Pass*
Blackpool North	Closed	Closed
Bispham	Pass	Pass*
Cleveleys	Pass	Pass*
Fleetwood	Fail (1) (2)	Pass
Heysham Half Moon Bay	Fail (0) (2)	Fail (0) (2)
Morecambe South	Pass	Pass
Morecambe North	Pass	Pass
Walney Biggar Bank	Pass (G)	Pass
Walney Sandy Gap	Pass	Fail (0) (2)
Walney West Shore	Pass	Pass
Roan Head	Pass	Pass
Askam-in-Furness	Pass	Pass
Haverigg	Pass	Pass
Silecroft	Pass (G)	Pass (G)
Seascale	Pass	Pass
St Bees	Pass (G)	Pass
Allonby South	Pass*	Pass
Allonby	Pass*	Pass
Silloth	Pass	Pass
Skinburness	Pass	Pass

Pass (G): Indicates that the bathing water achieved the more stringent guideline standard (for total and faecal coliforms and faecal streptococci), as well as the mandatory standard. Fail (-): The number in brackets indicates the number of failing coliform samples - (1 failure in 20 samples is a "pass" under the rules for assessing compliance). \* Indicates Abnormal Weather Waiver. Source <http://archive.defra.gov.uk/environment/quality/water/waterquality/bathing/documents/bathing-waters-results-summary-2011.pdf> [Accessed September 2012].

There are 100 designated coastal bathing waters along the Welsh coast which are tested for compliance with water quality standards under the EC Bathing Waters Directive. In 2010 all beaches met mandatory water quality standards. In 2011 Llandudno West failed to meet the mandatory standards which led to a decrease to 98.9% compliance. In 2010, 85% of beaches met the guideline standards, a decrease of 4% on 2009<sup>32</sup>. In 2011 this increased to 93.2%, the best performance recorded in Wales<sup>33</sup>. Bathing waters in Wales are popular destinations to tourists and recreation users and are important to the Welsh economy.

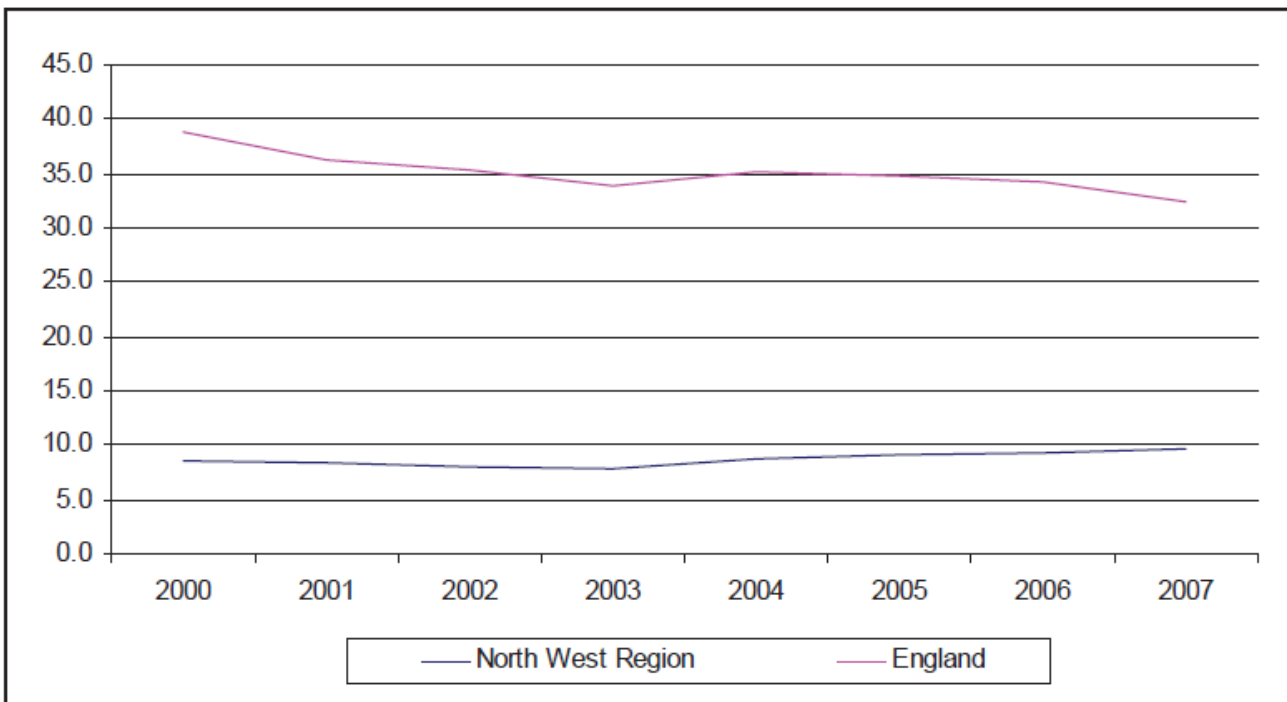
<sup>32</sup> WAG (2010). *State of the Environment: Indicator 36b*. Available at: [www.stats.wales.gov.uk/TableViewer/document.aspx?ReportId=5878](http://www.stats.wales.gov.uk/TableViewer/document.aspx?ReportId=5878) [Accessed June 2012]

<sup>33</sup> [http://www.environment-agency.gov.uk/static/documents/Leisure/2011\\_BATHING\\_WATERS\\_REPORT\\_WALES.pdf](http://www.environment-agency.gov.uk/static/documents/Leisure/2011_BATHING_WATERS_REPORT_WALES.pdf) [Accessed June 2012].

*Nitrate Zones*

Nitrate Vulnerable Zones (NVZs) are areas of land that drain into surface or ground water where nitrate levels are already high (greater than 50mg/l), or may have high levels of nitrate in the future. Rivers in the North West have been shown to have generally lower nitrate levels than the English average (see Figure 2.7). Only 9.7% of river length in the region had high levels of nitrate which compares with an English average of over 30%<sup>17</sup>.

**Figure 2.7 Percentage River Length with High Nitrate Levels (>30mg/l) for North West and England**



Source: Northwest Regional Development Agency (2010) Environment Evidence Base RS2010, available from [http://www.4nw.org.uk/downloads/documents/aug\\_10/4nw\\_1280991230\\_Environment\\_Evidence\\_Base.pdf](http://www.4nw.org.uk/downloads/documents/aug_10/4nw_1280991230_Environment_Evidence_Base.pdf) [Accessed August 2012]

In 2009 the NVZs in Wales extended to 2.1% of total land area, with the majority being in the North East and South East of Wales close to the English border. This is a reduction from 2008 but an overall increase of 0.4% since 2002<sup>34</sup>.

The lower parts of the River Dee were designated as a Water Protection Zone (WPZ) in 1999. This is the only designated WPZ in the UK and was designated to protect public water supply sources from point source pollution

<sup>34</sup> WAG (2010). State of the Environment: Indicator 36d. Available at: [www.statswales.wales.gov.uk/TableViewer/document.aspx?ReportId=6069](http://www.statswales.wales.gov.uk/TableViewer/document.aspx?ReportId=6069) [Accessed June 2012].

on the river. This designation means that consent from the Environment Agency is required before substances including fuels, medicines and liquid foods can be used within the zone<sup>35</sup>.

### *Flood Risk*

Parts of the area supplied by United Utilities are prone to flooding. Much of the coastal area is at risk of tidal flooding, particularly low-lying land adjacent to the major estuaries in the region including the Solway Firth, the rivers entering Morecambe Bay, the Ribble, the Mersey and the Dee. The major rivers in the region also pose a flood risk to people and property, with notable incidents in recent years at Carlisle (River Eden) and West Cumbria and Cocker mouth (River Cocker and Derwent).

In 2010 the Environment Agency identified that around 159,000 homes and 14,000 commercial properties are at risk of flooding in the North West region, although many of these are already protected by flood defences. Figure 2.8 shows the location of areas most at risk from flooding. Approximately 220,000 properties in Wales are at risk from river and sea flooding of which 64,000 are at significant risk (greater than a 1 in 75 chance in any year).

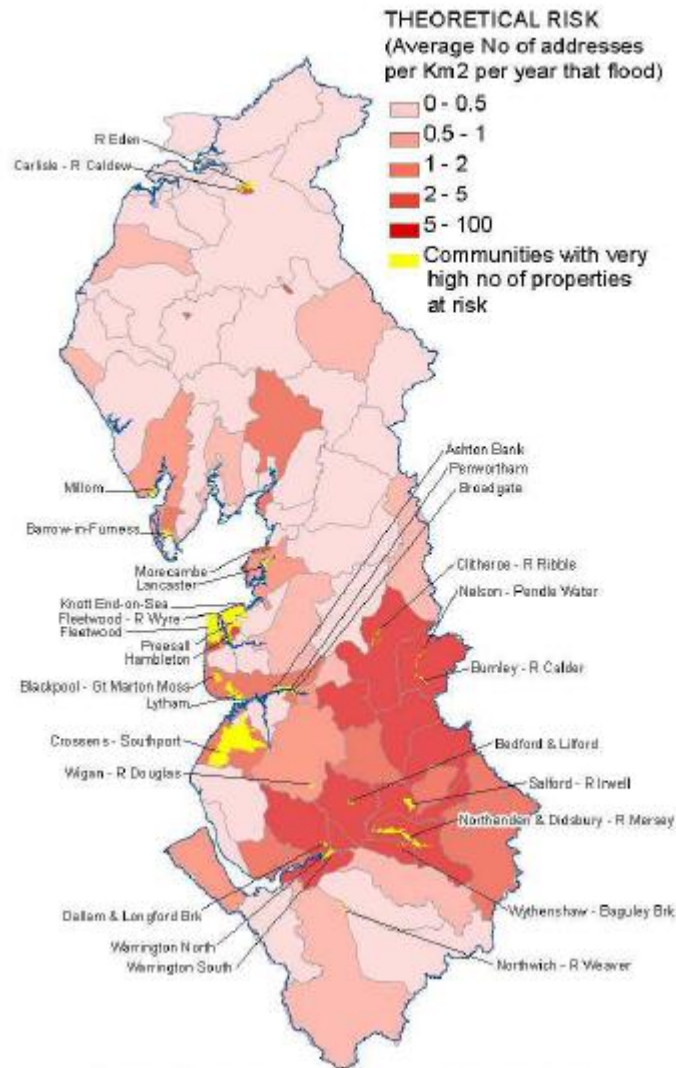
Sewer flooding can result from blockages within sewers and from capacity of sewers being exceeded due to intense or prolonged rainfall. In 2011/12 the number of internal sewer flooding incidents in the area served by United Utilities was 500, compared to 1,063 in the previous year<sup>18</sup>. Additionally, United Utilities' infrastructure may be at risk of flooding and flood events could lead to disruption to water supply and pollution incidents.

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<sup>35</sup> Department for Environment, Food and Rural Affairs (2008). Consultation on Draft Statutory Instrument to amend provisions of the Water Resources Act 1991 for Water Protection Zones, and related Draft Statutory Guidance for the Environment Agency. Defra: London.



Figure 2.8 Priority Risk Areas in the North West Located within the Flood Plain



Source: Environment Agency (2010) *North West Regional Contribution 2010-2015 Evidence Pack*, available from [http://www.environment-agency.gov.uk/static/documents/Research/NW\\_Reg-contrib\\_evidence\\_summary.pdf](http://www.environment-agency.gov.uk/static/documents/Research/NW_Reg-contrib_evidence_summary.pdf) [Accessed August 2012]

### Future Trends

- Under the WFD, rivers in England and Wales are required to achieve ‘good ecological status’ by 2015. Where this is not possible and subject to criteria set out in the Directive, the aim is to achieve good status by 2021 or 2027.
- Pressure to meet demand for public water supply in the area will increase as the population grows, despite efforts to manage demand through water efficiency and leakage reduction. Investigations being undertaken and the WFD will result in further sustainability reductions, over and above those already identified.

- WFD Characterisation reports have identified that rivers within the south east and northern areas are considered ‘at risk’ or ‘probably at risk’ of failing to meet the objectives of the Directive, pressures include point and diffuse source pollution.
- The National Environment Programme (NEP) is a list of environmental improvement schemes produced by the Environment Agency that ensure that water companies meet European and national targets related to water. The NEP includes requirements for water companies to undertake improvement schemes, or where more evidence is required, to investigate a particular problem. A total of 207 actions have been identified for United Utilities (comprising 131 improvement actions, 35 investigations, 38 event duration monitoring, 2 catchment management actions and 1 field trial).
- There are a total of 30 Restoring Sustainable Abstraction (RSA) schemes in the North West region (64% of which relate to water company abstraction). These schemes seek to reduce the amount of water taken from the environment and to prevent and reduce environmental damage by modifying abstraction licences. Of those schemes in the North West, 12 sites are in Habitats Directive-designated areas, 1 site is in a SSSI and 15 sites are within areas of local interest. There are a further 25 schemes in Wales, 42% of which are water company schemes.
- Climate change presents increased risk with respect to coastal flooding in the long term, while climate change combined with an increase in housing numbers or urban area presents an increased risk to fluvial and sewer flooding.
- The UK Climate Programme 2009 (UKCP09) projections for the North West for the medium emissions scenario central estimate (50% probability) that:
  - Winter mean precipitation will increase by 16% by the 2080s. It is very unlikely to increase by less than 3% and is very unlikely to increase by more than 34%.
  - Summer mean precipitation will reduce by 22% by the 2080s. It is very unlikely that summer mean precipitation will reduce by more than 43% and it is very unlikely that it will increase by more than 0%<sup>36</sup>.

## 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.

<sup>36</sup> UKCP09 *Key Findings*, available from <http://ukclimateprojections.defra.gov.uk/22324> [Accessed August 2012]

## 2.2.5 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). Such thresholds are set as objectives and include pollutants such as nitrogen dioxide (NO<sub>2</sub>), sulphur dioxide (SO<sub>2</sub>) volatile organic compounds (VOCs) and fine particles (known as 'particulates'). Air Quality Management Areas (AQMAs) 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*<sup>37</sup>.

In a 2010 report<sup>17</sup>, the North West Regional Development Agency gathered evidence on air quality within the region. They found that, apart from carbon monoxide, all key air pollutants have shown major decreases in recent years, and that this is likely to be due to a combination of stricter air quality standards and the de-industrialising of the region. They also found that:

- Air quality is better in the northern part of the region (Cumbria).
- Carbon monoxide levels have increased due to growing traffic in the region, particularly in major cities at peak travelling times.
- Although 18% more carbon monoxide was released in 2007 than in 1998, the amount is well below the peak in 2003 and the trend is downward.
- Transport emissions are increasing and congestion appears to increase pollutant levels more than traffic volume. CO<sub>2</sub> and nitrogen oxides (NO<sub>x</sub>) emissions are, therefore, problematic in a localised pattern around congestion hot spots.
- Large reductions in levels of SO<sub>x</sub> and particulates have contributed to improving air quality, but particulate matter is still one of the main pollutants in urban areas. The other main pollutant is ozone.

In 2006, the North West emitted 136,200 tonnes of NO<sub>x</sub>, 50,200 tonnes of SO<sub>2</sub> and 12,000 tonnes of particulates (PM10). This accounted for 10% of the total NO<sub>x</sub> emissions, 8% of the total SO<sub>2</sub> emissions and 9% of all PM10 emissions nationally.

The number of days when pollution was moderate or higher in Wales has fluctuated from year to year although since 2006 there has been a general improvement (reduced number of days when air pollution was moderate or higher). In 2010 the number of days when air pollution was moderate or higher at urban sites was highest in Port Talbot Margam (18) and lowest in Chepstow (2) and at Swansea (0). The main causes of pollution at urban sites are fine particles (PM10) and ozone. The hot summer in 2003 was a major factor in the high figures for 2003 that

<sup>37</sup> Defra (2007) *Air Quality Strategy for England, Scotland, Wales and Northern Ireland*, available from [www.defra.gov.uk/publications/2011/03/28/air-quality-strategy-vol2-pb12670/](http://www.defra.gov.uk/publications/2011/03/28/air-quality-strategy-vol2-pb12670/) [Accessed August 2012]

deviated from the downward trend. The main cause of air pollution in rural areas is the variation in ozone levels, which are affected by the weather<sup>38</sup>.

A total of 28 of the North West region's 39 local authorities have declared AQMAs<sup>39</sup>, largely reflecting an increase in emissions from road transport. There was also a steep increase from 4 to 13 AQMAs declared in Wales between 2000 and 2002 but a steadier increase to 15 AQMAs between 2002 and 2007. However, between 2007 and 2011 the number of designations more than doubled to 31. This is partly related to the implementation of the Air Quality Strategy in 2000 and the improved methodologies for reviewing, assessing and identifying locations which have air quality problems.

### Climate

The effects of climate change are potentially some of the most significant environmental problems facing this area. These effects could include increased variability in precipitation and drought patterns, increased sea levels and a higher risk of flooding. By the 2080s sea level increases of up to 63cm across most of the North West region are expected along with more frequent storm surges<sup>40</sup>.

The UK Climate Programme 2009 modelled the effect of different climate emissions scenarios. For North West England the central estimate (50% probability of occurring) indicates that there will be an increase in the amount of winter rainfall by around 16%, and an increase in average summer temperatures of 3.7°C by 2080. For Wales the central estimate (50% probability of occurring) indicates that there will be an increase in the amount of winter rainfall by around 19%, and an increase in average summer temperatures of 3.5°C by 2080. It is also forecast that there will be an increase in the number of dry periods exceeding 10 days during summers and the number of extreme hot days.

A report by ClimateUK<sup>40</sup> highlights that climate change could see river flows in important regional rivers such as the Eden, Lune and Mersey (all of which have major water supply abstractions and wastewater discharges), reduce by as much as 80%, with impacts for households and businesses, especially during times of drought. The changes in climate are expected to result in an increase in the number of flash flooding events, place increased pressure on the capacity of the sewerage system, increase the frequency of summer water shortages and low flows in rivers and result in the loss of habitats and species.

Greenhouse gases including CO<sub>2</sub> emitted from human actions is a major contributor to climate change. The amount of CO<sub>2</sub> emitted in North West England between 2005 and 2009 is shown in Table 2.10 and highlights that emissions have reduced since 2005 by 14% to 51,602kt CO<sub>2</sub> in 2009, principally because of a decline in emissions from the industry and commercial sector (which represents the largest source of CO<sub>2</sub> emissions in the region).

<sup>38</sup> Welsh Government (2011) State of the Environment: Indicator 33a, available from <http://www.statswales.wales.gov.uk/TableViewer/document.aspx?ReportId=5756> [Accessed June 2012]

<sup>39</sup> Defra(2012) *List of Local Authorities with AQMAs*, available from <http://aqma.defra.gov.uk/list.php> [Accessed August 2012]

<sup>40</sup> ClimateUK (2012) *A Summary of Climate change Risks for North West England*, available from [http://www.climatechangenorthwest.co.uk/assets/files/documents/jan\\_12/cli\\_1327577206\\_NW\\_CCRA.pdf](http://www.climatechangenorthwest.co.uk/assets/files/documents/jan_12/cli_1327577206_NW_CCRA.pdf) [Accessed August 2012]

**Table 2.10 End User Estimates of Carbon Emissions (kt CO<sub>2</sub>), North West England 2005-2009**

End User	2005	2006	2007	2008	2009
Industry and Commercial	27,152	26,421	25,910	25,421	22,043
Domestic	17,649	17,564	17,054	16,889	15,221
Road Transport	14,912	14,732	14,793	14,348	13,903
LULUCFa	460	446	438	430	434
Total	60,173	59,162	58,194	57,087	51,602
Per Capita Emissions (t)	8.8	8.63	8.48	8.3	7.48

NB: due to rounding totals may not sum exactly

Source: DECC (2011) *2009 Local Authority CO<sub>2</sub> Figures*, available from

[http://www.decc.gov.uk/en/content/cms/statistics/climate\\_stats/gg\\_emissions/2009\\_laco2/2009\\_laco2.aspx](http://www.decc.gov.uk/en/content/cms/statistics/climate_stats/gg_emissions/2009_laco2/2009_laco2.aspx) [Accessed August 2012]

The amount of CO<sub>2</sub> emitted in Wales between 2005 and 2009 has also reduced since 2005 by 15.3% to 28,393kt CO<sub>2</sub> in 2009 because of a decline in emissions from the industry and commercial sector (which represents the largest source of CO<sub>2</sub> emissions in Wales). The reduction in CO<sub>2</sub> emissions is greater than that of the North West and England over the same period.

Increasing the amount of renewable energy generation is one response to the need to reduce CO<sub>2</sub> emissions. The North West is a leading region for renewable energy generation, with most renewable energy currently generated from landfill gas. The most recent data from the Department of Energy and Climate Change<sup>41</sup> shows that in 2009, the North West had an installed capacity of 613.7MWe from sites generating electricity from renewable sources. This was an increase of 11% on 2008 and the third highest regional capacity at 17% of the total capacity in England.

In 2010/11 total gross emissions from United Utilities (sum of all emissions from grid electricity, process and fugitive emissions, waste disposal, direct emissions, fleet transport and business travel) was 570,963 tonnes of CO<sub>2</sub> equivalent to a fall of 0.7% on the previous year<sup>18</sup>. In order to reduce emissions further, United Utilities are accelerating their plans for renewable energy generation. They already operate sewage gas powered CHP and have been able to generate 14% of their total business electricity consumption.<sup>42</sup>

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. Where available, this information has been utilised within the assessment of the dWRMP options.

<sup>41</sup> Available from <https://restats.decc.gov.uk/cms/histoicregionalstatistics/> [Accessed August 2012]

<sup>42</sup> United Utilities (2011) *Increasing Our Renewable Energy Generation*, available from <http://corporateresponsibility2011.unitedutilities.com/renewableenergygeneration.aspx> [Accessed August 2012]

## Future Trends

### Air Quality

- With increasingly strong air quality legislation and de-industrialisation, levels of the majority of air pollutants will continue to decline.
- Pollutants associated with road transport (ozone, carbon monoxide) will be harder to reduce particularly in hotspot areas of traffic congestion.

### Climate Change

- The UK Climate Programme 2009 (UKCP09) provides climate information for different emissions scenarios (high, medium, low) and differing levels of uncertainty. For North West England (under medium emissions), by the 2080s the UKCP09 central estimate (50% probability) indicates that there will be:
  - An increase in winter mean temperature of 2.6°C; it is very unlikely to be less than 1.4°C and is very unlikely to be more than 4°C.
  - An increase in summer mean temperature of 3.7°C; it is very unlikely to be less than 2°C and is very unlikely to be more than 5.9°C.
  - A change in annual mean precipitation of 0%; it is very unlikely to be less than -8% and is very unlikely to be more than 8%.
  - A change in winter mean precipitation of 16%; it is very unlikely to be less than 3% and is very unlikely to be more than 34%.
  - A change in summer mean precipitation of -22%; it is very unlikely to be less than -43% and is very unlikely to be more than 0%<sup>43</sup>.
- A 2012 report by ClimateUK identifies a range of potential impacts associated with changes in average temperatures, precipitation and sea level rise including:
  - An increase in flood risk from both tidal and fluvial sources.
  - A reduction in water availability in the summer which would affect all water users including homes, industry and business.
  - Changes to the natural environment including impacts on habitats and species. These changes are likely to include changing locations of species, different migration patterns and disruption to the synchronisation of breeding cycles with food supplies.
  - Adverse impacts on the marine environment including reduced marine water quality and an increase in non-native invasive species.

<sup>43</sup> UKCP09 (2009) *Key Findings*, available from <http://ukclimateprojections.defra.gov.uk/22324> [Accessed August 2012].



- Under the Kyoto Protocol, the UK has agreed a legally binding target to reduce its greenhouse gas emissions to 12.5% below the base year level over the period 2008-2012 (the base year is comprised of 1990 for CO<sub>2</sub>, methane and nitrous oxide, and 1995 for fluorinated compounds).
- The UK Climate Change Act 2008 has now set legally binding targets for the UK to reduce greenhouse gas emissions by at least 80% by 2050, and CO<sub>2</sub> emissions by at least 26% 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 22%, 28% and 34% reductions in carbon emissions compared to 1990 levels respectively.
- 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. However, United Utilities are committed to reducing their emissions by 21% by 2015 and halving emissions by 2035 (against a 2006 baseline).

## Key Sustainability Issues Relevant to the WRMP

The key sustainability issues arising from the baseline assessment for air 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.

### 2.2.6 Human Environment

#### Baseline Characteristics

##### *Community*

The population of the North West at March 2011 was 7.1 million<sup>44</sup>, an increase of 4% from 2001. The North West has the third largest population of any English region but had seen a decrease in its population between 1981 and 2001. However, the period from 2001 to 2011 saw population growth of 4%; larger than in the North East but still less than the population growth in other English regions and Wales.

At the sub-regional level, a large proportion of the region's population is concentrated in Greater Manchester which had an estimated population of 2,611,000 in mid-2010 (equating to 37.6% of the region's population). Cumbria

<sup>44</sup> Office of National Statistics (ONS), available from <http://www.ons.gov.uk/ons/rel/mro/news-release/census-result-shows-increase-in-population-of-the-north-west/censusnorthwestnr0712.html> [Accessed August 2012]

has the lowest (county) population level accounting for 7.2% of the region's total population<sup>45</sup>. Greater Manchester has experienced the most significant population change between 2009 and 2010 in absolute and percentage terms, equating to 28,488 people (see Table 2.11). Both Cumbria and Blackpool UA have experienced a decline in population over the same period.

**Table 2.11 Components of Population Change (mid 2009-mid 2010)**

County/Unitary Authority	Mid 2009	Natural Change	Net Migration & Other Changes	Total Change	Mid 2010	+/- ve
Blackburn with Darwen UA	139,900	978	-833	145	140,045	+ve
Blackpool UA	139,998	-49	25	-24	139,974	-ve
Cheshire East UA	362,659	259	902	1,161	363,820	+ve
Cheshire West and Chester UA	326,555	620	125	745	327,300	+ve
Halton UA	118,707	616	-60	556	119,263	+ve
Warrington UA	197,763	691	451	1,142	198,905	+ve
Cumbria	495,043	-230	-463	-693	494,350	-ve
Greater Manchester	2,600,900	13,989	14,499	28,488	2,629,388	+ve
Lancashire	1,1665,803	2,182	1,285	3,467	1,169,270	+ve
Merseyside	1,350,577	1,898	946	2,844	1,353,421	+ve

Source: ONS (2011) *Mid-2009 to Mid-2010 Population Estimates: Components of population change for local authorities in the United Kingdom*, available from <http://www.ons.gov.uk/ons/publications/re-reference-tables.html?edition=tcm%3A77-231847> [Accessed August 2012]

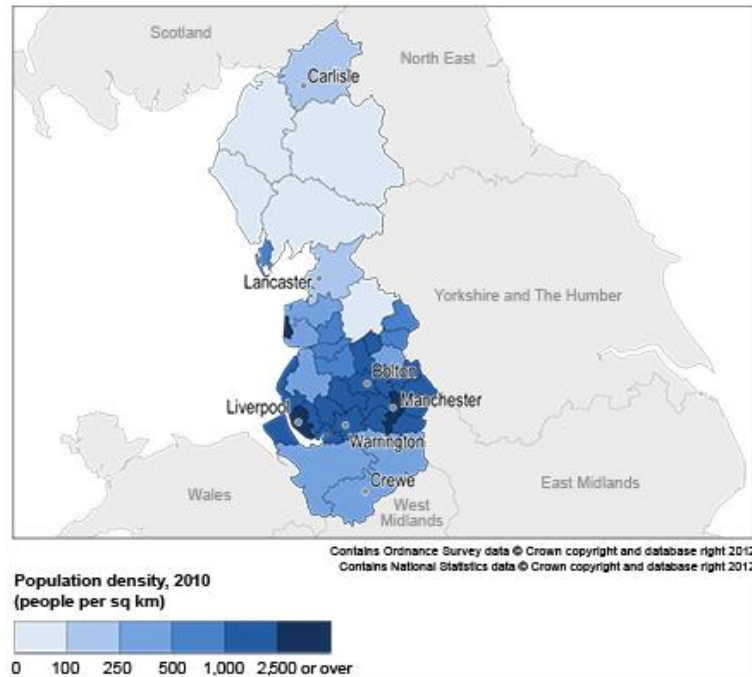
As at 2010 it is estimated that over 87% of the population of the North West lived in urban areas contributing to the second highest regional population density in the UK (490 people per sq km)<sup>46</sup>. Within the region, population density varies widely. Merseyside has 1.4 million residents living in 645km<sup>2</sup> (equivalent to 2,100 people per km<sup>2</sup>). In comparison, Cumbria is largely rural with approximately 0.5 million residents living in 6,800km<sup>2</sup> (equivalent to 70 people per km<sup>2</sup>). Figure 2.9 illustrates the population density in the region.

<sup>45</sup> ONS (2011) *2010-based subnational population projections for England*, available from <http://www.ons.gov.uk/ons/rel/snpp/sub-national-population-projections/2010-based-projections/stb-2010-based-snpp.html#tab-Projections-for-regions> [Accessed August 2012]

<sup>46</sup> ONS (2012) *North West Regional Profile: Key Statistics*, available from <http://www.ons.gov.uk/ons/rel/regional-trends/region-and-country-profiles/key-statistics-and-profiles---august-2012/key-statistics---north-west---august-2012.html> [Accessed August 2012]



**Figure 2.9 Population Density in the North West, 2010**



Source: Source: North West Regional Intelligence unit (2010) *Summary of the Evidence Base RS2010 Population Change*, available from [http://www.4nw.org.uk/downloads/documents/aug\\_10/4nw\\_1280991964\\_Population\\_Change\\_Evidence\\_Bas.pdf](http://www.4nw.org.uk/downloads/documents/aug_10/4nw_1280991964_Population_Change_Evidence_Bas.pdf) [Accessed August 2012]

The population of North East Wales (defined as the North Wales Spatial Plan Area) stood at 491,200 in 2009, an increase of 2.4% since 2001 (when the population of the area was 479,900)<sup>47</sup>.

### Health

Life expectancy is used as a broad measure of the health of an area and where a person is born largely influences how long they will live. In England the average life expectancy at birth in 2005/7 was 79.7 years for all persons compared with 78.2 years in the North West<sup>48</sup>. The region has the lowest life expectancy across all regions and the highest rates of early death from heart diseases. Compared with the rest of England, men in the North West can expect to live 1.6 years less on average whilst women can expect to live 1.4 years less<sup>49</sup>.

<sup>47</sup> Office for National Statistics (reported in <http://www.stats.wales.gov.uk/TableViewer/document.aspx?ReportId=4849>) [Accessed June 2012]

<sup>48</sup> North West Regional Intelligence Unit (2010) *Summary of the Evidence Base RS2010 Health and Wellbeing*, available from [http://www.4nw.org.uk/downloads/documents/aug\\_10/4nw\\_1280991389\\_Health\\_and\\_Wellbeing\\_Evidence\\_.pdf](http://www.4nw.org.uk/downloads/documents/aug_10/4nw_1280991389_Health_and_Wellbeing_Evidence_.pdf) [Accessed August 2012]

<sup>49</sup> NHS North West (2011) *North West Strategic Health Authority Annual Monitoring Report 2010/2011*, available from [http://www.northwest.nhs.uk/document\\_uploads/Publications/Annual-Report-2010-2011.pdf](http://www.northwest.nhs.uk/document_uploads/Publications/Annual-Report-2010-2011.pdf) [Accessed August 2012]

According to the 2001 Census<sup>50</sup>, 17.1% of the North West's population was classified as having a long term limiting illness, 2.1 percentage points above the UK figure of 15.7%. The only other region ranked lower than the North West is the North East at 19.4%. The local authority of Knowsley was the worst performing authority in the North West and was ranked 425 out of 434 local authorities in England with 23.1% of people classified as having a long term limiting illness. There are also geographical variations in health in Wales and in this respect the percentage of adults with a limiting long term illness in North East Wales is lower than any other area in Wales (approximately 25% in 2008-2009). However, this remains higher than North West and UK averages.

### Economy

The proportion of economically active people during the period January 2012 to March 2012 was marginally lower in the North West and Wales than for the UK as a whole (see Table 2.12). Economically active in this context is defined as those persons of working age who are employed or looking to be employed. In the same period, the unemployment rate was 1.1% higher in the North West than the UK average whilst the rate in Wales was 1% higher.

**Table 2.12 Economic Activity (January 2012 - March 2012)**

	North West Levels	North West %	Wales Levels	North Wales %	UK Levels	UK %
Economically Active	3,497,000	76.8	1,473,000	75.0	32,039,000	77.4
In Employment	3,179,000	69.6	1,341,000	68.1	29,476,000	71.0
Unemployed	319,000	9.1	132,000	9.0	2,564,000	8.0

Source: NOMIS (2012) *Labour Market Profiles*, available from <https://www.nomisweb.co.uk/reports/lmp/la/contents.aspx> [Accessed August 2012]

Table 2.13 lists jobs by industry sector and indicates that the largest proportion of jobs in the North West and Wales is within wholesale and retail trade and manufacturing sectors, similar to UK trends. A total of 23,000 jobs in the North West (0.7%) are within the water supply, sewerage and waste management sector, similar to the proportion of jobs in this sector in Wales (0.9%) and for the UK as a whole (0.6%). In the period 2010/11, United Utilities employed around 5,000 people<sup>18</sup>.

<sup>50</sup> Source: ONS (2004) *Limiting Long-term Illness, 2001 Census*, available from <http://www.neighbourhood.statistics.gov.uk/dissemination/> [Accessed August 2012]

**Table 2.13 Workforce Jobs by Industry Sector (March 2012)**

Sector	North West Levels	North West %	Wales Levels	Wales %	UK Levels	UK %
A: Agriculture, forestry and fishing	23,000	0.7	32,000	2.3	420,000	1.3
B: Mining and quarrying	2,000	0.1	2,000	0.1	62,000	0.2
C: Manufacturing	305,000	9.2	143,000	10.4	2,562,000	8
D: Electricity, gas, steam and air conditioning	13,000	0.4	7,000	0.5	130,000	0.4
E: Water supply; sewerage, waste management	23,000	0.7	12,000	0.9	198,000	0.6
F: Construction	213,000	6.4	95,000	6.9	2,038,000	6.4
G: Wholesale and retail trade; repair of vehicles	547,000	16.6	215,000	15.6	4,903,000	15.4
H: Transportation and storage	159,000	4.8	51,000	3.7	1,522,000	4.8
I: Accommodation and food service activities	229,000	6.9	101,000	7.3	2,086,000	6.5
J: Information and communication	94,000	2.8	26,000	1.9	1,239,000	3.9
K: Financial and insurance activities	102,000	3.1	31,000	2.2	1,137,000	3.6
L: Real estate activities	45,000	1.4	15,000	1.1	435,000	1.3
M: Professional, scientific and technical activities	226,000	6.8	65,000	4.7	2,468,000	7.8
N: Administrative and support service activities	251,000	7.6	82,000	5.9	2,492,000	7.9
O: Public administration and defence	160,000	4.8	84,000	6.1	1,618,000	5.1
P: Education	283,000	8.6	135,000	9.8	2,698,000	8.6
Q: Human health and social work activities	473,000	14.3	208,000	15.1	4,022,000	12.8
R: Arts, entertainment and recreation	77,000	2.3	37,000	2.7	874,000	2.8
S: Other service activities	77,000	2.3	37,000	2.7	914,000	

Source: NOMIS (2012) *Labour Market Profiles*, available from <https://www.nomisweb.co.uk/reports/lmp/la/contents.aspx> [Accessed August 2012]

### Transport<sup>28</sup>

The North West is easily accessible from the north and the south via the M6 and the West Coast mainline railway between London and Edinburgh; from east to west, the M62 connects Liverpool to Leeds. There are two major international airports in the region; in 2008 Manchester handled 21.0 million passengers and Liverpool 5.3 million. The North West also has a major seaport in Liverpool, which handled 5% of all UK sea freight in 2008 (32.2 million tonnes).

In 2007/2008, the average resident of the North West made around 980 journeys within Great Britain each year. Yorkshire and Humber and London were the only English regions where residents made fewer journeys than the

North West. Over the same time period, the average distance travelled per person per year in the North West by all modes of transport was relatively low at 6,400 miles. This is similar to the North East but not as low as London residents, who travelled the smallest distance (5,300 miles). In the North West, over 5,200 miles (84%) were undertaken as a car driver or passenger or by other private road vehicle, similar to the Great Britain average of 81%.

With over 20,000 accidents in 2008, the North West's roads are among the most dangerous in the country. Relative to the volume of traffic, the accident rate on major roads was the highest outside London at 275 per billion vehicle kilometres, compared with the average of 260 for Great Britain.

### Tourism

In 2009, 13.7 million UK domestic overnight trips were made to the North West generating a total spend of £2.4 billion<sup>51</sup>. Visitor spend in the region directly supports an estimated 168,000 workforce jobs in the North West, totalling 5.1% of the regional workforce in 2007. This total, which includes part time and seasonal workers as well as owner-managers and the self employed, is equivalent to around 135,000 full time equivalent jobs (FTEs)<sup>52</sup>.

In 2011, 9.7 million UK domestic tourist trips were made to Wales generating £1,734 million<sup>53</sup>. Based on 2010 data (2011 datasets were not available), 3.4 million tourist trips were made to North Wales. This figure compares with 1.59 million trips to Mid Wales, 1.84 million to the South West and 1.68 million to the South East<sup>54</sup>. Data for 2009 shows that £332 million was generated from 991,000 overseas visits<sup>55</sup>.

With specific regard to water resources, large seasonal fluxes in tourist numbers create additional demand on water resources in summer months when demand is already at its highest. There may be an increasing trend in the near future in light of the expected increase in domestic holidays due to the current economic climate. United Utilities own 76 sites, including reservoirs, where public access is encouraged and more than 60% of the company's land is designated as open space or registered common land under the Countryside and Rights of Way Act 2000<sup>18</sup>. United Utilities' waste water management activities also influence the tourist industry due to the impacts on river and bathing water quality.

<sup>51</sup> Visit England (2010) *North West Tourism Statistic – Key Facts*, available from [http://www.visitengland.org/Images/North%20West%20Tourism%20FactsheetLisaedits2\\_tcm30-18377.pdf](http://www.visitengland.org/Images/North%20West%20Tourism%20FactsheetLisaedits2_tcm30-18377.pdf) [Accessed August 2012]

<sup>52</sup> North West Regional Intelligence Unit (2010) *Culture, Image and Heritage Evidence Base RS2010*, available from [http://www.4nw.org.uk/downloads/documents/aug\\_10/4nw\\_1280991024\\_Culture\\_Image\\_and\\_Heritage\\_Evi.pdf](http://www.4nw.org.uk/downloads/documents/aug_10/4nw_1280991024_Culture_Image_and_Heritage_Evi.pdf) [Accessed August 2012]

<sup>53</sup> Welsh Government (2012). *Great Britain Tourism Survey*. Available at: <http://wales.gov.uk/topics/tourism/research/tourisminwales/volumeandvalue/?lang=en> [Accessed June 2012]

<sup>54</sup> Welsh Government (2010). *Domestic Tourism to Wales in 2008, 2009 and 2010*. Available at: <http://wales.gov.uk/topics/tourism/research/tourisminwales/volumeandvalue/?lang=en> [Accessed June 2012]

<sup>55</sup> Welsh Government (2010). *Tourist traffic to Wales: Total expenditure*. Available at: <http://www.statswales.wales.gov.uk/ReportFolders/reportFolders.aspx> [Accessed June 2012]

### Deprivation

The English Index of Deprivation (IMD) measures relative levels of deprivation in small areas of England called Lower Layer Super Output Areas (LSOA). Deprivation refers to an unmet need, which is caused by a lack of resources including for areas such as income, employment, health, education, skills, training, crime, access to housing and services, and living environment.

The North West region has 900 of the 10% most deprived LSOAs in England. There are 4,459 LSOAs in total in the region, therefore over a fifth (20.2%) of all its LSOAs are in the 10% most deprived. The region has a greater proportion of its LSOAs in the most deprived 10% than any other region. The North West region has 41.0% of its LSOAs in the 50% least deprived LSOAs on the IMD 2010.

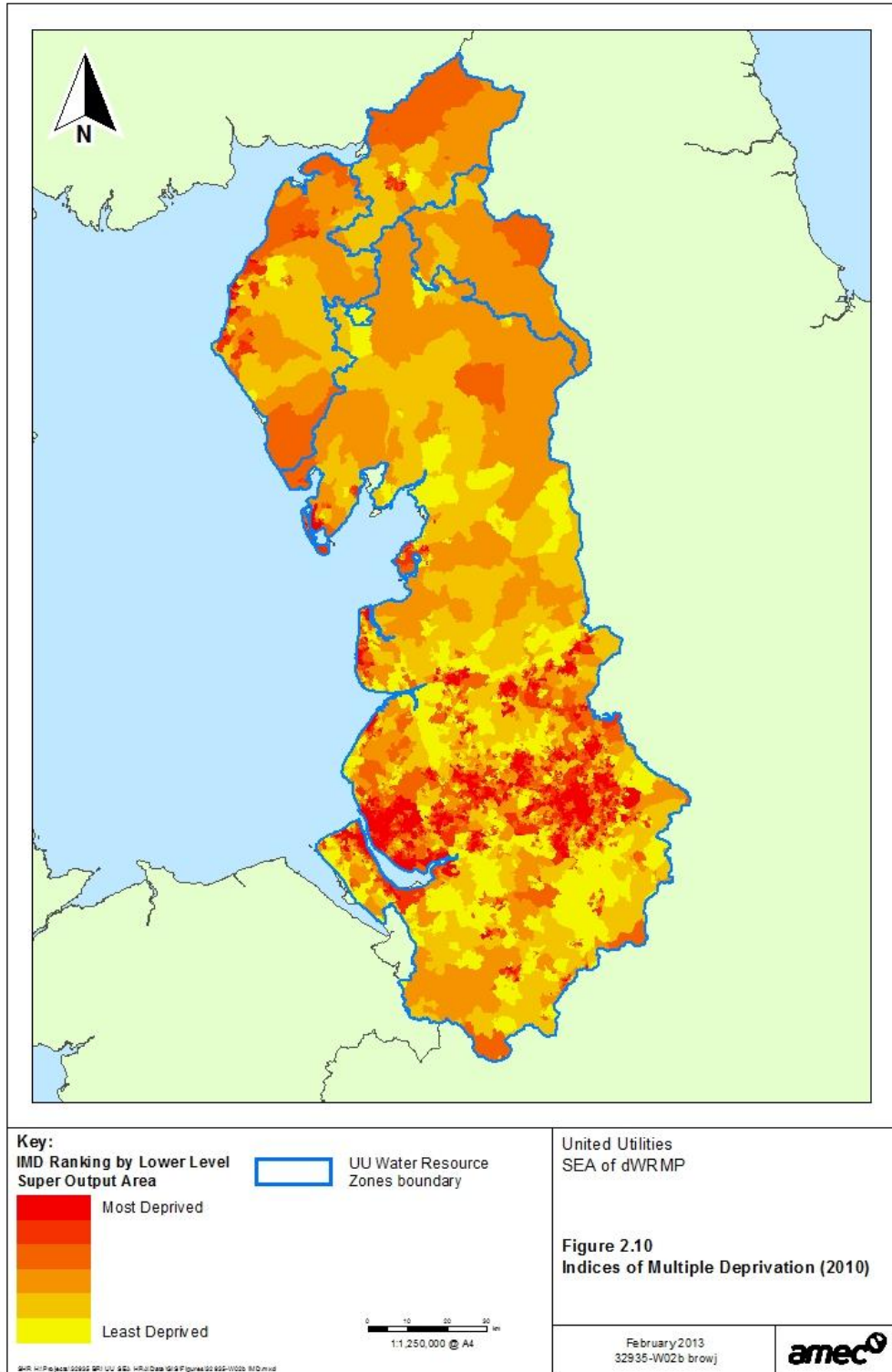
A map ranking each of the LSOAs within the United Utilities supply area is shown in Figure 2.10. Severe deprivation is evident in most of the districts. Concentrations of LSOAs showing deprivation in the most deprived decile are found in the urban areas in and around Liverpool and Manchester. As with the previous Indices, the Merseyside districts of Liverpool, Sefton, Knowsley and St Helens, along with the area of Birkenhead on the Wirral, stand out as containing large concentrations of LSOAs with high levels of deprivation, as do many of the districts in Greater Manchester including Manchester, Wigan, Bolton, Salford and Oldham. Further concentrations of deprived areas can be seen in the coastal resort town of Blackpool and also in the series of towns running from the head of the Ribble Valley at Preston through Blackburn, Hyndburn, Burnley and Pendle.<sup>56</sup>

United Utilities invest in programmes that support communities including, for example, United Futures which seeks to help regenerate neighbourhoods following mains and sewer improvement works. In the period 2010/11, the company invested around £2 million in these programmes.<sup>18</sup>

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<sup>56</sup> CLG (2011) *The English Indices of Deprivation 2010*, available from <http://www.communities.gov.uk/documents/statistics/pdf/1870718.pdf> [Accessed September 2012]

Figure 2.10 Indices of Multiple Deprivation (2010)





## Housing

In 2008, there were just over 2.9 million households in the North West, approximately 14% of the English total. If recently observed trends continue, the number of households is projected to rise by 18% over the next 25 years, reaching almost 3.5 million by 2033. This is the smallest projected change among English regions in percentage terms. In 2007, 71% of housing stock was owner occupied (compared to the English proportion, 70%), 12% was rented from a social landlord (the highest proportion of any English region), and 17% was rented from local authorities/privately rented or with a job or business.<sup>17</sup> Household projections for Wales show that by 2033 the number of households is projected to increase by 19% to 1.6 million.

## Future Trends

- The 2010 based sub-national population projections, which are consistent with the mid-2010 population estimates, provide an indication of future population levels if current trends continue. The projections indicate that by 2035 the North West will have an additional 992,000 people, which equates to a 14.3% proportional increase since 2010. Analysis of population projections for 2010 and 2035 at the sub-regional level indicates that there is likely to be little change in where people live with Greater Manchester and Merseyside continuing to have the highest proportion of the region's population.
- The population of Wales is projected to increase by 12% from 2008 to 3.3 million by 2033.
- Projections from the Cross Government Review of Water Affordability published in 2004 indicate that the proportion of customers who pay more than 3% of their income on water and sewerage is likely to have risen from 7.8% in 2004-05 to 10.7% in 2009-10. However, there is currently no means of evaluating these projections and measuring water affordability and it is likely that the current economic situation means that water affordability is an increasingly pressing issue for many customers<sup>57</sup>.
- The number of households in the North West is projected to rise by 18% over the next 25 years, reaching almost 3.5 million by 2033. Household projections for Wales show that by 2033 the number of households is projected to increase by 19% to 1.6 million.
- Future economic growth and job creation is uncertain in the current economic climate.
- There is likely to be an increase in tourist numbers and popularity of water sports and other water based recreational activities.

## 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;

<sup>57</sup> Water UK (2009) *Water UK Sustainability Indicators 2008/09*. London. Water UK.



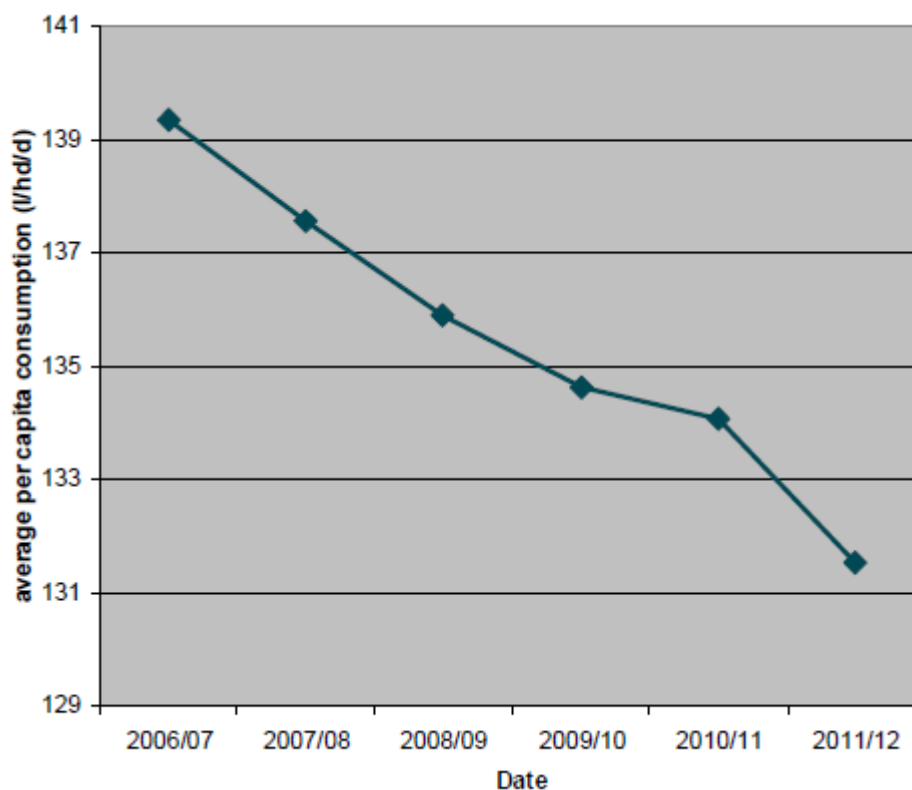
- the need to ensure that water resources remain affordable;
- the need to ensure that the WRMP measures do not impact on the health and well-being of all members of the community;
- the need to ensure that the WRMP measures do not adversely affect the economy;
- the need to ensure that vulnerable people are not affected by implementation of the WRMP measures;
- the need to ensure that WRMP measures do not have an adverse economic impact;
- 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.

## 2.2.7 Material Assets and Resource Use

### *Water Demand*

United Utilities currently abstract about 1,750 million litres of water from the environment every day to meet customer demand in the North West. Figure 2.11 shows that the average per capita water consumption in the United Utilities supply area has reduced between 2006/07 and 2011/12 by approximately 7 litres per head per day (l/hd/d) to 132 l/hd/d. This is lower than the national average of approximately 150 l/hd/d.

Figure 2.11 Per Capita Consumption Trend 2006-7 to 2011-12



Source: United Utilities (2012) *Water Resources Management Plan 2011/12 Annual Review*, available from [http://corporate.unitedutilities.com/documents/Annual\\_Review\\_of\\_Water\\_Resource\\_Management\\_Plan.pdf](http://corporate.unitedutilities.com/documents/Annual_Review_of_Water_Resource_Management_Plan.pdf) [Accessed August 2012]

As Table 2.14 shows, resource demand is heavily weighted to the Integrated Resource Zone, which is unsurprising given that it is by far the largest area of the four zones and contains the North West's main urban centres.

Table 2.14 Key WRZ Data for United Utilities 2011/12

	Carlisle Resource Zone	Integrated Resource Zone	North Eden Resource Zone	West Cumbria Resource Zone	Regional Total
Water Available for use (own water sources) (M/d)	36	1,991	9	58	2,094
Total Population (000's)	107	6,640	13	144	6,904
Number of metered households (000's)	13	887	2	13	916
Water Consumption by Households (M/d)	14	847	2	22	885

	Carlisle Resource Zone	Integrated Resource Zone	North Eden Resource Zone	West Cumbria Resource Zone	Regional Total
Security of supply index	100%	100%	100%	100%	100%

Source: United Utilities (2012) *Water Resources Management Plan 2011/12 Annual Review*, available from [http://corporate.unitedutilities.com/documents/Annual\\_Review\\_of\\_Water\\_Resource\\_Management\\_Plan.pdf](http://corporate.unitedutilities.com/documents/Annual_Review_of_Water_Resource_Management_Plan.pdf) [Accessed August 2012]

In 2010, United Utilities had to instigate a drought plan in response to the first 6 months of the year being the driest on record. Restrictions were placed on the use of water (e.g. hosepipe restrictions, or sprinkler/unattended hosepipe restrictions) and lifted six weeks later following further rainfall in the late summer. Drought permits were applied for at four reservoirs, however with further rainfall these were not required. Demand may exceed supply in drought conditions in the future, particularly in view of the required reduction in levels of water abstraction from some rivers to comply with the Habitats Directive.

### Leakage

Leakage levels are affected by a number of factors including the length, age and condition of the water mains network as well as weather conditions. Between 2007/08 and 2010/11, United Utilities' rolling average for leakage increased by approximately half a per cent from 462 million litres per day (ML/d) to 464.24 ML/d. By 2011/2012, total leakage had been reduced to 453 ML/d. Leakage varies between the WRZs reflecting the length of the network, age and condition of pipes, and the volume of water supplied through the network (see Table 2.15).

**Table 2.15 United Utilities Leakage Rates by WRZ**

	Carlisle Resource Zone	Integrated Resource Zone	North Eden Resource Zone	West Cumbria Resource Zone	Regional Total
Total leakage 2010/2011	5.2	441	2.0	16.4	464
Total Leakage 2011/12	5.5	430	2.1	15.7	453

Source: United Utilities (2012) *Water Resources Management Plan 2011/12 Annual Review*, available from [http://corporate.unitedutilities.com/documents/Annual\\_Review\\_of\\_Water\\_Resource\\_Management\\_Plan.pdf](http://corporate.unitedutilities.com/documents/Annual_Review_of_Water_Resource_Management_Plan.pdf) [Accessed August 2012]

### Water Efficiency

In 2011/12, United Utilities saved an estimated 5.01ML/d through water efficiency measures, exceeding Ofwat's target to achieve an average of 2.95 ML/d.<sup>58</sup> Table 2.16 summarises the water efficiency programme in 2011/12.

<sup>58</sup> Ofwat (2009) *Appendix 1: Water efficiency targets 2010-11 to 2014-15*, available from [http://www.ofwat.gov.uk/pricereview/pap\\_pos\\_pr09supdempolapp1.pdf](http://www.ofwat.gov.uk/pricereview/pap_pos_pr09supdempolapp1.pdf) [Accessed August 2012]

**Table 2.16 Summary of United Utilities Water Efficiency Programme 2011/12**

Water Efficiency Activity	Number	Estimated Water Saving (M/d)
Cisten devices distributed to customers	53,380	0.54
Water efficiency customer self audits (saving capped at 30% of 2.95M/d as per Ofwat reporting requirements)	108,482	1.11
Water butts distributed to customers	397	0.001
Crystal packs/water sticks distributed to customers	5,155	0.002
Retrofit devices distributed to customers	64,269	1.79
Free meter options	44,240	1.5
West Cumbria sustainable level of water efficiency programme (shower heads, regulators and audits)	2,446	0.07
<b>Total</b>		<b>5.01</b>

Source: United Utilities (2012) *Water Resources Management Plan 2011/12 Annual Review*, available from [http://corporate.unitedutilities.com/documents/Annual\\_Review\\_of\\_Water\\_Resource\\_Management\\_Plan.pdf](http://corporate.unitedutilities.com/documents/Annual_Review_of_Water_Resource_Management_Plan.pdf) [Accessed August 2012]

Water metering can help improve water efficiency within the home as households pay for the water that they use and as a result typically use less. Figures from Ofwat show that in 2010/11, 39.8% of households (in England and Wales) had a water meter installed<sup>59</sup>. The percentage of metered households varies between different water companies from 23.8% to 70.3%. United Utilities has a lower percentage of household customers that are metered (26%) compared to the England and Wales average (39.8 %). Since 2001, customers have been entitled to trial water meters free of charge. The expected trend is for more customers to have water meters installed over time although demand for meters is expected to decline over the WRMP period as the proportion of households without meters decreases.

### Energy Use

The North West is a major producer and consumer of energy. Total energy consumption in the region was 174.5 terrawatt hours in 2009, about 11.5% of the total UK figure. Table 2.17 provides a breakdown of total energy use in 2009 for the region for industry and commercial uses, domestic and road transport. It shows that industrial and commercial use is slightly above the UK average, whilst domestic energy use is lower.

<sup>59</sup> [http://www.ofwat.gov.uk/regulating/reporting/rpt\\_tar\\_2010-11hhwatcust.xls](http://www.ofwat.gov.uk/regulating/reporting/rpt_tar_2010-11hhwatcust.xls) [Accessed August 2012]

**Table 2.17 Breakdown of Energy Consumption in North West England and Comparison with UK**

Sector	Proportion of Total Regional Energy Use	UK Proportional Energy Use
Industry and Commercial	38.95%	37.18%
Domestic	33.70%	33.33%
Road Transport	26.36%	27.12%

Source: DECC (2010) *Regional Energy Consumption Statistics 2005-2009*, available from <http://www.decc.gov.uk/publications/basket.aspx?filetype=4&filepath=11%2fstats%2fenergy%2fsub-national-energy%2f3948-total-subnatl-final-energy-cons-2005-2008.xls&minwidth=true#basket> [Accessed August 2012]

Energy consumption by source is fairly representative of national trends, with most energy coming from natural gas (40.1%) and petroleum (37.6%). As noted in section 2.2.5, the most recent data from the Department of Energy and Climate Change shows that in 2009, the North West had an installed capacity of 613.7MWe from sites generating electricity from renewable sources. This was an increase of 11% on 2008, the third highest regional capacity at 17% of the total capacity in England.

Total energy consumption in Wales over the period 2005 to 2009 has reduced year-on-year from 108,654 Gigawatt hours (GWh) to 97,730GWh, a decrease of 10.1%. As with the North West region, industry and commercial was the largest energy consuming sector in Wales in 2009 (accounting for 50.3% of total energy consumption) ahead of domestic (27.6%) and transport (22.1%). Petroleum (primarily associated with road transport) and natural gas are also the most dominant energy sources and combined they account for 71.0% of energy use in Wales. Only 2.1% of energy consumed was generated from renewables (including waste) in the same period although this proportion is slightly greater than for the UK as a whole (1.9%).

In 2010/11 United Utilities' electricity use was marginally higher than in 2007/08 at 803GWh (in 2007/08 energy use stood at 798GWh). A total of 14% (11GWh) was generated by renewable technologies at United Utilities' sites. The company has also recently pursued an asset optimisation programme which reduced energy use at 19 wastewater sites and delivered 4.7GWh of power savings.<sup>18</sup>

### *Material Use and Waste Generation*

During 2010/11, 3.63 million tonnes of waste was collected by local authorities in the North West, which constitutes approximately 13% of England's total waste. As highlighted in Table 2.18, the amount of household waste collected by local authorities in the region has reduced between 2002/03 and 2010/11 by approximately 630,000 tonnes per year. Conversely, the recycling rate across the region has risen significantly from 9% in 2000/01 to 40.2% in 2010/11 whilst the amount of municipal waste sent to landfill has fallen from 90% to 55% over the same period (see Table 2.19). However, recycling rates for the North West are below the England average of approximately 43% and, therefore, improvements are still needed to reduce the amount of waste sent to landfill.

**Table 2.18 Quantities of Waste (Thousands of tonnes) Produced in the North West Between 2000 and 2011**

Household Waste from:	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11
Regular household collection	2,571	2,489	2,444	2,385	2,222	2,051	2,021	1,828	1,702	1,608	1,593
Other household sources	279	251	304	262	240	341	177	186	156	171	157
Civic amenity sites	700	750	752	669	582	519	448	383	338	289	247
Household recycling	286	355	445	549	724	907	1,077	1,202	1,269	1,294	1,318
<b>Total household</b>	<b>3,836</b>	<b>3,846</b>	<b>3,945</b>	<b>3,866</b>	<b>3,767</b>	<b>3,818</b>	<b>3,723</b>	<b>3,599</b>	<b>3,465</b>	<b>3,362</b>	<b>3,315</b>
Non household sources (excl. recycling)	191	214	258	283	278	119	256	214	178	206	173
Non household recycling	97	123	141	231	258	222	236	239	209	123	148
<b>Total municipal waste</b>	<b>4,125</b>	<b>4,183</b>	<b>4,344</b>	<b>4,380</b>	<b>4,304</b>	<b>4,159</b>	<b>4,215</b>	<b>4,052</b>	<b>3,852</b>	<b>3,692</b>	<b>3,636</b>

Source: Defra (2011) *Local Authority collected waste for England – annual statistics*, available from <http://www.defra.gov.uk/statistics/environment/waste/wrfq23-wrmsannual/> [Accessed August 2012]

**Table 2.19 Methods of Waste Disposal in the North West (percentages) Between 2000 and 2011**

Method	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11
Landfill	90.0%	86.0%	83.0%	80.0%	74.7%	70.3%	65.9%	62.2%	58.6%	59.2%	55.5%
Incineration with EfW	1.0%	2.0%	3.0%	2.0%	2.4%	2.5%	2.9%	2.2%	2.8%	2.2%	1.9%
Incineration without EfW	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Recycled/composted	9.0%	11.0%	13.0%	18.0%	22.8%	27.1%	31.1%	35.6%	38.3%	38.3%	40.2%
Other	0.0%	0.0%	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%	0.2%	2.4%

Source Defra (2011) *Local Authority collected waste for England – annual statistics*, available from <http://www.defra.gov.uk/statistics/environment/waste/wrfq23-wrmsannual/> [Accessed August 2012]

The amount of commercial and industrial waste produced in Wales decreased from an estimated 6.1 million tonnes in 1998/99 to 3.6 million tonnes in 2006/07. However, the volume of construction and demolition waste arisings generated per annum in Wales has increased from an estimated 3.3 million tonnes in 1998/99 to over 12 million tonnes in 2005/06. The percentage of commercial and industrial waste that was sent to landfill in 2006/07 was 39.1 per cent whilst 49.1 per cent was recycled, composted or re-used<sup>60</sup>.

Most of the waste produced by United Utilities is a direct result of the wastewater treatment processes (primarily wastewater sludge). In 2010/11, United Utilities produced 870,873 tonnes of waste which represents a decrease of approximately 37% on the amount of waste produced in 2007/08. However, the proportion of waste diverted from landfill was less at 89%.

Building water treatment works, renewing pipes and infrastructure requires large quantities of materials and generates a large amount of construction waste. In 2010/11, United Utilities diverted 79.6% of its construction waste from landfill (against a target of 80%). The company re-used an estimated 716,560 tonnes of excavated material on its construction sites, for example, to backfill excavations and create landscaping schemes<sup>18</sup>.

## Future Trends

- United Utilities has agreed new targets for leakage reduction in the period 2010-2015, Ofwat monitors the leakage targets. The Ofwat Leakage target for the 2010/11 year was 464Ml/d (which United Utilities met), with targets reducing to 463Ml/d by 2014/15<sup>61</sup>.
- Across the supply area as a whole, United Utilities forecast that water demand will generally reduce due primarily to the expected effects of:
  - growth in customer metering;
  - the growing use of low-flush-volume toilets and other water efficient appliances;
  - the continuation of the base service water efficiency programme; and
  - forecast reductions in measured non-household demand resulting from macroeconomic factors and water efficiency.
- Notwithstanding the above, forecasts indicate that measures will be needed to maintain and increase water supply in the West Cumbria WRZ.
- Installed renewable energy capacity is expected to increase across North West England and Wales and in this context the UK has agreed to an EU-wide target of 20% renewable energy by 2020 - including a binding 10% target for the transport sector. The European Commission has proposed that the UK share of this target would be to achieve 15% of the UK's energy from renewables by 2020. In this

<sup>60</sup> Welsh Government (2011) *Waste Arisings by Sector*. Available at: <http://www.statswales.wales.gov.uk/TableViewer/document.aspx?ReportId=5815> [Accessed June 2012]

<sup>61</sup> Ofwat (2009) *Future water and sewerage charges 2010-15: Final determinations*, available from [http://www.ofwat.gov.uk/pricereview/pr09phase3/det\\_pr09\\_finalfull.pdf](http://www.ofwat.gov.uk/pricereview/pr09phase3/det_pr09_finalfull.pdf) [Accessed 2012]



respect, United Utilities is investing in advanced CHP and solar panels in order to increase the proportion of its energy derived from renewable sources.

- Future waste arisings in North West England and Wales are predicted to remain relatively static due to the likely future decoupling between economic growth and waste growth because of regulatory and economic measures and cultural factors and the likely further decline in the industrial/manufacturing sector in this region. United Utilities is committed to diverting 95% of the waste it produces away from landfill by 2015<sup>18</sup>.

## 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;
- the need to maintain the balance between supply and demand for water;
- the need to reduce energy consumption;
- the need to ensure the sustainable and 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.

### 2.2.8 Cultural Heritage

The majority of the North West's ancient historical and archaeological heritage occurs in the more rural areas of the region, which contain important sites such as the 3.63 mile long St Bees Heritage Coastline and Hadrian's Wall, a World Heritage Site. The urban areas of the region also contain significant amounts of more recent historical heritage, particularly buildings dating from the Industrial Revolution. Figure 2.12 highlights key cultural heritage designations within and around the United Utilities supply/source area.

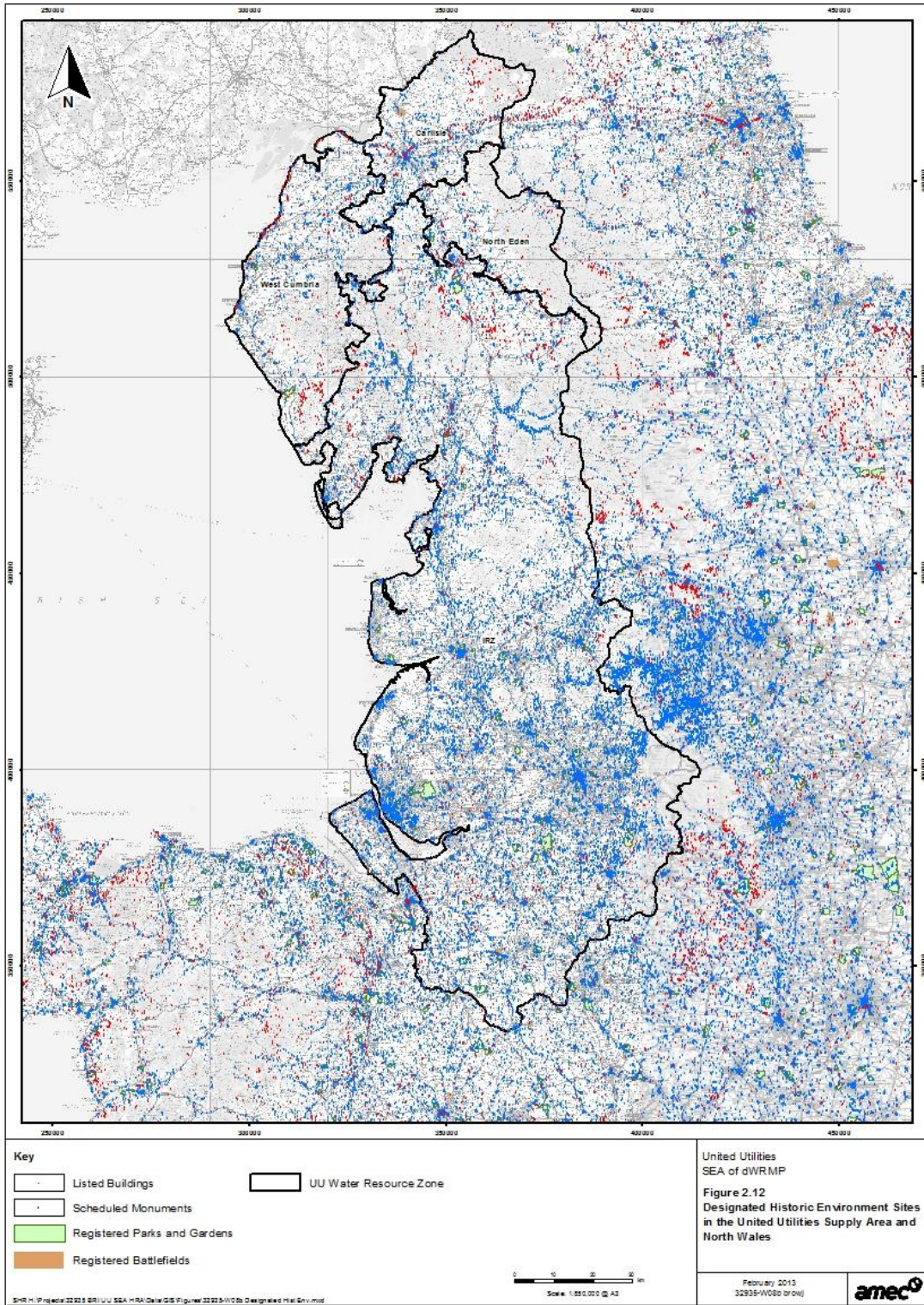
There are two internationally recognised historic areas in North West England - the World Heritage Sites of Hadrian's Wall (western section) and Liverpool waterfront and cultural quarter. According to English Heritage<sup>62</sup>, the North West also contains the following national and local designations:

- 1,316 scheduled monuments;
- 485 listed buildings (grade I);
- 1,533 listed buildings (grade II\*);

<sup>62</sup> English Heritage (2011) *Heritage Counts North West*, available from <http://hc.english-heritage.org.uk/content/pub/2011/hc-2011-north-west.pdf> [Accessed September 2012]

- 25,511 listed buildings (grade II);
- 130 registered parks and gardens;
- 3 registered battlefields;
- 1,322 listed places of worship; and
- 869 conservation areas.

Figure 2.12 Designated Historic Environment Sites in the United Utilities Supply Area and North Wales



The 2011 Heritage at Risk Register<sup>63</sup> highlights that:

- 5.2% (105) of grade I and grade II\* listed buildings are at risk in the region, compared to 3.0% nationally;
- 15.1% (198) of scheduled monuments are at risk, compared to 16.9% nationally;
- 5.4% (7) of the region's 130 registered parks and gardens are at risk, compared to 6.4% nationally;
- none of the regions' registered battlefields are at risk; and
- of the 752 conservation areas surveyed in the North West, 62 (8.2%) are at risk, compared to 6.6% nationally.

The North East Wales area is noted for its Iron Age hill forts, particularly along the Clwydian Range. It contains the following national and local designations:

- 533 scheduled monuments;
- 5,603 listed buildings
- 89 registered parks and gardens;
- 9 historic landscapes;
- 1 World Heritage Site; and
- 112 conservation areas.<sup>64</sup>

Additionally, the North West region and North East Wales contain a large number of undesignated cultural heritage assets, many of which may be of considerable significance (some of national quality, although not formally designated). Historic Environment Records (HERs) held by local authorities include both designated and undesignated assets.

## Future Trends

- Continued pressure from various factors has the potential to threaten the condition of cultural heritage sites and monuments and historical landscapes, including:
  - climate change - predicted increases in precipitation could limit visitor numbers outside the summer holiday session and wetter winters could cause increased damage to pathways and buildings; and

<sup>63</sup> English Heritage (2011) Heritage at Risk Register 2011: North West, available from <http://www.english-heritage.org.uk/publications/har-2011-registers/acc-nw-HAR-register-2011.pdf> [Accessed August 2011]

<sup>64</sup> Welsh Government (2011) Number of Cadw Sites (2010). Available at: [www.statswales.wales.gov.uk/ReportFolders/reportFolders.aspx](http://www.statswales.wales.gov.uk/ReportFolders/reportFolders.aspx) [Accessed October 2012].



- lack of Investment - the money for investment in heritage is now constrained by the current economic climate, restoration and maintenance work could therefore be delayed.
- The protection, preservation and settings of cultural heritage assets needs to be considered when locating any new development including water resources management infrastructure.

## Key Sustainability Issues Relevant to the WRMP

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

- the need to protect or enhance features, landscapes and sites of archaeological importance and cultural heritage interest.

### 2.2.9 Landscape

#### Baseline Characteristics

The landscape of the North West is some of the most diverse in the country, containing 32 distinct 'Landscape Character Area' types (see Figure 2.13) which have been defined by Natural England. Although the region is generally low lying, it also contains some of the most striking upland landscapes in England, particularly within the Lake District National Park. The coastal landscape in the North West contains remnants of the region's industrial history, in particular the Liverpool and Merseyside docklands, as well as having protected areas of Heritage Coastline around St Bee's Head.

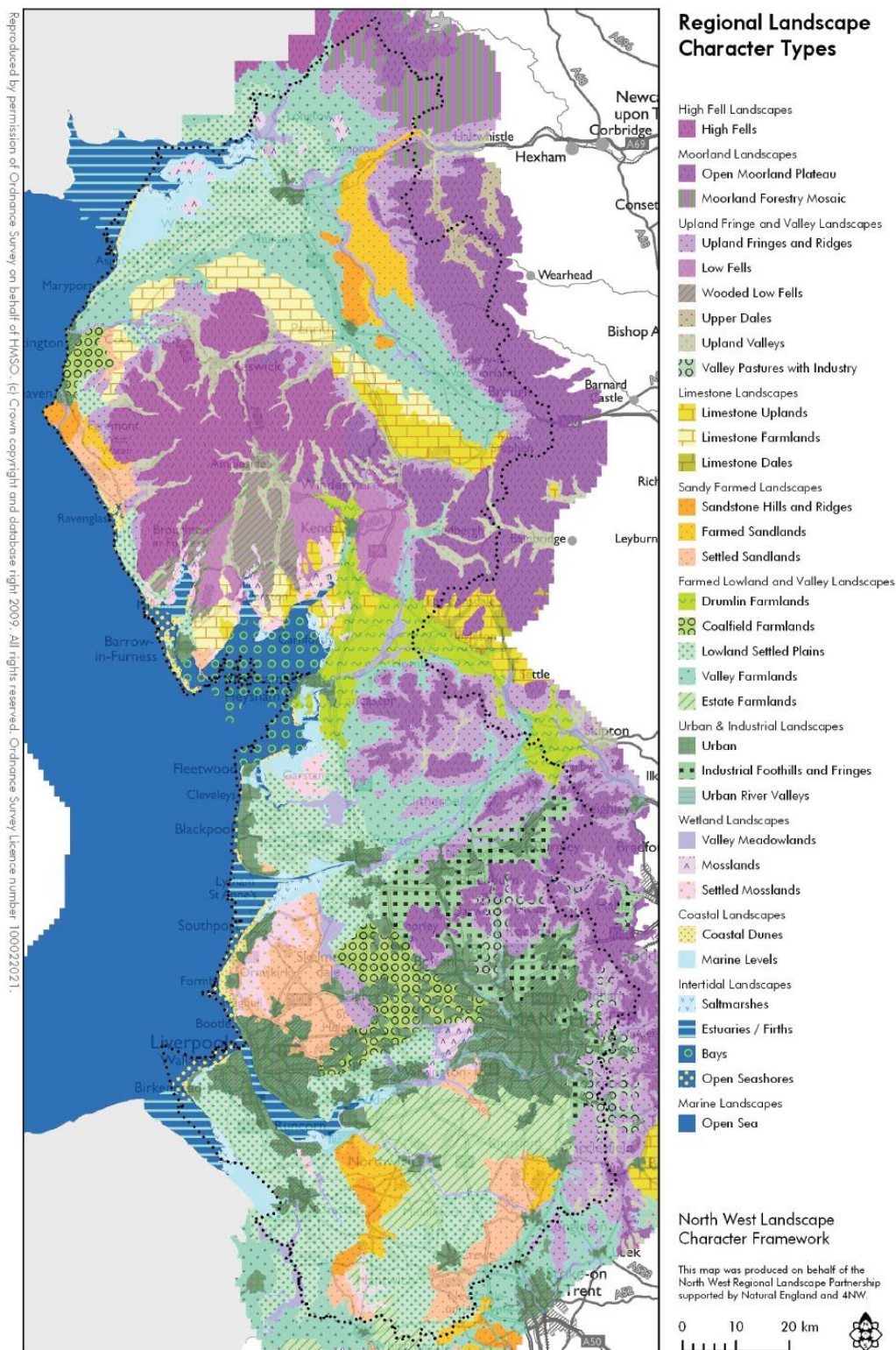
Some 29% of the region is designated as 'protected landscapes'. It contains the Lake District National Park in Cumbria (which accounts for 18% of the entire region) whilst two other National Parks also fall partly within the region - the Yorkshire Dales and the Peak District<sup>17</sup>. The region has three AONBs which lie wholly or mainly in the region (Solway Coast, Arnside and Silverdale and Forest of Bowland). The North Pennines AONB also straddles Cumbria's eastern border. Snowdonia National Park and the Clwydian Range AONB are the significant designated landscape sites within the region of Lake Vyrnwy and the River Dee. Figure 2.14 shows those landscape designations in the United Utilities supply area and North Wales.

The North West region contains 96,171ha of forest, representing 6.8% of the region's total area<sup>65</sup> and has a relatively high proportion of its land area designated as Green Belt (19% compared to 13% across England as a whole<sup>66</sup>) where major developments will generally not be permitted apart from in very special circumstances, in accordance with the National Planning Policy Framework (NPPF).

<sup>65</sup> Forestry Commission (2004) *Forest Industries in England's Northwest - New report sets out 'Prospects for Growth'*, available from <http://www.forestry.gov.uk/news/84D44653024F2CFC80256E59003D0346> [Accessed August 2012]

<sup>66</sup> Office for National Statistics (2011) *Regional Trends, N.43 -Portrait of the North West, 2011 Edition*, available from <http://www.ons.gov.uk/ons/rel/regional-trends/region-and-country-profiles/key-statistics-and-profiles---august-2012/key-statistics---north-west--august-2012.html> [Accessed August 2012]

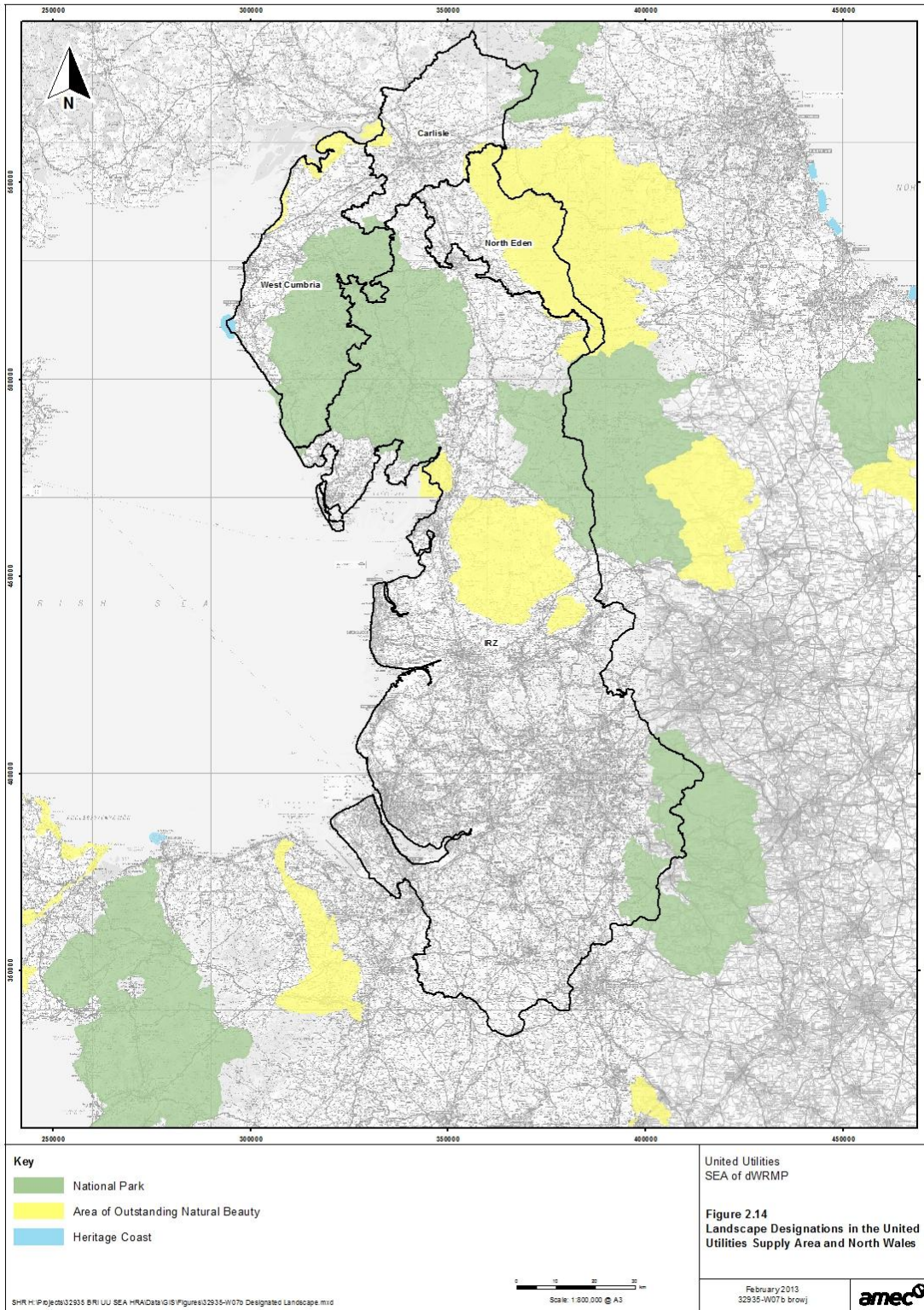
Figure 2.13 Regional Character Types and Area (2009)



Source: Natural England (2009) *North West Landscape Character Framework*, available from [http://www.naturalengland.org.uk/regions/north\\_west/ourwork/landscapecharacterframework.aspx](http://www.naturalengland.org.uk/regions/north_west/ourwork/landscapecharacterframework.aspx) [Accessed August 2012]



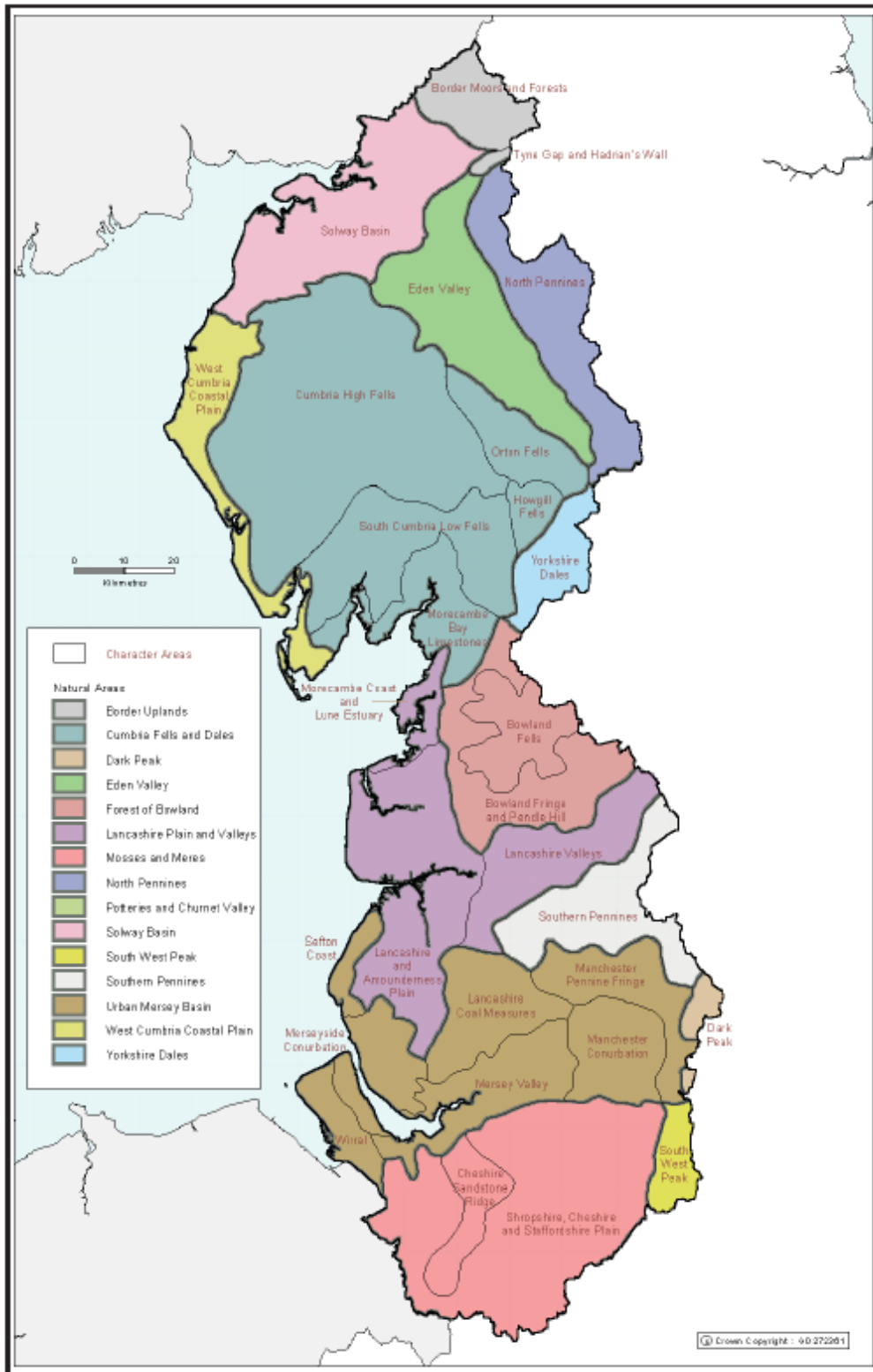
Figure 2.14 Landscape Designations in the United Utilities Supply Area and North Wales





Natural England's Countryside Quality Counts study (2008) identified 29 National Character Areas in the North West. These are illustrated in Figure 2.15. Of these, 14% are enhanced in character, 41% have maintained character, 7% are neglected and 38% are diverging from baseline character. Areas that are neglected or diverging are largely around major centres of population and transport corridors. Landscape character is largely being maintained in protected areas such as Cumbria High Fells, which makes up a large part of the Lake District National Park.

Figure 2.15 National Character Areas in the North West (2008)



Source Northwest Regional Development Agency (2010) *Environment Evidence Base RS2010*, available from [http://www.4nw.org.uk/downloads/documents/aug\\_10/4nw\\_1280991230\\_Environment\\_Evidence\\_Base.pdf](http://www.4nw.org.uk/downloads/documents/aug_10/4nw_1280991230_Environment_Evidence_Base.pdf) [Accessed August 2012]

## Future Trends

- There are threats to valuable landscapes from natural processes, climate change and human activities e.g. development, agriculture and infrastructure.
- Changes are proposed to the boundaries of the Lake District National Park and Yorkshire Dales National Park and these are the subject of an Order made under Section 5 of the National Parks and Access to the Countryside Act 1949.

## Key Landscape 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 National Parks and AONBs;
- the need to protect and maintain the landscape distinctiveness of the area.

### 2.3 Limitations of the Data and Assumptions Made

Although where possible the baseline data referred to in this report is based on the United Utilities area, many datasets were only available for the North West region and Wales as a whole. As such, this baseline information may not identify the more localised issues that may differ from the general trends described for the North West and Wales. This may include pockets of deprivation in relatively affluent areas or any localised differences in environmental quality.

Data has generally been sourced from national and regional bodies where information is collected for the North West and other regions using consistent methods. While this allows for a more effective comparison between the region, other regions and UK averages, reliance on these datasets has in some cases meant that information is a number of years old.

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 publication the baseline or predicted future trends may have varied from those described above.

## 3. Approach to the Assessment

### 3.1 Introduction

This section details the evolution, and provides an overview, of the framework that has been used to assess the economic, social and environmental effects of the dWRMP. This framework includes objectives and guide questions supported by definitions of significance that will help the reader understand how the assessor has determined the effect of the water management options considered against the objectives. The section then describes the approach to the assessment of both dWRMP feasible and preferred options for the West Cumbria WRZ before highlighting difficulties encountered during the process.

### 3.2 Scope of the Assessment

The first stage in the development of the assessment framework was to determine the scope of the assessment. The scope was defined through the identification of key sustainability issues relevant to the dWRMP and review of the objectives of other plans and programmes (as presented in section 2 of this report) to establish which, if any, of the 12 topics identified in the SEA Directive should be scoped in or scoped out of the assessment.

#### 3.2.1 Key Issues Relevant to the dWRMP

The key economic, social and environmental issues in the United Utilities supply area (and, where appropriate, source area) relevant to the dWRMP have been highlighted in section 2.2. These are summarised in Table 3.1.

**Table 3.1 Key Economic, Social and Environmental Issues Relevant to the WRMP**

Topic Area	Key Economic, Social and Environmental Issues
Biodiversity	<ul style="list-style-type: none"> <li>The need to protect and enhance the protected sites designated for nature conservation.</li> <li>The need to protect and enhance non-designated sites.</li> <li>The need to reverse the fragmentation of biodiversity in the lowlands of the North West region, especially in the south.</li> <li>The need to continue to improve the condition of priority habitats to support increases in wildlife, biodiversity and important protected species.</li> <li>The need to maintain/enhance ecological connectivity.</li> <li>The need to work within environmental limits and capacities.</li> </ul>
Geology and Soils	<ul style="list-style-type: none"> <li>The need to maintain or improve the quality of soils/agricultural land.</li> <li>The need to protect and enhance sites designated for their geological interest.</li> <li>The need to protect peatlands in the North West.</li> <li>The need to make use of previously developed land, and to reduce the prevalence of derelict land in the region.</li> <li>The need to maintain soil function.</li> </ul>

Topic Area	Key Economic, Social and Environmental Issues
Water	<p>The need to maintain and improve water quality.</p> <p>The need to maintain seasonal flows in groundwater and surface water.</p> <p>The need to ensure the continued risk of flooding is mitigated effectively.</p> <p>The need to improve the ecological status of water bodies.</p>
Air Quality	<p>The need to minimise emissions of pollutant gases and particulates and enhance air quality.</p> <p>The need to reduce the need to travel and promote sustainable modes of transport.</p>
Climate Change	<p>The need to reduce greenhouse gas emissions arising from implementation of the WRMP.</p> <p>The need to take into account and where possible adapt to the potential effects of climate change.</p> <p>The need to increase environmental resilience to the effects of climate change.</p>
Human Environment	<p>The need to ensure that water resource requirements of people and visitors can be met at all times, in a sustainable way.</p> <p>The need to ensure that water resources remain affordable.</p> <p>The need to ensure that the WRMP measures do not impact on the health and well-being of all members of the community.</p> <p>The need to ensure that the WRMP measures do not adversely affect the economy.</p> <p>The need to ensure that vulnerable people are not affected by implementation of the WRMP measures.</p> <p>The need to ensure that WRMP measures do not have an adverse economic impact.</p> <p>The need to avoid disruption through effects on the transport network.</p> <p>The need to ensure resilience of water supply/treatment infrastructure against climate change effects.</p>
Material Assets and Resource Use	<p>The need to promote water efficiency measures (including metering).</p> <p>The need to ensure that leakage is managed at a sustainable economic level.</p> <p>The need to maintain the balance between supply and demand for water.</p> <p>The need to reduce energy consumption.</p> <p>The need to ensure the sustainable and efficient use of resources such as construction materials.</p> <p>The need to minimise waste arisings, promote reuse, recovery and recycling and minimise the impact of wastes on the environment and communities.</p>
Cultural Heritage	<p>The need to protect or enhance features, landscapes and sites of archaeological importance and cultural heritage interest.</p>
Landscape	<p>The need to protect the natural beauty of the area, especially within designated sites such as National Parks and AONBs.</p> <p>The need to protect and maintain the landscape distinctiveness of the area.</p>

### 3.2.2 Key Policy Objectives Relevant to the dWRMP

Table 3.2 identifies those objectives and policy messages from the review of plans and programmes (Appendix B) relevant to the scope of the assessment of the dWRMP. Only the key sources are included; however, it is acknowledged that many other plans and programmes could also be highlighted here. The relevance of the key objectives and policy measures to the dWRMP is also indicated in Table 3.2.

**Table 3.2 Key Policy Objectives Identified in Other Plans and Programmes Relevant to the Assessment of the WRMP**

Key Objectives and Policy Messages	Key Sources	Relevant to the Assessment of the WRMP?
<b>Biodiversity, Fauna and Flora</b>		
Protection and enhancement of the levels and variety of biodiversity, including designated sites, priority species and habitats	UK Biodiversity Action Plan; 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, North West England Shoreline Management Plan; North West England Plan; Future North West: Our Shared Priorities; River Basin Management Plans (various); Local Biodiversity Action Plans; National Park Management Plans; AONB Management Plans; Local Authority Land Use Plans (various)	Yes
<b>Soil, Geology and Land Use</b>		
Protection and enhancement of soil quality and landscape character	Rural Strategy; UK Sustainable Development Strategy; Safeguarding Our Soils- A Strategy for England; National Planning Policy Statement; North West England Plan; Future North West: Our Shared Priorities; National Park Management Plans; AONB Management Plans; Local Authority Land Use Plans (various)	Yes
<b>Water</b>		
Protection and enhancement of all water supplies and resources	Water Framework Directive; Water Act 2003; Water Resource Strategy for England and Wales; Water for Life: White Paper; Environment Agency Drought Plans (various); Cleaner Coasts and Healthier Seas – EA Marine Strategy; Water Resource Planning Guidelines; Groundwater Regulation; UK Sustainable Development Strategy; Restoring Sustainable Abstraction Programmes; Water Resources Act; Water Act; National Planning Policy Framework; Water Company Drought Plans (various); Water Company Water Resource Management Plans (various); Outline Water Cycle Plans (various); River Basin Management Plans (various); Managing Drought in the North West; North West England Plan; Future North West: Our Shared Priorities; North West Shoreline Management Plan; Water for People and the Environment: Action Plan for the North West; Local Authority Land Use Plans (various)	Yes
Promoting the efficient use of water	Water Framework Directive; Water Act 2003; Water Resource Strategy for England and Wales; Water for Life - White Paper; Environment Agency Drought Plans (various); Cleaner Coasts and Healthier Seas – EA Marine Strategy; Water Resource Planning Guidelines; Groundwater Regulation; UK Sustainable Development Strategy; Restoring Sustainable Abstraction Programmes; Water Resources Act; Water Act; National Planning Policy Framework; Water Company Drought Plans (various); Water Company Water Resource Management Plans (various); Outline Water Cycle Plans (various); River Basin Management Plans (various); Managing Drought in the North West; North West England Plan; Future North West: Our Shared Priorities; Local Authority Land Use Plans (various)	Yes
Minimising flood risk and improving flood control infrastructure	Water Framework Directive; Water Resource Strategy for England and Wales; 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; UK Sustainable Development Strategy; Climate Change Act; Water Resource Management Plans (various); River Basin Management Plans (various); Catchment Flood Management Plans (various); Shoreline Management Plans (various); North West Climate Change Action Plan; Local Authority Land Use Plans (various).	Yes



Key Objectives and Policy Messages	Key Sources	Relevant to the Assessment of the WRMP?
<b>Air and Climate</b>		
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; North West England Plan, Future North West: Our Shared Priorities; Local Authority Land Use Plans (various)	Yes
Minimising the effects of climate change on natural resources, inhabitants and the economy	Climate Change Act 2008; Climate Change and Sustainable Energy Act 2006; National Planning Policy Framework; UK Sustainable Development Strategy, CRC Energy Efficiency Scheme, North West England Plan; Future North West: Our Shared Priorities; Managing Drought in the North West; A North West Climate Change Action Plan; North West Action for Sustainability; North West Sustainable Energy Strategy; River Basin Management Plans (various); Catchment Flood Management Plans (various); Shoreline Management Plans (various); Local Authority Land Use Plans (various)	Yes
Minimising emissions of greenhouse gases that may cause climate change	Climate Change Act 2008; Climate Change and Sustainable Energy Act 2006; National Planning Policy Framework; UK Sustainable Development Strategy; CRC Energy Efficiency Scheme; North West England Plan; Future North West: Our Shared Priorities; Managing Drought in the North West; A North West Climate Change Action Plan; North West Action for Sustainability; North West Sustainable Energy Strategy; River Basin Management Plans (various); Catchment Flood Management Plans (various); Shoreline Management Plans (various); Local Authority Land Use Plan (various)	Yes
Encouraging sustainable transport and reduce the need to travel	UK Sustainable Development Strategy; National Planning Policy Framework; North West England Plan; Future North West: Our Shared Priorities; Local Authority Land Use Plans (various)	Yes
<b>Population and Health</b>		
Addressing deprivation and reducing inequality through regeneration	National Planning Policy Framework; North West England Plan; Future North West: Our Future Priorities; Local Authority Land Use Plans (various)	No
Promoting improvements to health and well-being for members of the community	National Planning Policy Framework; North West England Plan; Future North West: Our Future Priorities; Local Authority Land Use Plans (various)	Yes
Ensuring social equality and prosperity for all	National Planning Policy Framework; Rural Strategy North West England Plan; Future North West: Our Future Priorities; North West Regional Economic Strategy; Local Authority Land Use Plans (various)	No
Providing high quality services, community facility and social infrastructure that is accessible to all	National Planning Policy Framework; North West England Plan; Future North West: Our Future Priorities; Local Authority Land Use Plans (various)	Yes
Minimising noise pollution	National Planning Policy Framework; UK Sustainable Development Strategy; North West England Plan; Future North West: Our Future Priorities Local Authority Land Use Plans (various)	Yes
<b>Economic</b>		
Improving economic competitiveness and promoting productivity	National Planning Policy Framework; Rural Strategy; North West England Plan; Future North West: Our Future Priorities; North West Regional Economic Strategy; 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; Rural Strategy; North West England Plan, Future North West: Our Future Priorities; North West Regional Economic Strategy; Local Authority Land Use Plans (various)	Yes

Key Objectives and Policy Messages	Key Sources	Relevant to the Assessment of the WRMP?
Providing training and development opportunities for all	National Planning Policy Framework; Rural Strategy; North West England Plan; Future North West: Our Future Priorities; North West Regional Economic Strategy; Local Authority Land Use Plans (various)	No
Maximising job opportunities for all and enhancing the quality of employment opportunities	National Planning Policy Framework; Rural Strategy; North West England Plan; Future North West: Our Future Priorities; North West Regional Economic Strategy; Local Authority Land Use Plans (various)	Yes
Improving and expanding the tourism economy	National Planning Policy Framework; Rural Strategy; North West England Plan; Future North West: Our Future Priorities; North West Regional Economic Strategy; North West Shoreline Management Plan; National Parks Management Plans; AONB Management Plans; Local Authority Land Use Plans (various)	No
Promoting sustainable transport which supports regeneration and economic growth	National Planning Policy Framework; North West England Plan; Future North West: Our Shared Priorities; Local Authority Land Use Plans (various)	Yes
<b>Material Assets and Resource Use</b>		
Minimising waste production, promoting re-use and recycling	Planning Policy Statement 10; North West Regional Waste Strategy; Local Authority Land Use Plans (various)	Yes
Promoting the most effective and efficient use of natural resources	UK Sustainable Development Strategy; North West England Plan; Future North West: Our Shared Priorities; Local Authority Land Use Plans (various)	Yes
Promoting the use of sustainable/renewable energy	Climate Change and Sustainable Energy Act 2006; National Policy Statement for Energy Infrastructure; UK Sustainable Development Strategy; CRC Energy Efficiency Scheme; National Planning Policy Framework; A North West Climate Change Action Plan; North West Regional Sustainability Framework; North West England Plan; Future North West: Our Shared Priorities; Local Authority Land Use Plans (various)	Yes
Promoting the use of sustainable design and construction and encouraging energy efficiency	Climate Change and Sustainable Energy Act 2006; National Policy Statement for Energy Infrastructure; UK Sustainable Development Strategy; CRC Energy Efficiency Scheme; National Planning Policy Framework; A North West Climate Change Action Plan; North West Regional Sustainability Framework; North West England Plan; Future North West: Our Shared Priorities; Local Authority Land Use Plans (various)	Yes
<b>Cultural Heritage and Archaeology</b>		
Protecting and enhancing cultural heritage and archaeological sites	National Planning Policy Framework; North West England Plan; Future North West: Our Shared Priorities; Local Authority Land Use Plans (various)	Yes
<b>Landscape and Visual Amenity</b>		
Protecting and enhancing the quality and distinctiveness of natural landscapes and environmental resources	National Planning Policy Framework, North West England Plan; Future North West: Our Shared Priorities; National Park Management Plans (various); AONB Management Plans (various); Local Authority Land Use Plans (various)	Yes

### 3.2.3 SEA Topics Included within the Assessment

The information presented in Tables 3.1 and 3.2 and the characteristics of the feasible water management options were used to define the scope of the assessment. Table 3.3 presents the findings of this scoping exercise for each of the 12 SEA topic areas although in this instance none of the topics were scoped out of the assessment.

**Table 3.3 Basis for Scoping Out Topic Areas from the SEA**

SEA Topic Area	Included in dWRMP SEA?	Justification for Scoping the Topic Out of the SEA
Biodiversity	Yes	Include within SEA framework
Population	Yes	Include within SEA framework
Human Health	Yes	Include within SEA framework
Fauna	Yes	Include within SEA framework
Flora	Yes	Include within SEA framework
Soils	Yes	Include within SEA framework
Water	Yes	Include within SEA framework
Air	Yes	Include within SEA framework
Climatic factors	Yes	Include within SEA framework
Material assets	Yes	Include within SEA framework
Cultural Heritage	Yes	Include within SEA framework
Landscape	Yes	Include within SEA framework

### 3.3 Assessment Framework

The SEA assesses each of the potential options to be included within United Utilities' dWRMP against a range of environmental and social objectives. These objectives are intended to reflect changes that contribute to sustainability. By assessing each option against the objectives, it is more apparent where the dWRMP will contribute to sustainability, where it might have a negative impact, and where its impact could be improved. Guide questions focus the assessment on specific aspects of the objective that reflect issues identified from the review of baseline and contextual information relating to the United Utilities area.

The SEA objectives and guide questions reflect the SEA topics included within the assessment and were informed by examining the baseline evidence, incorporating the identification of key issues, and the review of plans and programmes and the associated environmental protection objectives summarised in the previous section. Broadly, the objectives present the preferred environmental outcome, which typically involves minimising detrimental effects and enhancing positive effects.

A series of draft objectives and guide questions were included in the SEA Scoping Report that was issued for consultation in October 2012. Comments made during the consultation on the Scoping Report highlighted issues to be considered both in the baseline and sustainability issues that inform the objectives, and in the objectives and guide questions themselves. Responses to these comments are included in Appendix A.

As a result, the draft objectives and guide questions were amended. Amendments to the objectives and guide questions made as a result of the consultation process are shown in Table 3.4. Additions to the assessment framework are shown in **red text**. Deletions are shown as **red text that is struckthrough**.

Table 3.4 Amendments to the dWRMP Assessment Framework

Topic Area	SEA Objective	Guide Questions
Biodiversity	To protect and enhance biodiversity, key habitats and species, <b>working within environmental capacities and limits</b>	<i>Will the option <b>avoid-damage-to protect and enhance where possible</b> the most important sites for nature conservation (e.g. internationally or nationally designated conservation sites such as SACs, SPAs, Ramsar and SSSIs)?</i>
		<i>Will the option protect and enhance non-designated sites and local biodiversity?</i>
		<i>Will the option <b>protect and enhance biodiversity, and</b> provide opportunities for new habitat creation or restoration and link existing habitats as part of the development process?</i>
Geology and Soils	To ensure the appropriate and efficient use of land and protect soil quality	<i>Will the option lead to a change in the ecological quality of habitats due to changes in groundwater/river water quality and/or quantity?</i>
		<i>Will additional land be required for the development or implementation of the option or will the option require below ground works leading to land sterilisation?</i>
		<i>Will the option utilise previously developed land?</i>
		<i>Will the option protect and enhance protected sites designated for their geological interest and wider geodiversity?</i>
		<i>Will the option minimise the loss of best and most versatile soil?</i>
		<i>Will the option minimise conflict with existing land use patterns?</i>
Water – Quantity and Quality	To protect and enhance the quantity and quality of surface and groundwater resources <b>and the ecological status of water bodies</b>	<i>Will the option minimise land contamination?</i>
		<i>Will the option minimise the demand for water resources?</i>
		<i>Will the option protect and improve surface, groundwater, estuarine and coastal water quality?</i>
		<i>Will the option result in changes to river flows?</i>
		<i>Will the option result in changes to groundwater levels?</i>
Water – Flood Risk	To reduce the risk of flooding	<i><b>Will the option affect the ecological status of water bodies?</b></i>
		<i>Will the option have the potential to cause or exacerbate flooding in the catchment area now or in the future?</i>
		<i>Will the option have the potential to help alleviate flooding in the catchment area now or in the future?</i>
Air Quality	To minimise emissions of pollutant gases and particulates and enhance air quality	<i>Will the option be at risk of flooding now or in the future?</i>
		<i>Will the option adversely affect local air quality as a result of emissions of pollutant gases and particulates?</i>
		<i>Will the option exacerbate existing air quality issues (e.g. in Air Quality Management Areas)?</i>
		<i>Will the option maintain or enhance ambient air quality, keeping pollution below Local Air Quality Management thresholds?</i>
Climate Change	To limit the causes and potential consequences of climate change	<i>Will the option reduce the need to travel or encourage sustainable modes of transport?</i>
		<i>Will the option reduce or minimise greenhouse gas emissions?</i>
		<i>Will the option have new infrastructure that is energy efficient or make use of renewable energy sources?</i>
		<i>Will the option contribute positively to adaptation to climate change?</i>

Topic Area	SEA Objective	Guide Questions
<b>Human Environment - Health</b>	To ensure the protection and enhancement of human health	<i>Will the option increase environmental resilience to the effects of climate change?</i>
		<i>Will the option ensure the continuity of a safe and secure drinking water supply?</i>
		<i>Will the option affect opportunities for recreation and physical activity?</i>
		<i>Will the option maintain surface water and bathing water quality within statutory standards?</i>
<b>Human Environment - Social and Economic Well-Being</b>	To maintain and enhance the economic and social well-being of the local community	<i>Will the option adversely affect human health by resulting in increased nuisance and disruption (e.g. as a result of increased noise levels)?</i>
		<i>Will the option ensure sufficient infrastructure is in place for predicted population increases?</i>
		<i>Will the option ensure sufficient infrastructure is in place to sustain a seasonal influx of tourists?</i>
		<i>Will the option help to meet the employment needs of local people?</i>
		<i>Will the option ensure that an affordable supply of water is maintained and vulnerable customers protected?</i>
		<i>Will the option improve access to local services and facilities (e.g. sport and recreation)?</i>
		<i>Will the option contribute to sustaining and growing the local and regional economy?</i>
		<i>Will the option avoid disruption through effects on the transport network?</i>
<b>Material Assets and Resource Use - Water Resources</b>	To ensure the sustainable and efficient use of water resources	<i>Will the option be resilient to future changes in resources (both financial and human)?</i>
		<i>Will the option lead to reduced leakage from the supply network?</i>
<b>Material Assets and Resource Use - Resource Use</b>	To promote the efficient use of resources	<i>Will the option improve efficiency in water consumption?</i>
		<i>Will the option seek to minimise the demand for raw materials?</i>
		<i>Will the option reduce the total amount of waste produced and the proportion of waste sent to landfill?</i>
		<i>Will the option encourage the use of sustainable design and materials?</i>
<b>Cultural Heritage</b>	To protect and enhance cultural and historic assets	<i>Will the option reduce or minimise energy use?</i>
		<i>Will the option conserve or enhance historic buildings, places, conservation areas and spaces that enhance local distinctiveness, character and the appearance of the public realm?</i>
		<i>Will the option avoid or minimise damage to archaeologically important sites?</i>
<b>Landscape</b>	To protect and enhance landscape character	<i>Will the option affect public access to, or enjoyment of, features of cultural heritage?</i>
		<i>Will the option avoid adverse effects on, and enhance where possible, protected/designated landscapes (including woodlands) such as National Parks or AONBs?</i>
		<i>Will the option protect and enhance landscape character, townscape and seascape?</i>
		<i>Will the option affect public access to existing landscape features?</i>
		<i>Will the option minimise adverse visual impacts?</i>

The resulting framework that was used to assess the options in the SEA of the dWRMP is shown in Table 3.5.

**Table 3.5 Assessment Framework for the dWRMP**

<b>Topic Area</b>	<b>SEA Objective</b>	<b>Guide Questions</b>
<b>Biodiversity</b>	To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	<i>Will the option protect and enhance where possible the most important sites for nature conservation (e.g. internationally or nationally designated conservation sites such as SACs, SPAs, Ramsar and SSSIs)?</i>
		<i>Will the option protect and enhance non-designated sites and local biodiversity?</i>
		<i>Will the option provide opportunities for new habitat creation or restoration and link existing habitats as part of the development process?</i>
<b>Geology and Soils</b>	To ensure the appropriate and efficient use of land and protect soil quality	<i>Will the option lead to a change in the ecological quality of habitats due to changes in groundwater/river water quality and/or quantity?</i>
		<i>Will additional land be required for the development or implementation of the option or will the option require below ground works leading to land sterilisation?</i>
		<i>Will the option utilise previously developed land?</i>
		<i>Will the option protect and enhance protected sites designated for their geological interest and wider geodiversity?</i>
		<i>Will the option minimise the loss of best and most versatile soil?</i>
<b>Water – Quantity and Quality</b>	To protect and enhance the quantity and quality of surface and groundwater resources and the ecological status of water bodies	<i>Will the option minimise conflict with existing land use patterns?</i>
		<i>Will the option minimise land contamination?</i>
		<i>Will the option minimise the demand for water resources?</i>
		<i>Will the option protect and improve surface, groundwater, estuarine and coastal water quality?</i>
		<i>Will the option result in changes to river flows?</i>
<b>Water – Flood Risk</b>	To reduce the risk of flooding	<i>Will the option result in changes to groundwater levels?</i>
		<i>Will the option affect the ecological status of water bodies?</i>
		<i>Will the option have the potential to cause or exacerbate flooding in the catchment area now or in the future?</i>
<b>Air Quality</b>	To minimise emissions of pollutant gases and particulates and enhance air quality	<i>Will the option have the potential to help alleviate flooding in the catchment area now or in the future?</i>
		<i>Will the option be at risk of flooding now or in the future?</i>
		<i>Will the option adversely affect local air quality as a result of emissions of pollutant gases and particulates?</i>
		<i>Will the option exacerbate existing air quality issues (e.g. in Air Quality Management Areas)?</i>
<b>Climate Change</b>	To limit the causes and potential	<i>Will the option maintain or enhance ambient air quality, keeping pollution below Local Air Quality Management thresholds?</i>
		<i>Will the option reduce the need to travel or encourage sustainable modes of transport?</i>
		<i>Will the option reduce or minimise greenhouse gas emissions?</i>



Topic Area	SEA Objective	Guide Questions
<b>Human Environment - Health</b>	consequences of climate change	<i>Will the option have new infrastructure that is energy efficient or make use of renewable energy sources?</i>
		<i>Will the option contribute positively to adaptation to climate change?</i>
	To ensure the protection and enhancement of human health	<i>Will the option increase environmental resilience to the effects of climate change?</i>
		<i>Will the option ensure the continuity of a safe and secure drinking water supply?</i>
		<i>Will the option affect opportunities for recreation and physical activity?</i>
<b>Human Environment - Social and Economic Well-Being</b>	To maintain and enhance the economic and social well-being of the local community	<i>Will the option maintain surface water and bathing water quality within statutory standards?</i>
		<i>Will the option adversely affect human health by resulting in increased nuisance and disruption (e.g. as a result of increased noise levels)?</i>
		<i>Will the option ensure sufficient infrastructure is in place for predicted population increases?</i>
		<i>Will the option ensure sufficient infrastructure is in place to sustain a seasonal influx of tourists?</i>
		<i>Will the option help to meet the employment needs of local people?</i>
		<i>Will the option ensure that an affordable supply of water is maintained and vulnerable customers protected?</i>
		<i>Will the option improve access to local services and facilities (e.g. sport and recreation)?</i>
		<i>Will the option contribute to sustaining and growing the local and regional economy?</i>
		<i>Will the option avoid disruption through effects on the transport network?</i>
		<i>Will the option be resilient to future changes in resources (both financial and human)?</i>
<b>Material Assets and Resource Use - Water Resources</b>	To ensure the sustainable and efficient use of water resources	<i>Will the option lead to reduced leakage from the supply network?</i>
<b>Material Assets and Resource Use - Resource Use</b>	To promote the efficient use of resources	<i>Will the option improve efficiency in water consumption?</i>
		<i>Will the option seek to minimise the demand for raw materials?</i>
<b>Cultural Heritage</b>	To protect and enhance cultural and historic assets	<i>Will the option reduce the total amount of waste produced and the proportion of waste sent to landfill?</i>
		<i>Will the option encourage the use of sustainable design and materials?</i>
		<i>Will the option reduce or minimise energy use?</i>
<b>Landscape</b>	To protect and enhance landscape character	<i>Will the option conserve or enhance historic buildings, places, conservation areas and spaces that enhance local distinctiveness, character and the appearance of the public realm?</i>
		<i>Will the option avoid or minimise damage to archaeologically important sites?</i>
		<i>Will the option affect public access to, or enjoyment of, features of cultural heritage?</i>
<b>Landscape</b>	To protect and enhance landscape character	<i>Will the option avoid adverse effects on, and enhance where possible, protected/designated landscapes (including woodlands) such as National Parks or AONBs?</i>
		<i>Will the option protect and enhance landscape character, townscape and seascape?</i>

Topic Area	SEA Objective	Guide Questions
		<p><i>Will the option affect public access to existing landscape features?</i></p> <p><i>Will the option minimise adverse visual impacts?</i></p>

### 3.4 Assessment Methodology

The SEA has assessed the effects of the dWRMP in two stages, complementary to the development of the plan itself. The first stage has been a high level assessment of all feasible options (including both supply and demand side options) for the West Cumbria WRZ against the 12 SEA assessment objectives with the findings presented in a summary matrix. A more detailed assessment has then been undertaken of the three candidate preferred options that could form United Utilities’ final proposed planning solution for the West Cumbria WRZ. The potential effects (positive, negative or neutral) and the significance of the effects of each of the candidate 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. Each stage is described in more detail below.

#### 3.4.1 Feasible Options Assessment

Each feasible option was assessed against the SEA objectives presented in section 3.3 to identify its potential effects. The feasible options were assessed based on the nature of the effect, its timing and geographic scale, the sensitivity of the human or environmental receptor that could be affected, and how long any effect might last.

A matrix was prepared to capture the assessment of each option in a consistent manner (shown in Table 3.6). A key to the meaning of the symbols is presented in Table 3.7.

**Table 3.6 Example of Assessment Matrix**

	1. To protect and enhance biodiversity, key habitats and environmental capacities and links	2. To ensure the appropriate and efficient use of land and protect soil quality	3. To protect and enhance the quantity and quality of surface water and groundwater and the ecological status of water bodies	4. To reduce the risk of flooding	5. To minimise sea levels of pollution gaps and particles in water from air quality	6. To limit the cause and potential consequences of climate change	7. To ensure the protection and enhancement of human health	8. To establish and enhance the economic and social well-being of the local community	9. To ensure the sustainable and efficient use of natural resources	10. To protect the efficient use of resources	11. To protect, enhance cultural and historic assets	12. To protect and enhance landscape character	Commentary
<b>WE02 Domestic partnership retrofit Install (Design Capacity 0.026 Mld)</b>	0	0	0	0	0	0	0	0	0	-	0	0	<p>This option consists of 125 customers a year (over 5 years) receiving a water audit and retrofit (including, for example, shower heads, shower timer and save-a-flush). Activity associated with the implementation of this option would be within residential properties and therefore no effects are predicted on biodiversity, soils/land use, water environment/resources, flooding, historic assets or landscape. This option is not expected to result in an increase in vehicle movements (as installation would be undertaken by plumbers already visiting the customer and therefore no additional vehicle movements are anticipated) and therefore effects on air quality are expected to be negligible. Negligible emissions of carbon are anticipated under this option and in consequence effects on Objective 6 have been assessed as neutral. Implementation of the option is not expected to affect human health. It is expected that the installation of devices would be undertaken by plumbers already undertaking annual surveys/repairs and therefore any employment opportunities generated by the option would be limited. Notwithstanding, implementation of the option would directly benefit these businesses and there may be associated supply-chain benefits related to the manufacture and distribution of water efficiency devices although this is not expected to be at a scale that would generate a significant positive effect on the local/regional economy, particularly given uncertainties in respect of where the devices would be manufactured. The option would necessitate the use of new materials/resources in the manufacture/installation of devices and will generate waste (any replaced facilities or devices).</p> <p>Operation of the option is not expected to have effects on biodiversity, soils/land use, flooding, air quality, health, heritage assets or landscape. The option would reduce demand for water (by 0.026 Mld) through both the retrofit of water efficiency devices and audit (which is expected to increase customer awareness of, and action towards, water conservation). This would therefore help to protect surface and groundwater resources from which United Utilities abstracts which has been assessed as having a minor positive effect on Objectives 3 and 9. Reducing demand is also expected to, in-turn, reduce greenhouse gas emissions and energy use associated with reduced treatment, pumping of water and energy consumption within properties. However, savings would be negligible due to the relatively low capacity associated with this option and therefore effects on Objectives 6 and 10 have been assessed as neutral. By reducing demand, this option may reduce water bills for metered customers which has the potential to benefit vulnerable customers and increase disposable income although as this option would not be specifically targeted at such customers effects on Objective 8 have been assessed as neutral.</p>
<b>Construction / Implementation</b>	0	0	+	0	0	0	0	0	0	0	0	0	
<b>Operation</b>	0	0	+	0	0	0	0	+	0	0	0	0	

**Table 3.7 Key to Assessment Matrices**

Key to the Symbols to be used in the Relationship Column:	
++	Significant positive effect of the Water Resources Management Plan option on this objective
+	Positive effect of the Water Resources Management Plan option on this objective
0	Overall neutral or insignificant effect of the Water Resources Management Plan option on this objective
-	Negative effect of the Water Resources Management Plan option on this objective
--	Significant negative effect of the Water Resources Management Plan option on this objective
?	Uncertain effect of the Water Resources Management Plan option on this objective
++/-	Combination of positive and negative effects of the Water Resources Management Plan option on this objective

To ensure a consistent approach to interpreting the significance of effects and to help the reader understand the decisions made by the assessor, a series of quantitative and semi-quantitative ‘thresholds’ were defined (shown in Appendix C) to provide direction on what constitutes a significant effect. These were used to guide the assessment of the dWRMP options and were included in the SEA Scoping Report and have therefore been consulted upon.

The construction and operational effects of each option was assessed against all of the objectives (see Appendix D). This approach recognises that many of the options under consideration within the dWRMP are very different in nature in their construction and operational phases. For example, whilst metering options will involve vehicle movements during the construction phase, construction activity will be limited (with works being undertaken within properties). Conversely, supply-side options are likely to involve more substantial construction works including new above ground infrastructure.

It should be noted that the scoring of the assessments of the feasible options did not generally take into account any proposed mitigation measures that United Utilities would expect to or could undertake to minimise the effects. Specific mitigating measures were considered during the assessments of the candidate preferred options due to greater clarity being achieved around each scheme. This has resulted in differences in the scoring between options at the feasible and preferred options stage.

### 3.4.2 Preferred Options Assessment

The feasible options assessments were used by United Utilities to allow them to make an informed choice on which options could be taken forward as preferred options. Candidate preferred options for the West Cumbria WRZ were assessed in more detail with the results recorded in matrices. An extract from one of these matrices showing the resulting assessment and commentary against one SEA objective is shown Table 3.8. The full matrices include scoring and commentary against all the SEA objectives and incorporate a summary. These can be seen in Appendix E.

**Table 3.8 Extract of an Example Preferred Option Assessment Matrix**

Objective	Guide questions	Relationship		Commentary
		Construction	Operation	
5. To minimise emissions of pollutant gases and particulates and enhance air quality	<p>Will the option adversely affect local air quality as a result of emissions of pollutant gases and particulates?</p> <p>Will the option exacerbate existing air quality issues (e.g. in Air Quality Management Areas)?</p> <p>Will the option maintain or enhance ambient air quality, keeping pollution below Local Air Quality Management thresholds?</p> <p>Will the option reduce the need to travel or encourage sustainable modes of transport?</p>	-	0	<p><b>Effects of Construction</b></p> <p>The option would require 4,500 HGV movements over a 2.25 year construction period which, together with emissions to air from plant, may have a minor negative effect on local air quality. Pipeline works of the proposed scale (the proposed pipeline route exceeds 100 km in length) could also result in substantial disruption to roads in the area (the roads under which new pipes would be installed or existing pipes upgraded include approximately 61 km of A-road, 19 km of B-road, 19 km of C-road and 3 km of unclassified road), increasing congestion and associated emissions to air, particularly where the route passes through or is within close proximity to the larger settlements of Cockerthorpe and Keswick. However, the development sites and pipeline route are not within designated Air Quality Management Areas (AQMAs) and therefore the option has been assessed as having a minor negative effect on air quality.</p> <p><b>Effects of Operation</b></p> <p>Operational emissions to air are expected to be negligible and in this respect, the option would generate only 1 HGV movement per week. In consequence, the option has been assessed as having a neutral effect on air quality.</p> <p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>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, bank holidays etc).</li> <li>Measures to mitigate air quality impacts arising from construction activities should be considered within a Construction and Environmental Management Plan. These measures may include, for example, dust suppression, use of lower emissions plant, and monitoring.</li> <li>Detailed air quality and transport assessments should be undertaken as part of the Environmental Impact Assessment (EIA) process.</li> </ul> <p><b>Assumptions</b></p> <ul style="list-style-type: none"> <li>None identified.</li> </ul> <p><b>Uncertainty</b></p> <ul style="list-style-type: none"> <li>None identified.</li> </ul>

The commentary section of the matrices includes justification for how the assessment was reached which considered the factors listed in Table 3.9. The commentary section also includes details of assumptions made during the assessment (including mitigation included in the assessment), uncertainties and further mitigation measures that could enhance the option.

**Table 3.9 Contents of Commentary Column (where relevant)**

Commentary Column Likely to Include...
<ul style="list-style-type: none"> <li>-The nature of the potential effect (what is expected to happen);</li> <li>-The timing and duration of the potential effect (e.g. short, medium or long term);</li> <li>-The geographic scale of the potential effect (e.g. local, regional, national);</li> <li>-The location of the potential effect (e.g. whether it affects rural or urban communities, or those in particular parts of the United Utilities area);</li> <li>-The potential effect on vulnerable communities or sensitive habitats;</li> <li>-The reasons for whether the effect is considered significant;</li> <li>-The reasons for any uncertainty, where this is identified;</li> <li>-The potential to avoid, minimise, reduce, mitigate or compensate for the identified effect(s).</li> </ul>

### 3.5 Difficulties Encountered

Due to the scope of the plan, and its nature in combining site-specific options into a plan for the whole of United Utilities’ water supply area, a balance needed to be struck between the information provided as an overview of the whole area and the detail of a specific location. For example, in the baseline, a number of consultation comments called for more local information to be included, which would have increased the volume and level of detail of the report considerably. However, in order to assess some of the potential impacts, it was necessary to be aware of the local characteristics. Throughout the whole process, it was necessary to balance the need for enough information to undertake a robust assessment, while retaining its strategic focus.

In undertaking the 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 option assessments.

Reflecting the strategic nature of the dWRMP and SEA, for many 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 United Utilities and any assumptions used in the assessment (e.g. in respect of pipeline routes) 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.

In undertaking detailed option assessments, where appropriate, impacts have been assessed in the short, medium and long term. In undertaking these assessments it should be noted that “short, medium and long term” relate to the date that option would be implemented, allowing comparison between options. For example, although an option may be identified as being required in the latter stages of the planning period, say 2033 (i.e. in the longer term), the short-term impacts of that option would occur from 2033.

Whilst the assessment of cumulative effects of the implementation of the preferred option and other plans and programmes has been based on the most up to date information available at the time of writing, in many cases there is a lack of detailed information at this stage to make robust conclusions. For example, the in-combination effects of the preferred option and other water company WRMPs are difficult to establish at this stage as these plans are currently subject to review with draft plans expected to be published imminently.





## 4. Assessment of Feasible Options

### 4.1 Introduction

This section presents the findings of the assessment of the feasible options for the West Cumbria WRZ. The types of feasible options considered in the assessment can be broadly categorised as follows:

- supply side measures (e.g. increasing capacity at an existing groundwater source);
- demand management (e.g. water metering or household visits to install water efficiency measures); and
- leakage reduction and network metering measures (e.g. repairing pipes).

A summary of the feasible options considered in developing the dWRMP is presented in Table 4.1.

**Table 4.1 Descriptions of Feasible Options**

Ref*	Option	Design Capacity (Ml/d)*	Description
<b>Supply Side Options</b>			
WC01	Thirlmere Transfer into West Cumbria	80	This option would involve increasing current abstraction from Thirlmere reservoir by enhancing infrastructure capacity. The option would require a new treatment works and pumping station near Bridge End at the outlet of Thirlmere reservoir. Treated water would be pumped to a new service reservoir (SR) at Castle Rigg, from which the water would flow by gravity down a large diameter trunk main (LDTM) terminating at Stainburn SR. There would be three main take-offs from this LDTM to supply the Corn How, Ennerdale and Quarry Hill areas. The Ennerdale and Corn How connections would not require any additional pumping to deliver treated water to the existing Cornhow SR (which would be upgraded) and a proposed new replacement SR at Ennerdale. However, additional pumping would be required to transfer flows from Corn How to Buttermere SR. The Quarry Hill take-off would require booster pumping to deliver water to Bothel Moor SR. The total length of additional new pipeline required under this option would be approximately 100km. This option would also involve the abandonment of three existing water treatment works (WTWs) in West Cumbria namely, Quarry Hill, Ennerdale, and Corn How.
WC02	River Derwent Abstraction	4	This option would involve the construction of a new three stage water treatment works on the existing Barepot site and a 4Ml/d capacity pumping station. A new treated water pumping main (1.5 km in length) would also be required in addition to a further 16km of new pipeline from Stainburn to Summergrove service reservoirs.
WC04	Wastwater (negotiate part abstraction licence)	10	This option involves an agreement with third party licence holders for water transfer from Brow Top Service Reservoir to Ennerdale WTW. It would require the construction of a new 10Ml/d pumping station at Brow Top, 13.5km pipeline and a new mixing tank at Ennerdale.
WC05	Development of New Boreholes in West Cumbria Aquifer	6	This option would involve the construction of three new boreholes at Sandwith, Rottington and Moor Platts in addition to utilising an existing borehole at Catgill. The option would require drilling of a borehole at each site, a new fixed speed borehole pump and a new headworks GRP kiosk. The Catgill site would also require a new break tank, aeration tower and RWPS. A total of 1.5km of pipeline

Ref*	Option	Design Capacity (Ml/d)*	Description
			would be required from Sandwith to Rottington, 4km from Rottington to Moor Platts and 2.5km from Moor Platts to Catgill. Finally, a 13km pipeline would transfer all raw water to Ennerdale WTW. A new 1km washout main would also be needed at Catgill to the nearest Egremont sewer.
WC05a	Development of New Boreholes in West Cumbria Aquifer	10	This option would involve the construction of seven new boreholes at Sandwith, Rottington and Moor Platts in addition to utilising an existing borehole at Catgill (eight boreholes in total). The remainder of this scheme would be as Option WC05.
WC06	Roughton Gill Mine Adit (Option 1)	1.4	This option involves refurbishment of the existing Roughton Gill mine adit abstraction main. A new collection tank and raw water pumping station would also be required at Fellside together with 5km of associated pipework to transfer water between Fellside and Chapel House reservoir and 40km of pipeline from Quarry Hill WTW to Summergrove reservoir via Stainburn.
WC06	Roughton Gill Mine Adit (Option 2)	1.4	This option involves refurbishment of the existing Roughton Gill mine adit abstraction main. It would require the replacement of the existing main between Roughton Gill and Fellside together with a new 8.7km pipeline to Chapel House reservoir and a further 40km of pipeline from Quarry Hill WTW to Summergrove reservoir via Stainburn.
WC07	Kirklington Borehole Development	5	This option comprises the development of 3 new boreholes at Scaleby and 2 new boreholes at Longtown supplying 5Ml/d of water to a new treatment works located at Skitby. This treated water would be delivered to Waygill Hill service reservoir (SR), to feed the Carlisle WRZ. The option would also require a new booster pumping station (PS), located at the High Brow Nelson SR site, pumping 5Ml/d of water to Quarry Hill WTW SR to feed the West Cumbria WRZ. A further 40km of pipeline from Quarry Hill WTW to Summergrove reservoir via Stainburn would also be required.
WC09	Development of Boreholes in North Cumbria Aquifer	4.5	This option comprises the construction of two new boreholes at Waverton and Thursby for abstraction and transfer to Quarry Hill WTW. The option would also require a new 8km raw water transfer pipe from Waverton to the WTW and a 15km transfer pipe from Thursby to the WTW. A further 25km of pipeline from Quarry Hill WTW to Summergrove reservoir via Stainburn would also be required. The WTW is assumed to be able to accommodate this extra capacity at this stage.
WC10	Desalination, Workington	20	This option comprises a new 20Ml/d desalination plant located in Workington and would require 63km of associated pipelines, new pumping station and service reservoir at Brigham as well as a new pumping station at Corn How.
WC14d	Kielder Water Transfer to West Cumbria (Cumwhinton Treated)	80	This option comprises the transfer of water from Kielder Water in the Northumbrian Water supply region to the West Cumbria WRZ. The option would require: a new intake structure, pumping station and screening equipment with a 80Ml/d capacity; new 40km raw water transfer main from Kielder to Carlisle; new booster pumping station; new WTW facility; 23km raw water transfer main; new bulk supply point (BSP); new branch main feed into existing service reservoir; new continuation of previous LDTM between the new BSP and a further BSP located close to another existing service reservoir; new main and fluoridation at the reservoir; and new continuation of previous LDTM to a third existing service reservoir (with fluoridation at the reservoir). The option would also involve the abandonment of three existing WTWs in West Cumbria namely, Quarry Hill, Ennerdale, and Corn How.
WC19	Crummock Automated Compensation Control	2.7	This option would involve the replacement of Crummock weir's penstock with automated compensation control. This would allow for an automated control of the compensation flow to the River Derwent. The option would also require 16km of new pipeline from Stainburn to Summergrove service reservoirs.
WC23a	Supply of Final Effluent to Non-household Customers	0.5	This option would involve the supply of final effluent to non-household customers as non-potable supply. There are a number of possible customers that could accept final effluent from various facilities in the West Cumbria WRZ and no specific wastewater treatment works have been identified for the implementation of this option (as implementation would be dependent on the location of customers that can accept final effluent as a non-potable supply). A 'generic' assessment has therefore been made and it is assumed that the option would comprise: a new

Ref*	Option	Design Capacity (MI/d)*	Description
			break tank and pumping station at an existing water treatment works; new transfer pipeline of 2km length to transfer flows of 0.5 MI/d; and new receiving storage tanks at the end of the 2km transfer pipeline.
WC23b	Supply of Final Effluent to Non-household Customers	1	As per Option WC23a but capacity increased to 1MI/d.
WC23c	Supply of Final Effluent to Non-household Customers	2	As per Option WC23a but capacity increased to 2MI/d.
WC72	Raw Water Losses	0.08	This option would involve reducing raw water losses from the system. This would include identification of leaks on raw water transfers and repairing pipes to reduce leakage.
<b>Demand Management</b>			
WC WE01	Domestic Rainwater Harvesting	0.01	This option comprises the installation of 1 rainwater harvesting system a year to existing properties over a 5 year period.
WC WE02	Domestic Partnership Retrofit Install	0.026	This option consists of 125 customers a year (over 5 years) receiving a water audit and retrofit (including, for example, shower heads, shower timer and save-a-flush).
WC WE03	Domestic Visit and Fix	0.026	Under this option, 125 customers a year would receive a water audit and retrofit (including, for example, shower heads, shower timer and save-a-flush) by a United Utilities representative over a 5 year period.
WC WE04	Combi Boiler Saving Device - installation through Housing Associations	0.039	This option comprises the provision of a Combi Boiler device to 105 households per year over a 5 year period. Installation would be undertaken by housing associations during their routine visits.
WC WE05	Combi Boiler Saving Device - installation by United Utilities	0.049	This option comprises the provision of a Combi Boiler device to 131 households per year over a 5 year period. Installation would be carried out by United Utilities.
WC WE06	Retrofit Dual Flush Toilets	0.004	This option consists of 64 households receiving a water audit and fitting of a dual flush retrofit per year which would be undertaken by United Utilities over a 5 year period.
WC WE07	Leaky Loos	0.036	This option consists of 31 customers receiving a water audit and toilet retrofit per year over a 5 year period.
WC WE08	Subsidised Water Efficiency Products Sold via Website - vouchers	0.001	This option consists of customers receiving a water saving voucher to purchase water efficiency products sold via United Utilities' website. It is estimated that 120 vouchers would be provided each year over a 5 year period.
WC WE09	Showerhead Giveaways	0.214	This option consists of 2,000 customers per year receiving a water saving showerhead over a 5 year period.
WC WE10	Tourist Sites - promotion and retrofit	0.049	This option involves the promotion of water efficiency and retrofit of toilet facilities at 5 tourist sites per year over a 5 year period.
WC WE11	Waterless Car Washing Giveaways	0.026	This option consists of 2,000 customers receiving a sample bottle of waterless car wash and voucher to purchase additional bottles over a 5 year period.
WC WE12	Free Water Butt Distribution	0.001	This option consists of the distribution of water butts to 120 customers per year over a 5 year period.
WC WE13	Free Showerhead Distribution	0.007	This option consists of the distribution of showerheads to 125 customers per year over a 5 year period.
WC WE14	Subsidised Water Efficiency Products Sold via Website - shower heads	0.007	This option consists of subsidised showerheads being sold via United Utilities' website. It is estimated that 120 showerheads would be sold each year over a 5 year period.
WC	Enhanced Water Savers	0.058	This option comprises the distribution of 313 enhanced water savers packs to

Ref*	Option	Design Capacity (MI/d)*	Description
WE15	Pack Distribution		United Utilities' customers per year over a 5 year period.
WC Met-001	Metering on Customer Contact	0.026	Under this option free metering would be offered to unmeasured customers on contact with United Utilities. An average of 357 meters would be installed per annum at customer properties (between AMP6 and AMP10).
WC Met-002a	Enhanced Promotion 5 Year	0.38	This option would comprise targeted promotion at those customers who are likely to benefit financially from metering. It is anticipated that an average of 2,606 meters would be installed per annum under this option (during AMP6).
WC Met-002b	Enhanced Promotion 10 Year	0.14	This option would comprise targeted promotion at those customers who are likely to benefit financially from metering. It is anticipated that an average of 490 meters would be installed per annum under this option (during AMP6 and AMP7).
WC Met-003	Enhanced Home Water Efficiency Visits	0.08	Under this option free metering would be offered to customers as part of home water efficiency visits. It is anticipated that an average of 110 meters would be installed per annum at customer properties (between AMP6 and AMP10).
WC Met-004	Blanket Promotion	0.32	This option would comprise blanket promotion of free metering to all customers. It is anticipated that an average of 442 meters would be installed per annum at customer properties (between AMP6 and AMP10).
WC Met-005	Metering on Change of Occupier	0.75	Under this option meters would be installed at customer properties when the property changes ownership. It is anticipated that an average of 1,038 meters would be installed per annum at customer properties (between AMP6 and AMP10).
<b>Leakage and Network Metering</b>			
WC-LEA01	Leakage Detection Stage 1	1.70	This option would involve an increase in leakage detection and repair activity (such as fractured pipe repair or replacement) within the West Cumbria WRZ (an additional 175 surveys and 269 repairs would be undertaken per annum).
WC-LEA02	Leakage Detection Stage 2	2.70 (incl WC-LEA02)	Under this option there would be a total of 1,555 leakage repairs and 1,015 surveys per annum.
WC-LEA03	Infrastructure Replacement Stage 1	0.11	This option would involve the refurbishment/replacement of 41.3km of existing mains within the West Cumbria WRZ. No specific locations on the water supply network have been provided for this option and it is assumed that the option would be targeted at the worst performing mains within the network.
WC-LEA04	Pressure Management Stage 1	0.44	This option seeks to manage and reduce pressure within the distribution network in order to reduce leakage. It comprises the construction of chambers and installation of pressure management valves (PMVs) on the existing distribution network (a total of 9.5km of mains would be replaced and 19 new or modified PMVs would be installed under this option).
WC-LEA05	Increased Verification of Existing Meters	0.06	This option comprises an increase in the number of on-site checks to determine the accuracy of flow being registered through a meter, with inaccurate meters replaced.
WC-LEA06	Increased Number of Continuously Logged Meters	0.01	This option comprises the installation of temporary loggers to all customers identified as having a) high consumption (above 500 l/hr); b) in District Metered Areas (DMAs) with poor operability; c) in DMAs with good operability; to assess which customers have the biggest impact on the operability within DMAs. It is assumed that 10% of the customers temporarily logged will become permanent continuously logged users.
WC-LEA08	Widespread Metering Using AMR	0.94	This option consists of the (internal) installation of meters on currently unmeasured properties, plus installation of AMR units on existing metered properties with monthly meter readings taken via drive-by.
WC-LEA09	Splitting DMAs	0.02	This option includes a study of each non-operable DMA to determine the reason for the DMA being non-operable and to carry out the appropriate action to remedy any issues. The option scope includes office design, hydraulic modelling and site investigation, plus construction of chambers and installation of meters and repair of

Ref*	Option	Design Capacity (MI/d)*	Description
			pipework and other equipment (including loggers).
WC-LEA10	Splitting Large Upstream Tiles	0.13	This option includes initial desk studies and site visits to determine the validity of identified faults before replacing existing, and installing new, meters and probes on existing United Utilities' infrastructure.
WC-LEA11	Establishing Water Balance Areas	0.00	This option comprises a desk-based exercise to establish new hydraulic areas in Netbase.

The feasible options listed above were assessed using the framework set out in section 3 of this report. Each feasible option was assessed against the SEA objectives to identify its potential effects in both the short term (during construction) and medium/long term (during operation). The feasible options were assessed based on the nature of the effect, its timing and geographic scale, the sensitivity of the human or environmental receptor that could be affected, and how long any effect might last. Where quantified information was available for the feasible option from United Utilities<sup>67</sup>, the assessment was also informed by reference to threshold values set out in the definitions of significance (see Appendix C).

The following sections present a summary of the findings of the assessment, grouped by broad option type (i.e. supply side, demand management and leakage detection and network metering). Full assessments are contained in Appendix D.

## 4.2 Supply Side Options Assessment

A table summarising the assessments of the 16 side feasible options for the West Cumbria WRZ is presented in Table 4.2. A description of construction and operational effects follows.

<sup>67</sup> Where quantitative information has been used to inform the assessment, this has been based on information provided to AMEC by United Utilities and is assumed to be the most up-to-date information available at the time of writing this report.



Table 4.2 Supply Side Feasible Option Assessment Summary

Ref	Option Name	Design Capacity (MI/d)	Construction (C) or Operation (O)	Biodiversity	Land Use/Soils	Water Quantity and Quality	Flooding	Air Quality	Climate Change	Human Health	Economic and Social Well-being	Water Resource Use	Use of Resources	Heritage	Landscape
WC01	Thirlmere Transfer into West Cumbria	80	C	--	-	0	-	-	:-	-	++/-	0	:-	-	:-
			O	++	0	++	-	0	:-	++	++	0	:-	0	-
WC02	River Derwent Abstraction	4	C	--	+	0	-	-	:-	-	++	0	:-	-	-
			O	--	0	-	-	0	-	0	+	0	-	0	-
WC04	Wastwater (negotiate part abstraction licence)	10	C	--	+	0	-	-	:-	0	++	0	-	0	-
			O	?	0	-	-	0	0	+	+	0	0	0	0
WC05	Development of New Boreholes in West Cumbria Aquifer	6	C	--	-	0	-	-	:-	-	++	0	:-	-	-
			O	?	0	-	0	0	:-	+	+	0	:-	-	-
WC05a	Development of New Boreholes in West Cumbria Aquifer (10 MI/d)	10	C	--	-	0	-	-	:-	-	++	0	:-	-	-
			O	?	0	-	0	0	:-	+	+	0	:-	-	-
WC06a	Roughton Gill Mine Adit (Option 1)	1.4	C	--	-	0	-	-	:-	-	++/-	0	:-	-	:-
			O	0	0	-	0	0	-	0	+	0	-	0	-

Ref	Option Name	Design Capacity (Ml/d)	Construction (C) or Operation (O)	Biodiversity	Land Use/Soils	Water Quantity and Quality	Flooding	Air Quality	Climate Change	Human Health	Economic and Social Well-being	Water Resource Use	Use of Resources	Heritage	Landscape
WC06b	Roughton Gill Mine Adit (Option 2)	1.4	C	--	0	0	-	-	--	-	++/-	0	--	-	--
			O	0	0	-	0	0	-	0	+	0	-	0	0
WC07	Kirklington Borehole Development	5	C	--	-	0	-	-	--	-	++/-	0	--	--	-
			O	--	0	-	0	0	--	+	+	0	--	0	-
WC09	Development of Boreholes in North Cumbria Aquifer	4.5	C	--	-	0	-	-	--	-	++/-	0	--	-	-
			O	?	0	-	0	0	--	0	+	0	--	0	-
WC10	Desalination, Workington	20	C	--	0	0	-	-	--	-	++/-	0	--	-	--
			O	--	0	-	-	0	--	++	++	0	--	0	-
WC14d	Kielder Water Transfer to West Cumbria (Cumwhinton Treated)	80	C	--	-	0	-	-	--	-	++	0	--	-	-
			O	++	0	++	0	0	-	++	++	0	--	0	-
WC19	Crummock Automated Compensation Control	2.7	C	--	+	0	-	-	-	-	++	0	-	-	-
			O	?	0	0	0	0	-	0	+	0	-	0	0

Ref	Option Name	Design Capacity (Ml/d)	Construction (C) or Operation (O)	Biodiversity	Land Use/Soils	Water Quantity and Quality	Flooding	Air Quality	Climate Change	Human Health	Economic and Social Well-being	Water Resource Use	Use of Resources	Heritage	Landscape
WC23a	Supply of Final Effluent to Non-household Customers	0.5	C	?	0	0	?	-	-	-	0	0	-	0	0
			O	?	0	+	?	0	0	0	+	+	0	0	0
WC23b	Supply of Final Effluent to Non-household Customers	1	C	?	0	0	?	-	-	-	0	0	-	0	0
			O	?	0	+	?	0	0	0	+	+	0	0	0
WC23c	Supply of Final Effluent to Non-household Customers	2	C	?	0	0	?	-	-	-	0	0	-	0	0
			O	?	0	+	?	0	0	0	+	+	0	0	0
WC72	Raw Water Losses	0.08	C	?	0	0	0	0	0	0	++	0	-	0	0
			O	0	0	+	0	0	0	0	0	+	0	0	0

#### 4.2.1 Construction Effects

Significant effects were identified against biodiversity, climate change, economic and social well-being, use of resources and landscape. Significant positive effects were identified for economic and social well-being with the remaining effects assessed as being negative. The majority of the significant effects would occur during the construction phase of the supply side options.

The construction of the majority of options would represent a large capital investment (as defined within the definitions of significance presented in Appendix C as being in excess of £10 million) which is likely to generate a number of employment opportunities and supply chain benefits as well as increased spend in the local economy by contractors and construction workers. This was assessed as having a significant positive effect on economic and social well-being across the majority of options, although HGV movements and large scale pipeline works associated with seven feasible options (WC01, WC06a, WC06b, WC07, WC09, WC10 and WC14d) were considered to have the potential to cause traffic disruption, generating a (mixed) minor negative effect on economic and social well-being. For the remaining options, investments would be less (i.e. below £10 million) and therefore positive effects on this objective were assessed as minor.

No further significant positive effects were identified during the assessment. Three options were assessed as having a minor positive effect on land use/soils (Options WC02, WC04 and WC19) as new infrastructure associated with these schemes would be located at existing sites and therefore there would be no long term loss of greenfield land.

The majority of the supply side feasible options were assessed as having a significant negative effect on biodiversity during the construction phase. This principally reflects the environmental sensitivity of the West Cumbria WRZ and potential for pipeline works in particular to affect several European designated sites including the River Ehen SAC, River Derwent and Bassenthwaite Lake SAC, North Pennine Moors SAC/SPA, Border Mires, Kielder - Butterburn SAC and Lake District High Fells SAC as well as SSSIs including, for example, the River Derwent and Tributaries. However, it should be noted that in most cases the HRA has identified that potential effects on these sites could be avoided or mitigated by using existing road crossings and through scheme specific mitigation. Further, it would be anticipated that scheme level investigations and appropriate assessment would also be undertaken at the project stage should the options be taken forward. The main exception would be Option WC06 (Roughton Gill Mine Adit (Option 2)). This option would require the replacement of mains/new pipeline through the Lake District High Fells SAC with no obvious alternative route. Effects associated with Options WC23a-c and WC72 on biodiversity were considered to be more uncertain as the locations of works under these options are at this stage unknown.

Reflecting the scale of construction activity associated with the feasible supply side options, most were assessed as having a significant negative effect on climate change as a result of associated greenhouse gas emissions from HGV movements, construction plant and embodied carbon in raw materials, taking into account the definitions of significance contained in Appendix C. Material use and energy requirements would also be substantial and therefore these options were also assessed as having a significant negative effect on resource use.

Those options involving more substantial development (e.g. new water treatment works, pumping stations) within the Lake District National Park were assessed as having a significant negative effect on landscape during the construction phase. These options included Option WC01 (Thirlmere Transfer into West Cumbria), WC06a/06b (Roughton Gill Mine Adit) and WC10 (Desalination, Workington). The remaining options were generally assessed as having minor negative effects on this objective due to the potential for localised landscape/visual impacts associated with construction activity. Whilst the majority would involve pipeline works along the boundary of, and within, the Lake District National Park, routes would generally follow existing linear features (roads) and adverse landscape impacts would be over a short timescale with planting and re-seeding likely to return land to a pre-development state within a year (depending on the season in which works are undertaken).

One feasible option was assessed as having a significant negative effect on cultural heritage (Option WC07) due to potential impacts associated with pipeline works on designated heritage sites including Hadrian's Wall World Heritage Site and Scheduled Monument. Due to potential impacts on the settings of cultural heritage assets such as listed buildings, 14 supply side options were assessed as having a minor negative effect on this objective during construction.

No further significant negative effects were identified during the assessment. Emissions to air from HGV movements and construction plant were considered likely to have a minor negative effect on air quality and, together with noise/vibration, human health in most cases. This reflects both the temporary nature of construction activity, the potential for adverse effects to be minimised through the adoption of good practice, and the remoteness of many of the development sites from sensitive human receptors. Further minor negative effects were identified in respect of land use/soils (due to the loss of greenfield land associated with around half of the supply side options) and flooding (given the location of some development sites and pipeline works within Flood Zones 2 and 3).

All options were assessed as having a neutral effect in respect of water quantity/quality and water resource use 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).

#### 4.2.2 Operational Effects

Significant effects were identified against biodiversity, water quantity/quality, climate change, human health, economic and social well-being, use of resources and landscape. Significant positive effects were identified for biodiversity, water quantity/quality, human health and economic and social well-being with the remaining effects assessed as being negative.

Options WC01 (Thirlmere Transfer into West Cumbria) and WC14d (Kielder Water Transfer to West Cumbria (Cumwhinton Treated)) were assessed as having a significant positive effect on the biodiversity objective during operation due to potential benefits in respect of the River Ehen SAC and River Derwent and Bassenthwaite Lake SAC related to the abandonment of Ennerdale, Corn How and Quarry Hill water treatment works and associated abstraction reductions from sources identified for amendment as part of the RoC programme. The decommissioning of these water treatment works may also generate significant positive effects on water quantity

and quality due to increases in flows in the catchments in which associated abstractions are located (Dash Beck, Bassenthwaite/Derwent, Ellen, Ehen and Cocker).

These larger scale options, together with Option WC10 (Desalination, Workington), were also assessed as having a significant positive effect on health (in helping to ensure the continuity of a safe and secure drinking water supply) and economic and social well-being (given the potential for additional supply to support economic/population growth). This reflects their substantial design capacities (between 20 and 80 Ml/d) which, in accordance with the definitions of significance (see Appendix C), were considered to be significant. Design capacities associated with the remaining options are lower (i.e. 10Ml/d and under) and positive effects on these objectives related to their operation have therefore been assessed a minor or neutral.

No further significant positive operational effects were identified during the assessment. Options WC23a-23c and Option WC72 were assessed as having a minor positive effect in respect of water quantity/quality and resource use due to the potential for these options (through effluent reuse and reductions in raw water losses) to deliver increased capacity without the need for additional abstraction.

A total of three feasible supply side options were assessed as having significant negative operational effects on biodiversity (Options WC02, WC07, WC10) due to potential impacts on designated European sites including the River Derwent and Bassenthwaite Lake SAC (under Options WC02 and WC10) and the River Eden SAC and the Solway Firth suite of estuarine sites (under Option WC07) as well as nationally designated sites including the Scaleby Moss SSSI (also under Options WC07). As under the construction phase, effects associated with Options WC23a-b on biodiversity were considered to be more uncertain. Whilst in most cases a reduction in effluent flows to a watercourse of the scale expected under these options (up to 0.6Ml/d) would be unlikely to have any impacts, it is recognised that in certain locations treated effluent may constitute an important component of surface flow and in consequence a reduction in effluent being returned to watercourses could affect biodiversity in these instances.

Several options were also considered likely to have significant negative effects on climate change and resource use SEA objectives during operation, reflecting the additional energy requirements (and related greenhouse gas emissions) associated with the treatment and pumping of water, taking into account the definitions of significance contained in Appendix C.

No further significant negative effects associated with the operation of the feasible options were identified during the assessment. Minor negative effects were identified for a number of options in respect of water quantity, due to associated reductions in surface and groundwater levels, and flood risk, due to the location of new infrastructure in Flood Zones 2/3. There may also be minor negative effects on cultural heritage and landscape which principally reflects the potential for adverse landscape/visual impacts associated with new above ground infrastructure.

Once construction activity is complete, it was not expected that any of the feasible options would have adverse air quality impacts. Effects on this objective were therefore assessed as neutral. Operational effects on land use/soils were also assessed as neutral for all of the feasible options with any initial loss of land related to the implementation of these schemes being assessed during the construction phase.



### 4.3 Demand Management Options Assessment

There are a total of 15 water efficiency and six metering options for the West Cumbria WRZ. Table 4.3 provides a summary of the assessments of these options. A description of construction and operational effects follows.

Table 4.3 Demand Management Feasible Option Assessment Summary

Ref	Option Name	Design Capacity (M/d)	Construction (C) or Operation (O)	Biodiversity	Land Use/Soils	Water Quantity and Quality	Flooding	Air Quality	Climate Change	Human Health	Economic and Social Well-being	Water Resource Use	Use of Resources	Heritage	Landscape
WC WE01	Domestic Rainwater Harvesting	0.01	C	0	0	0	0	0	0	0	0	0	0	0	0
			O	0	0	+	0	0	0	0	0	+	0	0	0
WC WE02	Domestic Partnership Retrofit Install	0.026	C	0	0	0	0	0	0	0	0	0	-	0	0
			O	0	0	+	0	0	0	0	0	+	0	0	0
WC WE03	Domestic Visit and Fix	0.026	C	0	0	0	0	0	0	0	0	0	-	0	0
			O	0	0	+	0	0	0	0	0	+	0	0	0
WC WE04	Combi Boiler Saving Device - installation through Housing Associations	0.039	C	0	0	0	0	0	0	0	0	0	-	0	0
			O	0	0	+	0	0	0	0	0	+	+	0	0
WC WE05	Combi Boiler Saving Device - installation by United	0.049	C	0	0	0	0	0	0	0	0	0	-	0	0
			O	0	0	+	0	0	+	0	0	+	+	0	0

Ref	Option Name	Design Capacity (MI/d)	Construction (C) or Operation (O)	Biodiversity	Land Use/Soils	Water Quantity and Quality	Flooding	Air Quality	Climate Change	Human Health	Economic and Social Well-being	Water Resource Use	Use of Resources	Heritage	Landscape
	Utilities														
WC WE06	Retrofit Dual Flush Toilets	0.004	C	0	0	0	0	0	0	0	0	0	-	0	0
			O	0	0	+	0	0	0	0	0	0	+	0	0
WC WE07	Leaky Loos	0.036	C	0	0	0	0	0	0	0	0	0	-	0	0
			O	0	0	+	0	0	0	0	0	0	+	0	0
WC WE08	Subsidised Water Efficiency Products Sold via Website - vouchers	0.001	C	0	0	0	0	0	0	0	0	0	0	0	0
			O	0	0	+	0	0	0	0	0	0	+	0	0
WC WE09	Showerhead Giveaways	0.214	C	0	0	0	0	0	0	0	0	0	-	0	0
			O	0	0	+	0	0	+	0	0	+	+	0	0
WC WE10	Tourist Sites - promotion and retrofit	0.049	C	0	0	0	0	0	0	0	0	0	0	0	0
			O	0	0	+	0	0	0	0	0	0	+	0	0

Ref	Option Name	Design Capacity (MI/d)	Construction (C) or Operation (O)	Biodiversity	Land Use/Soils	Water Quantity and Quality	Flooding	Air Quality	Climate Change	Human Health	Economic and Social Well-being	Water Resource Use	Use of Resources	Heritage	Landscape
WC WE11	Waterless Car Washing Giveaways	0.026	C	0	0	0	0	0	0	0	0	0	0	0	0
			O	0	0	+	0	0	0	0	0	+	0	0	0
WC WE12	Free Water Butt Distribution	0.001	C	0	0	0	0	0	0	0	0	0	-	0	0
			O	0	0	+	0	0	0	0	0	+	0	0	0
WC WE13	Free Showerhead Distribution	0.007	C	0	0	0	0	0	0	0	0	0	-	0	0
			O	0	0	+	0	0	0	0	0	+	0	0	0
WC WE14	Subsidised Water Efficiency Products Sold via Website - shower heads	0.007	C	0	0	0	0	0	0	0	0	0	-	0	0
			O	0	0	+	0	0	0	0	0	+	0	0	0
WC WE15	Enhanced Water Savers Pack Distribution	0.058	C	0	0	0	0	0	0	0	0	0	-	0	0
			O	0	0	+	0	0	0	0	0	+	0	0	0
WC Met-	Metering on Customer	0.026	C	0	0	0	0	0	-	0	0	0	-	0	0

Ref	Option Name	Design Capacity (MI/d)	Construction (C) or Operation (O)	Biodiversity	Land Use/Soils	Water Quantity and Quality	Flooding	Air Quality	Climate Change	Human Health	Economic and Social Well-being	Water Resource Use	Use of Resources	Heritage	Landscape
001	Contact		O	0	0	+	0	0	0	0	0	+	0	0	0
WC Met-002a	Enhanced Promotion 5 Year	0.38	C	0	0	0	0	0	-	0	0	0	-	0	0
			O	0	0	+	0	0	+	0	0	+	+	0	0
WC Met-002b	Enhanced Promotion 10 Year	0.14	C	0	0	0	0	0	-	0	0	0	-	0	0
			O	0	0	+	0	0	0	0	0	+	0	0	0
WC Met-003	Enhanced Home Water Efficiency Visits	0.08	C	0	0	0	0	0	-	0	0	0	-	0	0
			O	0	0	+	0	0	0	0	0	+	0	0	0
WC Met-004	Blanket Promotion	0.32	C	0	0	0	0	0	-	0	0	0	-	0	0
			O	0	0	+	0	0	+	0	0	+	+	0	0
WC Met-005	Metering on Change of Occupier	0.75	C	0	0	0	0	0	-	0	0	0	-	0	0
			O	0	0	+	0	0	+	0	0	+	+	0	0

### 4.3.1 Construction Effects

With the exception of one option (of the 21 assessed), no significant effects have been identified for the construction phase of the demand management feasible options.

In general, the environmental effects of each of the feasible demand management options were considered to be very similar. Implementation of water efficiency devices and activities and metering options would all take place within domestic or commercial properties and none would have effects on biodiversity, soils/land use, water quantity/quality, flooding, air quality, human health, water resource use, heritage or landscape. For devices and activities that require home visits there is a possibility of creating jobs and supply chain benefits, although any economic benefits are unlikely to be substantial and it is more likely that the additional work would be accommodated in existing employees' or contractors'/partners' workloads.

All of the efficiency and metering options would require different amounts of raw materials, energy and carbon depending on the need for manufacturing and means of distribution. Those elements which are customer-fitted can be sent out by post and be distributed along with the other mail, reducing the need for a specific trip to deliver a particular item but those which need United Utilities' engineers to fit or audit will require an individual journey with higher carbon emissions. In this context, the majority of metering and efficiency options were assessed as having a minor negative effect on the use of resources objective although only the metering options were considered likely to generate negative effects in relation to climate change (principally due to associated vehicle movements). One option (WC Met 005: Metering on Change of Occupier) was assessed as having a significant negative effect on resource use and climate change which reflects the embodied carbon in the relatively large number of meters that would be installed under this option (a total of 25,942 meters) and vehicle movements associated with their installation.

### 4.3.2 Operational Effects

Once installed, the feasible demand management options are unlikely to have any adverse environmental effects. Demand reductions through both the operation of water efficient devices and metering associated with these options was assessed as having a minor positive effect in respect of water quantity/quality and water resource use. Demand reductions may in-turn 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. Whilst net savings associated with the majority of options would be negligible (i.e. savings would be under 100 tonnes CO<sub>2</sub>e/a), water efficiency options WC WE05 and WC WE09 and metering options WC Met-002a, WC Met-004 and WC Met-005 would generate more substantial (but not significant) greenhouse gas emissions savings (i.e. in excess of 100 tonnes CO<sub>2</sub>e/a) and these options were therefore assessed as having a minor positive effect on climate change and resource use objectives.

Ongoing maintenance/meter reading activities may help to sustain current employment levels and generate a limited number of jobs, although in general economic benefits are not expected to be substantial. By reducing demand, metering and water efficiency options may reduce water bills for metered customers which has the potential to benefit vulnerable customers and increase disposable incomes. However, as the majority of options



would not be specifically targeted at such customers, operational effects on economic and social well-being were generally assessed as neutral. The one exception was Option WC WE04 which would involve the provision of Combi Boiler devices. As this option would be delivered through housing associations it was considered more likely to benefit low income households or those who need support and was therefore assessed as having a minor positive effect on this objective.

#### 4.4 **Leakage and Network Metering Options**

Table 4.4 summarises the assessments of the 10 feasible leakage and network metering options for the West Cumbria WRZ. A description of construction and operational effects follows.

Table 4.4 Leakage and Network Metering Feasible Option Assessment Summary

Ref	Option Name	Design Capacity (MI/d)	Construction (C) or Operation (O)	Biodiversity	Land Use/Soils	Water Quantity and Quality	Flooding	Air Quality	Climate Change	Human Health	Economic and Social Well-being	Water Resource Use	Use of Resources	Heritage	Landscape
WC-LEA01	Leakage Detection Stage 1	1.70	C	?	0	0	0	0	-	0	0	0	-	0	0
			O	0	0	+	0	0	+	0	+	+	0	0	0
WC-LEA02	Leakage Detection Stage 2	2.70	C	?	0	0	0	0	-	0	+	0	-	0	0
			O	0	0	+	0	0	+	0	+	+	0	0	0
WC-LEA03	Infrastructure Replacement Stage 1	0.11	C	?	0	0	0	0	-	0	0	0	-	0	0
			O	0	0	+	0	0	0	0	0	+	0	0	0
WC-LEA04	Pressure Management Stage 1	0.44	C	?	0	0	0	0	-	0	0	0	-	0	0
			O	0	0	+	0	0	0	+	0	+	0	0	0
WC-LEA05	Increased Verification of Existing Meters	0.06	C	0	0	0	0	0	0	0	0	0	-	0	0
			O	0	0	+	0	0	0	0	0	+	0	0	0

Ref	Option Name	Design Capacity (MI/d)	Construction (C) or Operation (O)	Biodiversity	Land Use/Soils	Water Quantity and Quality	Flooding	Air Quality	Climate Change	Human Health	Economic and Social Well-being	Water Resource Use	Use of Resources	Heritage	Landscape
WC-LEA06	Increased Number of Continuously Logged Meters	0.01	C	0	0	0	0	0	0	0	0	0	-	0	0
			O	0	0	+	0	0	0	0	0	+	0	0	0
WC-LEA08	Widspread Metering Using AMR	0.94	C	0	0	0	0	0	-	0	++	0	-	0	0
			O	0	0	+	0	0	0	0	0	+	0	0	0
WC-LEA09	Splitting DMAs	0.02	C	?	0	0	0	0	0	0	0	0	-	0	0
			O	0	0	+	0	0	0	0	0	+	0	0	0
WC-LEA10	Splitting Large Upstream Tiles	0.13	C	?	0	0	0	0	0	0	0	0	-	0	0
			O	0	0	+	0	0	0	0	0	+	0	0	0
WC-LEA11	Establishing Water Balance Areas	0.00	C	0	0	0	0	0	0	0	0	0	0	0	0
			O	0	0	0	0	0	0	0	0	0	0	0	0

#### 4.4.1 Construction Effects

No significant effects were identified during the construction phase of eight of 10 leakage feasible options assessed. For the remaining two feasible options, significant effects were assessed against climate change, use of resources and economic and social well-being.

In general, the construction-related effects of each of the leakage and network metering options were considered to be very similar with few environmental effects anticipated (reflecting the scale of works under these options and the likelihood that any potential adverse effects would be managed). There would be additional resource use and carbon emissions as a result of replacing pipes or in the manufacture and installation of meters. However, only one option (WC-LEA03) was assessed as having a significant negative effect on climate change and resource use, reflecting the scale of works anticipated under this option (i.e. mains replacement as opposed to repair or metering).

No further significant negative or minor negative construction-related effects were identified during the assessment. Construction activity associated with repairing leaks or replacing sections of pipeline may impact on biodiversity, priority habitats or protected species if existing pipelines pass through ecologically sensitive areas. If this is the case, these areas would be previously disturbed but may be subject to extensive excavation and disruption depending on the location. However, as the location of pipeline to be repaired is currently unknown, effects on biodiversity were assessed as uncertain.

Employment opportunities and supply chain benefits may be generated by the implementation of leakage and network metering options. For most options, these benefits are unlikely to be substantial although the scale of investment associated with Option WC-LEA08 is considered to be potentially significant, in accordance with the definitions of significance (see Appendix C). No further significant or minor positive construction-related effects were identified during the assessment.

#### 4.4.2 Operational Effects

For all leakage and network metering options, there would be no effects on biodiversity, soils/land use, air quality, flood risk, cultural heritage or landscape once works have been completed and no significant positive or significant negative effects have been identified. However, in most cases the operation of these options would result in less water being lost due to leakage and therefore lower demand for water abstraction which would benefit the water environment. Demand reductions may in-turn reduce greenhouse gas emissions and energy use associated with reduced treatment and pumping of water, although only Options WC-LEA01 and WC-LEA02 would be expected to have a minor positive effect on climate change and resource use objectives. These same options were also assessed as having a minor positive effect on economic and social well-being as their design capacities may help to support economic/population growth.

### 4.5 Summary

In summary, the assessment has found that the supply side feasible options are likely to have the most significant effects (both positive and negative) during construction and operation across the SEA objectives. This principally

reflects the scale of construction activity under these options, the sensitivity of the receiving environment of West Cumbria and their more substantial design capacities.

In this respect, many of the supply side feasible options are likely to have significant negative effects on biodiversity (due to potential impacts on European and national designated sites), climate change (related to greenhouse gas emissions) and resource use (given their anticipated high energy and raw material requirements) during construction with further negative effects on climate change and resource use expected during operation related to the pumping and treatment of water. However, the supply side options have generally been assessed as having positive effects on health and economic and social well-being. In particular, the larger options including Options WC01 (Thirlmere Transfer into West Cumbria, WC14d (Kielder Water Transfer to West Cumbria (Cumwhinton Treated)) and WC10 (Desalination, Workington), are expected to generate significant positive effects on economic and social well-being during construction owing to the potential for these options to generate a number of employment opportunities and supply chain benefits as well as increased spend in the local economy by contractors and construction workers. The more substantial design capacities of these options (between 20MI/d and 80 MI/d) would also be expected to generate significant positive effects on economic and social well-being as well as on health during operation, given the increased supply of water. Options WC01 and WC14d have also been assessed as having a significant positive effect on biodiversity and water quantity/quality objectives during operation due to potential benefits related to the abandonment of Ennerdale, Corn How and Quarry Hill water treatment works and associated abstraction reductions. However, adverse operational effects of three supply side options on biodiversity have been assessed as significant whilst effects associated with the remaining options on this objective are considered to be either neutral or uncertain.

Effects associated with the implementation and operation of demand management and leakage and network metering options are considered likely to be more minor. Although there would be additional resource use and carbon emissions under these options, construction activity would be small scale and, in the case of water efficiency and metering options, undertaken predominantly within properties such that few environmental effects are anticipated. Once installed, these options are also unlikely to have any significant adverse environmental effects although they would help to reduce overall water use in the United Utilities supply area and minimise water loss from the network which is expected to have a positive effect on water quantity/quality and water resource use objectives.

## 5. Assessment of the Preferred Option and Alternatives

### 5.1 Introduction

The process for developing a WRMP includes a clear series of steps to develop solutions that are technically feasible, cost-effective and take into account the impacts on the community and environment. The feasible options presented in section 4 of this report were assessed in terms of their financial, environmental and social costs. The findings of the first stage of the SEA (also summarised in section 4 of this report) were included in this decision making process by reviewing the feasible options identified using the Economics of Balancing Supply and Demand method, and checking that the potential impacts identified in the SEA were included in the environmental and social costs already taken into account, or would not have affected the options identified. The feasible options were then ranked based on their combined costs. Informed by this assessment, ongoing discussion with stakeholders, and the outcomes of the SEA and HRA, this list was refined and a total of three options were identified to help address the deficit in the West Cumbria WRZ (one of which comprise a combination of feasible options) and taken forward for more detailed consideration as candidate preferred options. These options were:

- WC01: Thirlmere Transfer into West Cumbria.
- WC14d: Kielder Water Transfer to West Cumbria (Cumwhinton Treated).
- Lower Cost Option, comprising the collective implementation of **all** of the following options: Wastwater (negotiate part abstraction licence) (WC04); Development of New Boreholes in West Cumbria Aquifer (10 MI/d) (WC05a); Development of Boreholes in North Cumbria Aquifer (WC09); and Crummock Automated Compensation Control (WC19). Due to the relatively low design capacities of each component option, it is not possible to consider these options as preferred options individually as the amount of additional water supplied is insufficient to address the deficit in the WRZ.

Taking into account the option's availability; financial, environmental and social costs; the design capacity in terms of the amount of water it could add to the water supply; and the outcomes of the SEA and HRA, United Utilities identified Option WC01: Thirlmere Transfer into West Cumbria as the preferred option for the dWRMP.

Both the preferred option and the alternatives listed above were subject to more detailed assessment through the SEA and the findings are summarised in this section of the report. The assessment included the effects of mitigation that is likely to be incorporated into the design of each option by United Utilities and more detailed analyses where further information could be ascertained. The inclusion of these factors in the assessment of the preferred option and alternatives has resulted in differences in the scoring against some SEA objectives between the assessments of the same option during the feasible and preferred option assessments. Following the summary of the preferred option and alternatives assessments, an assessment of potential cumulative or synergistic effects of the implementation of the preferred option with others plans, programmes and projects is provided.

This section also outlines further mitigation measures that could be incorporated into the design of the preferred option to reduce negative effects or enhance positive effects. The full assessments and potential mitigation measures for the preferred option and alternatives are included in Appendix E.

Finally, this section concludes by identifying the reasons for selection of the preferred option.

## 5.2 **Potential Effects of the Preferred Option and Alternatives**

The findings of the detailed assessments of the preferred option and the two alternatives during both construction and operation are presented in Table 5.1 and are discussed in more detail in the sections that follow.



Table 5.1 Summary of the Preferred Option and Alternatives Assessment

Ref	Option Name	Design Capacity (Ml/d)	Construction (C) or Operation (O)	Biodiversity	Land Use/Soils	Water Quantity and Quality	Flooding	Air Quality	Climate Change	Human Health	Economic and Social Well-being	Water Resource Use	Use of Resources	Heritage	Landscape
WC01	Thirlmere Transfer into West Cumbria	80	C	-	-	0	-	-	∴	-	++/-	0	∴	-	∴
			O	++	0	++	-	0	∴	++	++	0	∴	0	-
WC14d	Kielder Water Transfer to West Cumbria (Cumwhinton Treated)	80	C	-	-	0	-	-	∴	-	++/-	0	∴	-	-
			O	++	0	++	0	0	∴	++	++	0	∴	0	-
WC04, WC05a, WC09, WC19	Lower Cost Option	27.2	C	-	-	0	-	-	∴	-	++/-	0	∴	-	-
			O	?	0	-	-	0	∴	++	++	0	∴	0	-

### 5.2.1 Preferred Option: Thirlmere Transfer into West Cumbria

The preferred dWRMP option involves increasing abstraction from Thirlmere reservoir within current licence conditions by enhancing infrastructure capacity. As set out in section 4 of this report, this option represents a large scale scheme comprising several infrastructure components including new service reservoir, a water treatment works, pumping stations and over 100km of new pipeline. This option would also involve the abandonment of three existing water treatment works in West Cumbria namely, Quarry Hill, Ennerdale, and Corn How. It should be noted that the option would involve the decommissioning of the sources from permanent operational use, although United Utilities may seek to retain some locations as drought contingency sources.

#### Construction Effects

Reflecting the scale of construction activity associated with this option, significant negative effects were identified in respect of climate change as a result of associated greenhouse gas emissions from HGV movements, construction plant and embodied carbon in raw materials (the option would generate an estimated 53,692 tonnes CO<sub>2</sub>e during construction). Using the embodied carbon associated with the construction phase as a proxy, material use and energy requirements are considered to be substantial and, taking into account waste generation, the option was therefore assessed as having a significant negative effect on resource use. The majority of the proposed development sites are located within the Lake District National Park. Approximately 50% of the pipeline length would also lie within the Lake District National Park and therefore there is potential for substantial landscape effects associated with construction activity. Development may also affect the visual amenity of residential receptors in close proximity to the development sites and in particular receptors to the north of the proposed new/upgraded service reservoirs at Castle Rigg and Bothel Moor and along the pipeline route as well as recreational users. Overall, the option was therefore assessed as having a significant negative effect on landscape.

The construction of this option would represent a large capital investment which is likely to generate a number of employment opportunities and supply chain benefits as well as increased spend in the local economy by contractors and construction workers. However, HGV movements and pipeline works of the proposed scale may cause traffic disruption, particularly if works are undertaken during peak tourist periods when the influx of visitors to the area causes congestion. The option was therefore assessed as having a mixed significant positive and minor negative effect on economic and social well-being.

The assessment did not identify any further significant negative or significant positive effects. The HRA identifies that there is potential for significant construction effects on the River Derwent and Bassenthwaite Lake SAC, Clints Quarry SAC, Lake District High Fells SAC and River Ehen SAC, primarily due to pipeline works. However, taking into account scheme specific mitigation, and a commitment for pipeline works to be within existing roads (or suitable alternatives identified in discussion with Natural England and the Environment Agency), no significant construction-related effects would be anticipated. It should also be noted that further, scheme level investigations and appropriate assessment would be undertaken at the project stage. Notwithstanding, this option would result in the loss of greenfield land at several development sites and in consequence, there is potential for localised loss of habitat and, in conjunction with decommissioning works, disturbance which has been assessed as having a minor negative effect on biodiversity.

The option may generate minor negative effects in respect of land use/soils (due to additional lank take required under this option), flood risk (the Bridge End and Ennerdale development sites are situated within Flood Zones 2/3 whilst several sections of the pipelines would be routed across Flood Zones 2/3) and cultural heritage (due to potential effects on the settings of listed buildings and scheduled monuments). Emissions to air from HGV movements and construction plant may also have a minor negative effect on air quality and, together with noise/vibration, human health.

The option was assessed as having a neutral effect in respect of water quantity/quality and water resource use during the construction phase. Whilst there is the potential for contaminants such as silt, concrete or fuel oil to pollute 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

Similar to the construction phase, the option is likely to have significant negative effects on climate change and resource use SEA objectives which principally reflects additional energy requirements (and related greenhouse gas emissions) associated with the treatment and pumping of water. Whilst this option would also result in the closure of existing water treatment works (Quarry Hill, Ennerdale, and Corn How) and would therefore generate some energy savings and associated carbon emission reductions (an estimated 3,008 tonnes CO<sub>2</sub>e/a), overall net operational greenhouse gas emissions are expected to be significant (approximately 8,001 tonnes CO<sub>2</sub>e/a).

The scheme is designed to relieve pressure on the River Ehen SAC. Abstraction from Ennerdale Water, which discharges into the Ehen, has been identified for amendments under the RoC programme due to the impact of abstraction on interest features in the SAC (primarily fresh water pearl mussels). The decommissioning of Ennerdale water treatment works and associated abstraction from Ennerdale Water under this option may therefore generate benefits in respect of these features due to increased flows. It is assumed that compensation flow to St John's Beck would be maintained in accordance with the existing consent and in consequence no adverse effects on the River Derwent and Bassenthwaite Lake SAC and the River Derwent and Tributaries SSSI (which includes the Beck) would be expected. The decommissioning of Quarry Hill water treatment works would result in a reduction in abstraction from Dash Beck and Hause Gill, sources that have been investigated under the RoC programme due to impacts on salmon which are interest features of this SSSI and SAC, whilst the decommissioning of Corn How water treatment works and cessation of abstraction from Crummock Water may also lead to benefits in respect of the SSSI and SAC (although this source has not been identified for reduction under the RoC programme). Taking into account the potential operational benefits in respect of the River Ehen SAC and River Derwent and Bassenthwaite Lake SAC in particular, this option was assessed as having a significant positive effect on biodiversity. The decommissioning of the three water treatment works has also been assessed as having a significant positive effect on water quantity and quality due to increases in flows in the catchments in which associated abstractions are located (Dash Beck, Bassenthwaite/Derwent, Ellen, Ehen and Cocker).

The option has a design capacity of 80 Ml/d, serving to meet short term peak demands as well as addressing the deficit within the West Cumbria WRZ which is based on critical period average demand. Further, the decommissioning of existing sources may benefit downstream abstractors (where hands off flow constraints are in

place) or present opportunities for new abstractions (subject to licensing). This has been assessed as having a significant positive effect on health (in helping to ensure the continuity of a safe and secure drinking water supply) and economic and social well-being (given the potential for additional supply to support economic/population growth and help sustain the seasonal influx of tourists to the area).

No further significant negative or significant positive operational effects were identified during the assessment. The operation of this option is expected to have minor negative effects on flood risk (owing to the location of assets within Flood Zones 2/3). Minor negative effects have also been identified in respect of landscape as new above ground infrastructure would (with the exception of Bothel Moor and Quarry Hill) be located within the Lake District National Park and in consequence there is potential for landscape impacts. New assets may also affect the visual amenity of residential receptors in close proximity to the development sites (and in particular receptors to the north of Castle Rigg and Bothel Moor) as well as recreational users. However, a number of new assets would be located within/adjacent to existing sites which, alongside the implementation of appropriate mitigation such as sympathetic design and use of local materials, is likely to reduce the magnitude of landscape impacts. Further, appropriate screening and landscaping would be likely to lessen the immediate landscape/visual impact over time (as vegetation matures).

The option was assessed as having a neutral effect on four objectives during operation namely, soils/land use, water resources, air quality and cultural heritage.

### 5.2.2 Alternative Option: Kielder Water Transfer to West Cumbria (Cumwhinton Treated)

This option comprises the transfer of water from Kielder Water in the Northumbrian Water supply region to the West Cumbria WRZ. The option would require:

- new intake structure, pumping station and screening equipment at Kielder Water with a 80MI/d capacity;
- new 40km raw water transfer main from Kielder to Carlisle;
- new booster pumping station located a Catgallow service reservoir;
- new water treatment works facility adjacent to Cumwhinton water treatment works;
- 23km raw water transfer main to Quarry Hill water treatment works;
- new bulk supply point (BSP) located close to Quarry Hill water treatment works;
- new continuation of previous large diameter trunk main (LDTM) between the new Quarry Hill BSP and a further BSP located close to Corn How service reservoir;
- new branch main feed into Corn How service reservoir;
- new main between Corn How BSP and Corn How service reservoir and fluoridation at the reservoir; and

- new continuation of previous LDTM between Corn How pumping station and Summergrove service reservoir (with fluoridation at the reservoir).

As with Option WC01 (Thirlmere Transfer into West Cumbria), this option would also involve the abandonment of three existing water treatment works in West Cumbria namely, Quarry Hill, Ennerdale, and Corn How.

## Effects of Construction

This option represents a large scale scheme comprising several infrastructure components including a new intake, water treatment works, pumping station and pipeline together with the decommissioning of three existing water treatment works. Construction activity is therefore expected to have a significant negative effect on climate change as a result of associated greenhouse gas emissions from HGV movements, construction plant and embodied carbon in raw materials (the option would generate 67,204 tonnes CO<sub>2</sub>e during construction). Using the embodied carbon associated with the construction phase as a proxy, material use and energy requirements are considered to be substantial and, taking into account waste generation, the option was therefore assessed as having a significant negative effect on resource use.

The construction of this option would represent a large capital investment which is likely to generate a number of employment opportunities and supply chain benefits as well as increased spend in the local economy by contractors and construction workers. However, HGV movements and pipeline works could result in disruption to roads in the area. Overall, the option was therefore assessed as having a mixed significant positive and minor negative effect on economic and social well-being.

The assessment did not identify any further significant negative or significant positive effects. Whilst the development sites do not contain any statutory or non-statutory designations, under current proposals the primary pipeline from Kielder to the United Utilities supply area is assumed to be a straight line across Kielder Forest (and hence across the Border Mires, Kielder - Butterburn SAC, River Eden SAC, River Eden and Tributaries and Kielder Mires SSSIs). The pipeline from Cumwhinton to Quarry Hill would also cross the River Eden SAC as well as ancient woodland whilst the pipeline from Quarry Hill to Summergrove would run adjacent to the River Derwent and Bassenthwaite Lake SAC and River Derwent and Tributaries SSSI for part of its route and would cross the SAC/SSSI. However, the HRA states that it is likely that effects on these sites arising from pipeline works could be managed/avoided with scheme specific mitigation (e.g. re-routing to avoid designated sites). In this respect, it is considered reasonable to assume that pipelines would be routed along existing carriageways (probably via the B6357 and then either the A6071 or the B6318) and river crossings (or via suitable alternative routes identified in discussion with Natural England and the Environment Agency). It should also be noted that further, scheme level investigations and appropriate assessment would be undertaken at the project stage. Notwithstanding, this option would result in the loss of greenfield land at several development sites and in consequence there is potential for localised loss of habitat and, in conjunction with decommissioning works, disturbance which was assessed as having a minor negative effect on biodiversity.

The option may generate minor negative effects in respect of land use/soils (due to additional lank take required under this option), flood risk (the site of the new intake and some decommissioning works would be within Flood Zones 2/3 whilst the proposed pipeline routes would cross Flood Zones 2/3 at several points) and cultural heritage

(due to potential effects on the settings of listed buildings and scheduled monuments). The Corn How and Ennerdale sites are within the Lake District National Park although works at these locations would be of a small scale and contained within an existing operational site. A large section of pipeline between Quarry Hill and Summergrove would also be within the Lake District National Park. However, the route would predominantly follow existing linear features (roads) and adverse effects would be over a short timescale with planting and re-seeding likely to return land to a pre-development state within a year (depending on the season in which works are undertaken). In consequence, effects on this objective were assessed as minor. Emissions to air from HGV movements and construction plant may also have a minor negative effect on air quality and, together with noise/vibration, human health.

The option was assessed as having a neutral effect in respect of water quantity/quality and water resource use during the construction phase. Whilst there is the potential for contaminants such as silt, concrete or fuel oil to pollute 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).

## Effects of Operation

As with Option WC01, this option is likely to have significant negative effects on climate change and resource use SEA objectives which principally reflects additional energy requirements (and related greenhouse gas emissions) associated with the treatment and pumping of water. Whilst this option would also result in the closure of existing water treatment works (Quarry Hill, Ennerdale, and Corn How) and would therefore generate some energy savings and associated carbon emissions reductions (an estimated 3,008 tonnes CO<sub>2</sub>e/a), overall, net operational greenhouse gas emissions are expected to be significant (21,539 tonnes CO<sub>2</sub>e/a).

The HRA identifies that the operation of this option is unlikely to have any adverse effects on designated European sites. Use of water from Kielder would not affect any water resource dependent interest features at sites within its catchment and the only real mechanism for impacts would be indirect, through increases in discharges after useage. In reality, however, it is assumed that the transfer would be tailored to the deficit and any increase in, for example, river flows would be well within natural variation. Although the option does constitute an interbasin transfer of raw water, it would be treated immediately on arrival and risks associated with this (e.g. invasive species transfer) would not be expected. Like Option WC01, this option would involve the decommissioning of Ennerdale, Corn How and Quarry Hill water treatment works. This was assessed as having a significant positive effect on biodiversity and water quantity/quality objectives.

The option has a design capacity of 80MI/d, serving to meet short term peak demands as well as addressing the deficit within the West Cumbria WRZ which is based on critical period average demand. Further, the decommissioning of existing sources may benefit downstream abstractors (where hands off flow constraints are in place) or present opportunities for new abstractions (subject to licensing). This has been assessed as having a significant positive effect on health (in helping to ensure the continuity of a safe and secure drinking water supply) and economic and social well-being (given the potential for additional supply to support economic/population growth and help sustain the seasonal influx of tourists to the area).



No further significant negative or significant positive effects have been identified. The operation of this option is expected to have minor negative effects on landscape which principally reflects the potential for adverse landscape/visual impacts associated with new above ground infrastructure. Further, the east end of Kielder reservoir lies within the Northumberland National Park and whilst new above ground infrastructure would not be expected to affect its character, additional draw-down of the reservoir may be perceptible to recreational users.

The option was assessed as having a neutral effect on five objectives during operation namely, soils/land use, flood risk, water resources, air quality and cultural heritage.

### 5.2.3 Alternative Option: Lower Cost Option

As noted above, this option would involve the collective implementation of four individual smaller scale options (assessed during the feasible options stage) that together would deliver 27.2ML/d to the West Cumbria WRZ. A summary of each constituent option is provided below:

- **Wastwater (negotiate part abstraction licence):** This component involves an agreement with third party licence holders for water transfer from Brow Top Service Reservoir to Ennerdale water treatment works. It would require the construction of a new 10ML/d pumping station at Brow Top, 13.5km pipeline and a new mixing tank at Ennerdale.
- **Development of New Boreholes in West Cumbria Aquifer (10 ML/d):** This component would involve the construction of seven new boreholes at Sandwith, Rottington and Moor Platts in addition to utilising an existing borehole at Catgill. The scheme would require drilling of a borehole at each site, a new fixed speed borehole pump and a new headworks GRP kiosk. The Catgill site would also require a new break tank, aeration tower and raw water pumping station. A total of 1.5km of pipeline would be required from Sandwith to Rottington, 4km from Rottington to Moor Platts and 2.5km from Moor Platts to Catgill. Finally, a 13km pipeline would transfer all raw water to Ennerdale water treatment works. A new 1km washout main would also be needed at Catgill to the nearest Egremont sewer.
- **Development of Boreholes in North Cumbria Aquifer:** This component comprises the construction of two new boreholes at Waverton and Thursby for abstraction and transfer to Quarry Hill water treatment works. The scheme would also require a new 8km raw water transfer pipe from Waverton to the water treatment works and a 15km transfer pipe from Thursby to the water treatment works.
- **Crummock Automated Compensation Control:** This component would involve the replacement of Crummock weir's penstock with automated compensation control. This would allow for an automated control of the compensation flow to the River Derwent.

In addition to the above, treated water would be transferred to Summergrove service reservoir from Quarry Hill water treatment works and Stainburn service reservoir. This would require a further 41km of pipeline from Quarry Hill water treatment works to Summergrove reservoir via Stainburn.

It is important to note that this option relies on the implementation of all of the options outlined above. It would not be possible for individual option elements (or alternative sets of options) to be brought forward due to the relatively low design capacities of each component option which would be insufficient to address the deficit in the WRZ.



## Effects of Construction

Reflecting the scale of this option, construction activity is expected to have a significant negative effect on climate change as a result of associated greenhouse gas emissions from HGV movements, construction plant and embodied carbon in raw materials (the option would generate 9,885 tonnes CO<sub>2</sub>e during construction). Using the embodied carbon associated with the construction phase as a proxy, material use and energy requirements are considered to be substantial and the option was therefore assessed as having a significant negative effect on resource use.

The construction of this option would represent a large capital investment which is likely to generate a number of employment opportunities and supply chain benefits as well as increased spend in the local economy by contractors and construction workers. However, HGV movements and pipeline works of the proposed scale may cause traffic disruption. The option was therefore assessed as having a mixed significant positive and minor negative effect on economic and social well-being.

The assessment has not identified any further significant negative or significant positive effects. Crummock Water is within the River Derwent and Bassenthwaite Lake SAC and River Derwent and Tributaries SSSI which may be affected by the replacement of the Crummock weir penstock. However, the HRA states that, as construction works required to deliver this option would be relatively minor and effects could be controlled/managed with normal best practice and scheme-specific measures (e.g. avoiding key migration periods) no adverse effects would be anticipated. Whilst no other development sites are affected by nature conservation designations, pipeline works may affect several European designated sites including the River Ehen SAC and River Derwent and Bassenthwaite Lake SAC. However, the HRA states that it is likely that effects on these sites arising from pipeline works could be managed/avoided with scheme specific mitigation (e.g. re-routing to avoid designated sites). In this respect, it is considered reasonable to assume that pipelines would be routed along existing carriageways and river crossings (or via suitable alternative routes identified in discussion with Natural England and the Environment Agency). It should also be noted that further, scheme level investigations and appropriate assessment would be undertaken at the project stage. Notwithstanding, this option would result in the loss of greenfield land at several development sites and in consequence there is potential for localised loss of habitat and disturbance which has been assessed as having a minor negative effect on biodiversity.

The option may generate minor negative effects in respect of land use/soils (due to additional bank take required under this option), flood risk (the proposed new mixing tank at Ennerdale, replacement penstock at Crummock weir and sections of the proposed pipelines would be within/cross Flood Zones 2/3) and cultural heritage (due to potential effects on the settings of listed buildings and scheduled monuments). With regard to landscape, Ennerdale water treatment works and Crummock weir are located within the Lake District National Park and in consequence there is potential for significant landscape impacts. However, the scale of works at these sites would be small (construction of a new mixing tank and replacement of an existing penstock) whilst in the case of Ennerdale development would be within an existing site. The proposed pipelines would also cross the Lake District National Park although routes would generally follow existing linear features (roads) and adverse effects would be over a short timescale with planting and re-seeding likely to return land to a pre-development state within a year (depending on the season in which works are undertaken). In consequence, effects on this objective were assessed as minor. Emissions to air from HGV movements and construction plant may also have a minor negative effect on air quality and, together with noise/vibration, human health.

The option was assessed as having a neutral effect in respect of water quantity/quality and water resource use during the construction phase. Whilst there is the potential for contaminants such as silt, concrete or fuel oil to pollute 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).

## Effects of Operation

Similar to the construction phase, this option is likely to have significant negative effects on climate change and resource use SEA objectives. This principally reflects the additional energy requirements (and related greenhouse gas emissions) associated with the treatment and pumping of water (the combined greenhouse gas emissions associated this option would be an estimated 6,158 tonnes CO<sub>2</sub>e/a).

The option has a design capacity of 27.2Ml/d, serving to address deficit within the West Cumbrian WRZ. This was assessed as having a significant positive effect on health (in helping to ensure the continuity of a safe and secure drinking water supply) and economic and social well-being (given the potential for additional supply to support economic/population growth and help sustain the seasonal influx of tourists to the area). However, it should be noted that this option would not solve West Cumbria's vulnerability to short droughts and limited drought options.

No further significant negative or significant positive effects were identified during the assessment. The operation of this option is expected to have minor negative effects on water quantity, due to a minor reduction in river flows and reservoir and groundwater levels, and flood risk, due to the location of the mixing tank at Ennerdale within Flood Zone 2.

As noted above, this option would result in new above ground infrastructure within the Lake District National Park and in consequence there would be potential for substantial landscape impacts. However, the new mixing tank at Ennerdale water treatment works would be small scale and within an existing site, benefitting from screening whilst no permanent landscape impacts are expected once the penstock at Crummock weir is operational (as it would replace an existing unit). New above ground infrastructure outside the Lake District National Park would be in rural settings and on greenfield land and in consequence, there may be potential for adverse effects on local landscape character (although the pumping station at Brow Top and works at Catgill would be within existing sites). Together with potential adverse effects on the visual amenity of residential receptors in close proximity to the development sites, this was assessed as having a minor negative effect on landscape.

The option was assessed as having a neutral effect on four objectives during operation namely, soils/land use, water resources, air quality and cultural heritage.

Effects on biodiversity were assessed as uncertain at this stage. Whilst the majority of the scheme components are unlikely to have any significant adverse effects on European designated sites, the findings of the HRA in respect of the operation of the new West Cumbria aquifer boreholes, Wastewater transfer and Crummock automated compensation control indicate that effects on several European designated sites including Wastewater SAC, River Ehen SAC and River Derwent and Bassenthwaite Lake SAC are uncertain. Further, new borehole abstractions at Waverton and Thursby have the potential to impact on the nearby River Waverly and River Wampool and may

affect water dependent SSSIs downstream of the borehole sites although no readily available flow data could be found for the River Waverley or Wampool to contextualise the abstraction volumes and current flow.

#### 5.2.4 Summary of the Assessment of the Preferred Option and Alternatives

Construction related effects associated with the preferred option and the alternatives are considered to be broadly similar with significant negative effects assessed against climate change and resource use objectives and significant positive effects identified in respect of economic and social well-being. For all options it was assumed that pipeline works would be within existing roads (or suitable alternatives identified in discussion with Natural England and the Environment Agency) such that no significant construction-related effects on designated European sites would be anticipated. However, Option WC01 (the preferred option) was assessed as having a significant negative effect on landscape as the majority of the proposed development sites under this scheme are located within the Lake District National Park. However, this would be during the construction phase only with minor negative effects expected on this objective during operation. Further, whilst all options were assessed as having a significant negative effect against climate change and resource use during construction, estimated emissions do vary with those associated with Option WC14d (Kielder Water Transfer to West Cumbria (Cumwhinton Treated)) being the greatest (67,204 tonnes CO<sub>2</sub>e) and the Lower Cost Option the least (9,885 tonnes CO<sub>2</sub>e).

As with construction, significant negative operational effects were identified in respect of climate change and resource use objectives for all options, due to additional energy requirements (and related greenhouse gas emissions) associated with the treatment and pumping of water, although again operational emissions associated with Option WC14d are estimated to be considerably higher than both the preferred option and Lower Cost Option (21,539 tonnes CO<sub>2</sub>e/a compared to 8,001 tonnes CO<sub>2</sub>e/a under Option WC01 and 6,158 tonnes CO<sub>2</sub>e/a under the Lower Cost Option). All of the options were also assessed as having a significant positive effect on health and economic and social well-being, reflecting the substantial additional capacity each would deliver, although it should be noted that design capacities of Option WC01 and Option WC14d are substantially greater than the Lower Cost Option (80MI/d compared to 27.2MI/d).

There was a marked difference in effects against the biodiversity and water quantity/quality SEA objective across the options for operation. Both Option WC01 and Option WC14d would involve the decommissioning of Ennerdale, Corn How and Quarry Hill water treatment works which was assessed as having a significant positive effect on biodiversity and water quantity/quality objectives. The operational effects of the Lower Cost Option on biodiversity, meanwhile, were considered to be more uncertain particularly as it is not clear at this stage how the operation of several scheme components may affect European designated sites. Effects on water quantity/quality associated with the operation of this option were assessed as being negative.

### 5.3 Cumulative Effects of Implementing the Preferred Option

An assessment of the cumulative effects of implementing the preferred option that is proposed to be taken forward has been undertaken. The following sections consider the potential for cumulative effects of the dWRMP and the following:

- population change in the United Utilities area;
- Nationally Significant Infrastructure Projects (NSIPs);
- United Utilities' Draft Statutory Drought Plan 2012; and
- other water company WRMPs.

Any changes or amendments to these assumptions will need to be considered during the five-yearly reviews of the WRMP and at the planning and implementation phase for the options (e.g. in Environmental Impact Assessments and HRAs) to ensure that the latest and most up to date information is taken into account.

### 5.3.1 Population Change

Population change in the United Utilities area has already been considered in the dWRMP along with the potential for further changes in demographics throughout the plan period. These forecasts have been based upon population and property forecasts published by the ONS as well as historical reporting data and property changes on the billing system. This means that 'in combination' water-resource effects with growth promoted by other plans or projects are considered and accounted for during the WRMP development process. Arguably, therefore, potential 'in combination' effects in respect of water-resource demands due to other plans or projects are unlikely since these demands are explicitly modelled when determining deficit zones and hence developing feasible options. As a result (in respect of water resources), the WRMP is not likely to make non-significant effects in other plans significant (indeed, other plans are arguably the 'source' of any potential effects in respect of water demand, with the WRMP having to manage potential effects that are not generated by the WRMP itself).

Since 2008, the number of new household connections to the distribution network has declined (although there has been a small increase in the period 2011 to 2012), reflecting the economic climate. Table 5.2 shows the connected population forecasts for each WRZ to 2040. Figure 5.1 provides forecast household new connections across the United Utilities supply area which is based on the following:

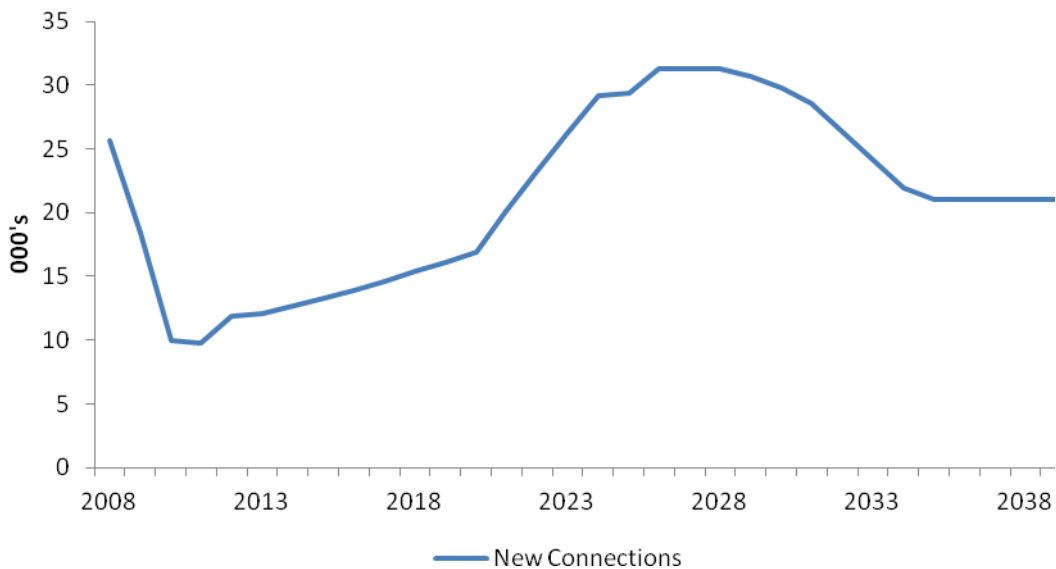
- the June Return/Regulatory Reporting data for past household data (i.e. base year 2012);
- 2013-current best estimate of household growth based on property changes on the billing system to the end of September 2012;
- 2014-2020 - assumes household growth increases by an additional 5%; and
- 2020-2040 - assume gradual increase back to average (ONS) forecasted level with additional growth to allow for alignment to overall ONS figures.

**Table 5.2 Connected Population in Each Water Resource Zone ('000)**

Water Resource Zone	Population (000s)			
	2012	2020	2030	2040
Integrated Zone	6,640	6,888	7,137	7,339
Carlisle Zone	107	113	118	124
North Eden Zone	13	13	13	14
West Cumbria Zone	144	149	152	155
Total population in UU's region provided with water supply from UU (from CACI ONS data)	6,904	7,162	7,421	7,632

Source: United Utilities

**Figure 5.1 Forecast Household New Connections**



Source: United Utilities

Across the supply area as a whole, United Utilities forecast that water demand will generally reduce due primarily to the expected effects of:

- growth in customer metering;
- the growing use of low-flush-volume toilets and other water efficient appliances;
- the continuation of our base service water efficiency programme; and

- forecast reductions in measured non-household demand resulting from macroeconomic factors and water efficiency.

Notwithstanding the above, forecasts indicate that measures will be needed to maintain and increase water supply in the West Cumbria WRZ.

### 5.3.2 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 5.3.

**Table 5.3 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	Published June 2011	No
Fossil Fuels EN-2	Published June 2011	No
Renewable energy EN-3	Published June 2011	No
Oil and Gas Supply and Pipelines EN-4	Published June 2011	No
Electricity Networks EN-5	Published June 2011	No
Nuclear Power EN-6	Published June 2011	Yes
Ports	Published 2012	No
Transport Networks (including rail and roads)	draft not yet published	n/a
Aviation	draft not yet published	n/a
Water Supply	draft not yet published	n/a
Hazardous Waste (England only)	Consultation draft published July 2011	No
Waste Water Treatment (England only)	Published in March 2012	Yes

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. Of these sites, two are located within the United Utilities supply area, Heysham and Sellafield, with the latter being within the West Cumbria WRZ. Proposals for a new nuclear build at Sellafield (NuGen's Moorside Project) are currently at the pre-application stage with an application for the scheme due to be submitted to the Planning Inspectorate in 2014. The National Grid's North West Coast Connections Project, a 400kV electricity transmission connection from NuGen's proposed new nuclear generating station to the existing transmission system in Cumbria/Lancashire, is also due to be submitted to the Planning Inspectorate in summer 2015.

It is understood that at this stage environmental baseline studies are underway and therefore robust conclusions on the potential scale and extent of cumulative effects cannot be made. However, the NPS and accompanying HRA highlight that there is potential for impacts associated with the operation of Sellafield on the River Ehen SSSI/SAC via impacts on migratory fish due to obstruction and on pearl mussels as a result of the abstraction of cooling water. Impacts on the River Derwent and Bassenthwaite Lake SAC can also not be ruled out. However, as the preferred dWRMP option is designed to relieve pressure on the River Ehen SAC in particular, no adverse cumulative effects are anticipated. Nonetheless, United Utilities should consider the potential implications of water demands associated with the construction and operation of these NSIPs as part of monitoring and through the five year review of the WRMP when more details of the schemes should be available.

Wylfa (Isle of Anglesey) is also identified for the deployment of a new nuclear power station. This site is within the adjacent Welsh Water supply area although no significant cumulative effects in-combination with the implementation of the dWRMP are anticipated at this stage.

Two potential NSIPs are set out in the Waste Water Treatment NPS but both of these are located in London and are not expected to have any effect on water demand in the United Utilities area.

A number of further NSIPs that are not detailed in the NPSs are set out on the Planning Inspectorate website<sup>68</sup>. It lists eight additional projects in the North West at the pre-application stage (three wind farms, one grid connection project, one road enhancement project, one new hazardous waste management facility, one biomass project and one railway scheme). However, none are within the West Cumbria WRZ and therefore no significant cumulative effects are anticipated at this stage. Nevertheless, the water demands of all of these projects should be considered in their applications for approval to the Planning Inspectorate and if significant demand is forecast, this should be considered by United Utilities during monitoring of the WRMP and in the five year review.

A further road enhancement scheme and underground gas storage facility are awaiting decision. The road enhancement scheme, the Heysham to M6 Link Road, is outside the West Cumbria WRZ and the nature of the proposed development (which is not expected to require substantial water resources) is such that no significant cumulative effects are anticipated. The Preesall Saltfield Underground Gas Storage scheme is situated to the south/south-east of Fleetwood and would therefore also be outside the West Cumbria WRZ. Whilst the operation of the scheme would involve the discharge of high volumes of saline water and abstraction of seawater, no common ecological/water resource receptors have been identified.

### 5.3.3 United Utilities' Draft Statutory Drought Plan 2012

Public consultation on United Utilities' Draft Statutory Drought Plan 2012<sup>69</sup> closed in January 2013. It provides a comprehensive statement of the actions that may be implemented during drought conditions to safeguard essential water supplies to customers and minimise environmental impact.

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<sup>68</sup> See <http://infrastructure.planningportal.gov.uk/> [Accessed 21.02.2013]

<sup>69</sup> Available from [http://corporate.unitedutilities.com/documents/Draft\\_Drought\\_Plan.pdf](http://corporate.unitedutilities.com/documents/Draft_Drought_Plan.pdf) [Accessed January 2013].



The Draft Statutory Drought Plan 2012 identifies that the West Cumbria WRZ is the most sensitive to drought due to its short (75 days) critical period. Drought triggers have been produced for the stored water resources in the West Cumbria WRZ: Ennerdale and Crummock. Drought triggers have also been developed for the Scales boreholes based on actual abstraction compared to the annual licence limit. Table 5.4 summarises the drought permit/order sites that have been identified in the draft Plan for the West Cumbria WRZ together with details of the change that would be sought in a drought event and any protected sites in the vicinity of the source.

**Table 5.4 Potential Drought Permit/Order Sites (West Cumbria WRZ)**

Source	Change Sought	Designated Sites in Vicinity
Crummock Water	Allow pumping of abstraction and compensation flows at lake levels below 1.1m below weir crest level to 1.5m below weir crest level	River Derwent and Bassenthwaite Lake SAC
Ennerdale Water	Allow drawdown of the lake to 1.7m below weir crest with mitigated compensation flow regime Note: The Ennerdale Operating Agreement states that abstraction is only possible down to 1.35 m below weir crest and to abstract below this would require a drought permit/order	River Ehen SAC, Ennerdale Lake SSSI
Scales boreholes	Increase the annual licence limit from 365Ml to between 438 and 621 Ml to enable the continuation of a higher daily abstraction rate (up to the licence limit of 6Ml/d)	No protected sites

Source: United Utilities

The SEA prepared in support of the Draft Statutory Drought Plan 2012<sup>70</sup> states that allowing drawdown of Ennerdale Water could have impacts on the ecology of the lake. It also highlights the potential for in-combination effects with the existing abstraction licence at Ennerdale, noting that the Environment Agency RoC concluded that the normal compensation flow in the River Ehen could not be demonstrated not to impact the freshwater pearl mussel population, although a mitigated flow regime has been discussed with the Environment Agency and Natural England. With the mitigated flow regime in place, the accompanying Appropriate Assessment concluded no adverse effects of the drought option's implementation on the River Ehen SAC. Further potential adverse effects are identified in respect of impacts on recreational angling, hydrodynamics of the lake as well as visual impacts due to reduced lake levels (although these levels will already be affected by a drought). However, the assessment identified that the additional lake drawdown under drought powers would enable the continued supply of water.

The SEA also highlights that the Crummock Water option could result in minor adverse impacts on fish populations in Crummock Water due to decreased marginal habitat. HRA Screening highlighted that there may be potential for adverse impacts on the River Derwent & Bassenthwaite Lakes SAC although it is noted that the

<sup>70</sup> Casacde (2012) *Strategic Environmental Assessment of United Utilities' Draft Statutory Drought Plan: Environmental Report*. Available from [http://corporate.unitedutilities.com/documents/Strategic\\_Environmental\\_Assessment\\_SEA\\_Environmental\\_Report.pdf](http://corporate.unitedutilities.com/documents/Strategic_Environmental_Assessment_SEA_Environmental_Report.pdf) [Accessed January 2013]

Appropriate Assessment for this drought option concluded that no adverse effects are anticipated. Potential adverse effects are identified in the SEA in respect of recreational angling, water quality and visual amenity. However, the assessment identified that the additional lake drawdown under drought powers would enable the continued supply of water.

In respect of the Scales borehole drought option, the SEA identifies the potential for moderate adverse impacts on habitats, although notes that none of the affected water bodies are nationally or internationally designated. The SEA also identifies the potential for moderate adverse hydrological impacts and minor adverse effects on landscape. As with the other drought options, the assessment identified that the option would enable the continued supply of water.

The dWRMP preferred option is designed to relieve pressure on the River Ehen SAC and so no adverse effects on this site would be expected in combination with the Drought Plan as it currently stands; likewise, the decommissioning of Corn How water treatment works under the dWRMP preferred option and cessation of abstraction from Crummock Water will decrease the risk of in combination effects on the River Derwent and Bassenthwaite Lake SAC.

However, it is critical to note that the implementation of the dWRMP preferred option would substantially change water resource management in the West Cumbria WRZ, such that these elements of the Drought Plan would immediately become irrelevant once the option was brought on-line. This would require a new drought plan to be developed. Logically, therefore, the current Drought Plan cannot have 'in combination' effects with the WRMP as the options and scenarios promoted in the two plans cannot operate together. Notwithstanding, it should be noted that the implementation of the dWRMP preferred option would help reduce the vulnerability of the West Cumbria WRZ to drought by increasing supply capacity. This is particularly beneficial given the limited number of drought options available within this WRZ.

#### 5.3.4 Other Water Company WRMPs

There is potential for United Utilities' WRMP to have cumulative effects with the WRMPs of adjacent water companies. A review of the proposals in neighbouring water company areas (Dŵr Cymru Welsh Water, Severn Trent, Yorkshire Water, Northumbrian Water, Scottish Water and Dee Valley Water) is included in Appendix B of this report. None of the current WRMPs have included options to draw water supply from resources in the West Cumbria WRZ. In light of this, no cumulative effects are likely to occur.

The information used to carry out this review is considered to be the most up to date information available at the time of writing. However, it should be noted that all water company WRMPs are currently subject to review with draft plans expected to be published imminently. Once published, an assessment will be undertaken for the dWRMPs. At this stage, it is assumed that none of the WRMPs have included options to draw water supply from resources in the United Utilities area. In light of this assessment, no cumulative effects are likely to occur. United Utilities will continue to monitor the potential effects on water resources as part of the five yearly review of their WRMP.

## 5.4 Preferred Option Proposed Mitigation Measures

The potential effects of the preferred option are set out in the sections above. In some cases there is an opportunity to reduce some of the potential negative effects and enhance positive effects. The detail of this mitigation needs to be considered during the planning phases of the scheme. Potential mitigation measures are included within the preferred option assessment matrix in Appendix E although these should be considered as a starting point for more detailed consideration as the option is planned and developed.

### *Species Specific Measures*

Scheme specific mitigation plans will be required to ensure that any construction related adverse effects on designated sites are avoided and localised effects on biodiversity minimised. With specific regard to the Clints Quarry SAC, mitigation requirements for Great Crested Newts would need to be reviewed at the scheme level. With respect to the River Ehen SAC and River Derwent and Bassenthwaite Lake SAC, the scheme should be designed to ensure that no bankside trees are removed. Construction within 200m of the river should be completed before late summer, prior to the autumn migration period.

The following general measures should also followed where appropriate to minimise the potential for impacts on species that are European site interest features unless project-level environmental studies or HRA indicate that they are not required or not appropriate, or that alternative or additional measures are more appropriate/necessary:

- Scheme design should aim to minimise the environmental effects by ‘designing to avoid’ potential habitat features that may be used by species that are European site interest features when outside the site boundary (e.g. linear features such as hedges or stream corridors; large areas of scrub or woodland; mature trees; etc.) through scheme-specific routing studies.
- The works programme and requirements should be determined at the earliest opportunity to allow investigation schemes, surveys and mitigation to be appropriately scheduled and to provide sufficient time for consultations with Natural England.
- Night-time working, or working around dusk/dawn, should be avoided to reduce the likelihood of negative effects on nocturnal species.
- Any lighting required (either temporary or permanent) should be designed with an ecologist to ensure that potential ‘displacement’ effects on nocturnal animals, particularly bat species, are avoided.
- All compounds/pipe stores etc. should be sited, fenced or otherwise arranged to prevent vulnerable SAC species from accessing them.
- All materials should be stored away from commuting routes/foraging areas that may be used by species that are European site interest features.
- All excavations should have ramps or battered ends to prevent species becoming trapped.
- Pipe-caps should be installed overnight to prevent species entering and becoming trapped in any laid pipe-work.

### Scheme Design and Planning

The preferred option will be subject to project-level environmental assessment<sup>71</sup> as it is brought forward, which will include assessments of its potential to affect European sites during construction or operation. These assessments will consider or identify (*inter alia*):

- opportunities for avoiding potential effects on European sites through design (e.g. alternative pipeline routes; micro-siting; etc.);
- construction measures that need to be incorporated into scheme design and or planning to avoid or mitigate potential effects - for example, ensuring that sufficient space is available for pollution prevention measures to be installed, such as sediment traps; and
- operational regimes required to ensure no adverse effects occur.

### Pollution Prevention

The habitats of European sites are most likely to be affected indirectly through construction-site derived pollutants rather than through direct encroachment. There is a substantial body of general construction good-practice that can be relied on (at this level) to prevent significant or adverse effects on a European 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 option:

- Environment Agency Pollution Prevention Guidance Notes [online]. Available at <http://www.environment-agency.gov.uk/business/topics/pollution/39083.aspx>:
  - PPG1: General guide to the prevention of pollution (May 2001; currently under review);
  - PPG5: Works and maintenance in or near water (October 2007);
  - PPG6: Pollution prevention guidance for working at construction and demolition sites (April 2010);
  - PPG21: Pollution incident response planning (March 2009); and
  - PPG22: Dealing with spillages on highways (June 2002; currently under review).
- Environment Agency (2001) *Preventing pollution from major pipelines* [online]. Available at [www.environment-agency.gov.uk/static/documents/Business/pipes.pdf](http://www.environment-agency.gov.uk/static/documents/Business/pipes.pdf). [Accessed 1 March 2011].
- Venables R. *et al.* (2000) *Environmental Handbook for Building and Civil Engineering Projects*. 2<sup>nd</sup> Edition. Construction Industry Research and Information Association (CIRIA), London.

The best-practice procedures and measures detailed in these documents will be followed for all construction works derived from the dWRMP<sup>72</sup> 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.

<sup>71</sup> These will be undertaken as part of the detailed 'investigation schemes' which are funded through inclusion in the WRMP.

### *Effects on Flood Risk, Climate Change and Resource Use*

The preferred option has substantial construction and operational energy requirements and associated greenhouse gas emissions. Effects could be in part mitigated through, for example, the use of low emission plant and through the use of on-site energy generation or renewable energy sources where feasible.

In view of the scale of the preferred option, a large volume of materials will be required and construction waste generated. Where significant raw materials are required this can be mitigated by utilising recycled and locally sourced materials. Construction and operational wastes should also be reused/recycled where appropriate.

To mitigate the potential effects of flooding, infrastructure should, where possible, be located outside the 1 in 100 year indicative flood plain. Where this is not possible due to operational requirements, the infrastructure should be designed such that it can continue to operate under flood conditions and not increase flood risk elsewhere.

### *Effects on Human Health and Social and Economic Well-being*

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 good practice pollution prevention guidance.

To maximise economic benefits in the United Utilities 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 local employment needs.

### *Effects on Cultural Heritage and Landscape*

Effects on landscape character and visual amenity should be considered at an early stage in the design process, particularly given the potential for adverse effects on the Lake District National Park during the construction phase of the preferred option. Potential mitigation includes, for example, the adoption of high quality design principles (e.g. design that reflects local vernacular) and landscaping/screening. In addition, it is also expected that a landscape and visual impact assessment would be undertaken at the project stage as part of any EIA.

The potential for adverse impacts of the settings of cultural heritage assets should also be considered early in the design process and as part of the EIA and any adverse effects minimised for example through micro-siting/alternative pipeline routes to avoid designated sites.

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<sup>72</sup> Both Preferred and Feasible options, if these are used.

## 5.5 Conclusions and Reasons for Selection of the Preferred Option

United Utilities chose the preferred dWRMP option 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.

United Utilities' preferred solution is to dedicate a greater proportion of the water available in Thirlmere reservoir to meet the needs of Cumbria. This would require a new water treatment works and a pipeline to transfer the water into West Cumbria. The population of West Cumbria would then benefit from being part of the UK's largest interconnected WRZ. This transfer would be of sufficient size to meet all the demand for West Cumbria and brings a number of benefits for the region, such as:

- increased confidence in long term supplies in meeting changing demands;
- support for the developing Britain's Energy Coast economic strategy as it would allow for more water to be available than is currently forecast;
- allows abstraction from existing sources in West Cumbria to cease and return the habitats to more natural conditions;
- protects internationally important SACs;
- provides future climate change resilience;
- removes the vulnerability to short duration droughts; and
- longer-term cost savings as these existing treatment works can be closed.

United Utilities has decided not to pursue the Lower Cost Option as it has raised a number of concerns:

- the solution is reliant on the agreement of a third part abstraction licence and there would be concerns over whether the third party would require this water for future growth;
- the SEA/HRA has identified that effects associated with the Wastewater component of this option on biodiversity are uncertain;
- if there are further sustainability changes in West Cumbria these options will no longer meet future demand
- it would not solve West Cumbria's reliance on abstraction from SACs; and
- this option set will not solve West Cumbria's vulnerability to short droughts and limited drought options.

Customers have expressed their preference in United Utilities' research for a least cost solution. However, this solution does not address the risk that, should the existing licence at Ennerdale be revoked, this option set would no longer meet the levels of demand.

The alternative option, WC14d: Kielder Water Transfer to West Cumbria (Cumwhinton Treated), has the same benefits as the preferred option, but avoids construction in the Lake District National Park. However, United Utilities has decided not to pursue this as it has raised a number of concerns:

- Construction costs - it is a very high cost option.
- Environmental issues - pipeline routes cross a number of designated European sites. This could be addressed but would further inflate costs.
- Planning issues - stakeholder buy-in and negotiations are likely to be lengthy.
- Operational costs - the option has higher costs associated with the pumping requirements for the option compared with the preferred option.





## 6. Next Steps

### 6.1 Consultation on the Environmental Report

The SEA Regulations require an Environmental Report to be issued to the statutory SEA consultation bodies and other organisations and ‘members of the public who are affected or likely to be affected by, or have an interest in the decisions involved in the assessment and adoption of the plan or programme concerned’. In addition, the Environmental Report helps to provide supporting information to the dWRMP which has also been issued for consultation under separate regulations.

This Environmental Report builds on the information in the SEA Scoping Report that was issued for consultation to statutory consultees in October 2012. The consultation on the Scoping Report considered the baseline information (reported in section 2 of this report) and the approach to the SEA (as set out in section 3).

This Environmental Report has set out the potential environmental, economic and social effects associated with the feasible and preferred options for managing supply and demand in the United Utilities area and focuses on the potential effects of the preferred option. These are summarised in section 4 and section 5, with more detail provided in Appendix D and Appendix E.

This consultation is important to ensure that any potentially interested organisations or members of the public have the opportunity to consider the assessment’s findings. It provides an opportunity for consultees to provide comment on whether we have identified the most relevant potential effects, or whether there are other potential effects that have not been identified in the assessment. This is relevant where any omitted effects might have affected the preferred option that United Utilities has included in their dWRMP. Where consultees have comments on other aspects of the dWRMP it may be more appropriate to respond to that consultation instead.

While we are keen to hear any comments you have about the content of this Environmental Report, the following two questions are particularly important:

- Q1. Does the assessment set out in this SEA Environmental Report describe the likely significant environmental effects of the feasible and preferred options?
- 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?

Please provide comments by post or email to:

**Secretary of State for Environment, Food and Rural Affairs**  
**Water Resources Management Plan Consultation**  
**3<sup>rd</sup> Floor**  
**17 Smith Square**  
**London**  
**SW1P 3JR**

**Email: [water.resources@defra.gsi.gov.uk](mailto:water.resources@defra.gsi.gov.uk)**

## 6.2 **How Environmental Effects will be Considered Going Forward**

Once the dWRMP has been agreed, the preferred option for managing water supply and demand contained within it will need to be implemented. As part of this process, the scheme will 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 is likely to be required in support of the implementation of the preferred option is an appropriate assessment, required by the Habitats Regulations 2010 (as amended). The HRA prepared in support the dWRMP has highlighted that appropriate assessment is likely to be required to assess whether the scheme could have a significant effect (during construction and operation) on internationally important nature conservation sites, and in particular Clints Quarry SAC, River Ehen SAC and River Derwent and Bassenthwaite Lake SAC (although the findings of the HRA of the dWRMP indicate that significant adverse effects on these sites are unlikely). Appropriate assessment will be undertaken alongside an EIA, which is the requirement of separate legislation. EIA will assess the potential positive and negative effects of the scheme, and identify opportunities to enhance the positive and mitigate the negative effects.

The preferred option will also need to be licensed by the Environment Agency. In considering whether to grant or extend a licence, the Environment Agency considers any potential impacts on the status of the water bodies (for example their chemical and biological quality, the volumes and flows of water, and the impacts on the structure of the water bodies) and on wildlife that might be affected by construction or operation.

## 6.3 **Monitoring the Effects of the WRMP**

United Utilities will continue to develop its Final WRMP in consultation with stakeholders. Subject to the approval of the Secretary of State, United Utilities expects to publish the Final WRMP on their website in 2014.

Once the WRMP is implemented its effects on the environment and people will need to be taken into account. United Utilities 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 United Utilities or by other relevant organisations such as the Environment Agency. For example, United Utilities already collects information for a robust annual review process (the June Return) that is submitted to the Office of Water Services (Ofwat). United Utilities updates their WRMP and Drought Plan every five and three years respectively and there are a number of statutory controls which must be monitored. In addition, United Utilities collects information on an annual basis for reporting to Water UK for inclusion in Water UK sustainability reporting. Much of this information is based on June Return data that is reported to Ofwat, however additional sustainability criteria outside of this is also collated.

### 6.3.1 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.

United Utilities 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, United Utilities may be required to put in place specific monitoring arrangements and will consider how best to mitigate or avoid the adverse consequences. Table 6.1 indicates some of the issues currently monitored and how they relate to the objectives considered in the SEA of the dWRMP.

**Table 6.1 Potential Indicators for Monitoring Effects**

Objective	Indicator	Source of Information	Commentary
1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	Condition of specific protected sites (e.g. SACs and SPAs)	Natural England (NE), Countryside Council for Wales (CCW)	Open communication between NE, CCW and United Utilities results in up-to-date information and identification of any potential issues.
	Condition of SSSIs on water industry land holdings	NE, CCW, United Utilities	Condition assessment of designated land on United Utilities' landholdings, both area and condition may change.
	Biological monitoring (macroinvertebrates, macrophytes, fisheries, bird surveys)	Environment Agency (EA), Environment Agency Wales (EAW), United Utilities, Angling clubs, BTO	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.
2. To ensure the appropriate and efficient use of land and protect soil quality	Number/floorspace of water infrastructure built on previously developed land	United Utilities	United Utilities could record the number and floorspace of new buildings that are built on previously developed land.
3. To protect and enhance the quantity and quality of surface and groundwater resources and the ecological status of water bodies	River flow and level characteristics	United Utilities, EA, EAW	Monitoring can be compared to historic records.
	River flows, river levels, lake and reservoir levels. Water quality of surface waters.	United Utilities, EA, EAW	At sensitive sites previous studies should be used to inform monitoring and assessment. For example RoC documentation and any Drought Permit (DP) Environmental Assessments and associated environmental monitoring plans.
	Groundwater levels, recharge characteristics and abstracted groundwater quality	United Utilities, EA, EAW	At sensitive sites previous studies should be used to inform monitoring and assessment. For example RoC documentation and any Drought Permit (DP) Environmental Assessments and associated environmental monitoring plans.
4. To reduce the risk of flooding	Number of properties that experience internal flooding from public sewers. Number of properties that experience internal flooding from public sewers.	United Utilities, EA, EAW	United Utilities report these data to Ofwat as part of the regulatory returns process.
5. To minimise emissions of pollutant gases and particulates and enhance air quality	Number of vehicle movements/distance travelled	United Utilities	United Utilities could record the number of vehicle movements and distance travelled as an indicator of air quality impacts.
6. To limit the causes and potential consequences of climate change	Quantity of greenhouse gas emissions per Megalitre of water supplied.	United Utilities	United Utilities' energy managers can use company data, and guidance from the UKWIR greenhouse gas workbook and BERR (Department for Business, Enterprise & Regulatory Reform) conversion factors to derive this information.
	Energy use used in the operational phase of water treatment and supply.		
	Renewable energy generated; renewable energy purchased.	United Utilities	
7. To ensure the protection and enhancement of human health	Compliance with drinking water standards at customers' taps (%).	United Utilities – drinking water quality report	United Utilities report these data to Ofwat as part of the statutory returns process (June Return) and to the Drinking Water Inspectorate.
	Compliance with water quality standards under the EC Bathing Waters Directive.	EA	The EA monitors the compliance of bathing waters and reports this annually.

Objective	Indicator	Source of Information	Commentary
	Number of United Utilities sites with public access which provide sporting, recreational and leisure resources and number of visits per year.	United Utilities	United Utilities hold information on the number of annual visitors to sites where specific visitor facilities are provided.
8. To maintain and enhance the economic and social well-being of the local community	Population and projected population change over time (per WRZ)	United Utilities	United Utilities report these data to Ofwat as part of the regulatory returns process and as part of the Strategic Business Plan.
9. To ensure the sustainable and efficient use of water resources	Proportion of customers who pay more than 3% of their income on water and sewerage	United Utilities	United Utilities could identify the proportion of customers who pay more than 3% of their income on water and sewerage.
	Leakage	United Utilities	These indicators will help identify whether the WRMP does contribute to the achievement of this SEA objective. However, at this stage, no adverse effects have been identified against this objective.
	Water saved through demand management/water efficiency measures	United Utilities	United Utilities report these data to Ofwat as part of the regulatory returns process .
10. To promote the efficient use of resources	Amount of primary and recycled aggregates used.	United Utilities	Information on aggregate use and recycling should be held by construction managers and accounts (contractors/consultants accounts, waste or procurement records).
	Chemicals used in water supply	United Utilities	Information on chemical use should be held in accounts.
11. To protect 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	United Utilities, Cadw, English Heritage	English Heritage/Cadw's field monument wardens monitor the condition of all statutorily protected monuments.
12. To protect and enhance landscape character	Loss or damage to landscape character and features of designated sites.	United Utilities	United Utilities could record the number and floorspace of new buildings that are built within designated landscape sites.

Further information and specific details about the monitoring proposals for the effects of the WRMP on the objectives and targets identified in the Environmental Report will be presented in the Post Adoption Statement (to be issued after the Final WRMP). United Utilities will continue to liaise with the Environment Agency, Environment Agency Wales, Natural England, Countryside Council for Wales, English Heritage, Cadw and the Welsh Government, as well as other stakeholders.

Progress on the implementation of the WRMP and identification of any issues arising will be reported in the water resources plan review that is part of Ofwat's annual June Return process.





# Appendix A

## Scoping Report Consultation Response Summary



# United Utilities dWRMP Strategic Environmental Assessment: Scoping Report Consultation Response Summary

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## Introduction

United Utilities published a Strategic Environmental Assessment (SEA) Scoping Report for the Draft Water Resources Management Plan (dWRMP) for a consultation period of five weeks ending 09 November 2012.

Responses were received to the consultation from the following organisations:

- Environment Agency;
- Environment Agency Wales;
- Natural England;
- Countryside Council for Wales;
- English Heritage; and
- Cadw.

In support of the consultation, a meeting attended by the Environment Agency and Natural England was also held on 25 October 2012. The purpose of this meeting was to seek initial feedback on the content of the SEA Scoping Report.

The following sections provides a summary of the comments received including those made via the scoping meeting with the statutory consultees, with responses and actions that have been taken in the SEA Environmental Report.

The SEA Assessment Framework was amended as a result of this consultation. The changes to the Assessment Framework are shown in Table A.8.

## SEA Scoping Report Response Summary and Proposed Actions

The comments received from those organisations who responded to the SEA Scoping Report consultation are shown in Tables A.1-A.7 below, with responses and actions that have been taken.

**Table A.1 Environment Agency**

Section	Consultee Response	Response/Action
Section 4: Baseline	We would like UU to acknowledge the inclusion of the National Environment Programme and the Restoring Sustainable Abstraction sites, discussing with the Environment Agency of their respective contents as each list potentially gets refined.	This information has been included within the baseline section of the Environmental Report (Section 2.2). Discussion in respect of the Programme/RSA content itself is outside the SEA process. However, UU will respond to this request directly.
Section 4: Baseline	There is a proposed extension to the Lake District National park and the Yorkshire Dales National Park, and we suggest you follow the standard wording provided by Natural England, as well as ensuring this is considered in your baseline.  UU should ensure that the SEA reports are produced using the latest and most accurate data at the time.	Agreed. Reference to proposed changes to National Park boundaries has been made within the baseline section of the Environmental Report (Section 2.2).  Noted.
Section 5: Draft Assessment Framework	UU need to ensure that the report and any potential summary will provide sufficient details regarding the environmental impact and timescales, clearly distinguishing short term from long term impacts, and identifying mitigation methods when possible.  It is essential that the SEA takes into account the potential risks of deterioration of WFD classification for waterbodies as well as aiming to achieve GES / GEP.  We would like UU to include a test or criteria to assess the resilience of solutions to future changes in resources from relevant organisations (e.g.	Noted. The assessment has included consideration of short, medium and long term effects and identified mitigation (where appropriate) as required under the SEA Directive. The differentiation aids the assessment to distinguish between construction related effects (predominately short term for any possible infrastructure identified) as opposed to operational effects (which will extend from the medium to long term).  The need to improve the ecological status of water bodies has been identified as a key issue. The definitions of significance contained in Appendix C have also been amended to reflect WFD compliance.  The following additional guide question has been included in the Assessment Framework: <i>Will the option be resilient to</i>

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<b>Section</b>	<b>Consultee Response</b>	<b>Response/Action</b>
General comments	reduced manpower).  There needs to be better description / explanation of how the SEA and HRA processes are integrated together.	<i>future changes in resources (both financial and human)?</i>  Noted. More detailed explanation in respect of the relationship between the SEA and HRA has been provided in Section 1.

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**Table A.2 Environment Agency Wales**

Section	Consultee Response	Response/Action
Section 3: Review of Plans and Programmes	<p>We recommend that the following should also be considered as part of the review of plans and programmes relevant to the Draft WRMP:</p> <p><b>International / European Plans and Programmes</b></p> <ul style="list-style-type: none"> <li>▪ The Environmental Noise Directive (2002/49/EC);</li> <li>▪ Whilst we welcome the reference to The Wild Birds Directive (79/409/EEC), we suggest that a reference should also be made to the codified version: Birds Directive (2009/147/EC).</li> </ul> <p><b>National Plans and Programmes</b></p> <ul style="list-style-type: none"> <li>▪ Welsh Government (2004) Technical Advice Note 15: Development and Flood Risk;</li> <li>▪ Welsh Government (2009) One Wales One Planet: The Sustainable Development Scheme for Wales;</li> <li>▪ Welsh Government (2008) People, Places, Futures: The Wales Spatial Plan 2008 Update;</li> <li>▪ Welsh Government (2008) Wales Environment Strategy Action Plan 2008 – 2011;</li> <li>▪ Welsh Government (2009) Technical Advice Note 5: Nature Conservation and Planning;</li> <li>▪ Welsh Government (2010) Climate Change Strategy for Wales and First Annual Progress Report (2012);</li> <li>▪ Welsh Government (2010) Flood and Coastal Erosion Risk Management: Development of a National Strategy for Wales – Consultation Document;</li> <li>▪ Welsh Government (2010) A Living Wales – A New Framework for Our Environment, Our Countryside and Our Seas (Consultation Document);</li> <li>▪ Welsh Government (2010) A Low Carbon Revolution: The Welsh</li> </ul>	<p>The plans and programmes identified have been included in the Environmental Report (Section 2.1) and Appendix B where appropriate.</p>

Section	Consultee Response	Response/Action
	<p>Assembly Government Energy Policy Statement;</p> <ul style="list-style-type: none"> <li>▪ Welsh Government (2011) Planning Policy Wales (Edition 4);</li> <li>▪ Welsh Government (2011) Strategic Policy Position Statement on Water;</li> <li>▪ Welsh Government (12 December 2011) Written Statement – Water Policy in Wales;</li> <li>▪ Welsh Government (2011) Welsh Government Policy Statement: Preparing for a Changing Climate;</li> <li>▪ Welsh Government (2012) Proposals for a Sustainable Development Bill;</li> <li>▪ Welsh Government (2012) Sustaining a Living Wales: A Green Paper on a New Approach to Natural Resource Management in Wales;</li> <li>▪ Reservoirs Act 1975;</li> <li>▪ Natural Environment and Rural Communities Act, 2006;</li> <li>▪ Environment Agency Corporate Plan 2011 – 2015;</li> <li>▪ Environment Agency Wales Corporate Plan 2011 – 2015: <i>Working together for a better environment.</i></li> </ul>	
	<p><b>Sub-regional/ Local Plans and Programmes</b></p>	
	<ul style="list-style-type: none"> <li>▪ Environment Agency (various) Salmon Action Plans;</li> <li>▪ Catchment Abstraction Management Strategies (Environment Agency);</li> <li>▪ Local flood authorities (local authorities in Wales) are currently preparing Local Flood Risk Management Strategies. These may not be available at the time of writing the Draft WRMP. However United Utilities should consider these strategies when completed. Preliminary Flood Risk Assessments are available: <a href="http://www.environment-agency.gov.uk/research/planning/135491.aspx">http://www.environment-agency.gov.uk/research/planning/135491.aspx</a>;</li> <li>▪ Relevant Site Action Plans &amp; Appropriate Assessments (Habitats Directive).</li> </ul>	



Section	Consultee Response	Response/Action
Section 4: Baseline	<p><b>Section 4.1.2: Biodiversity (p. 19)</b> The biodiversity information presented in this section relates mostly to north west England. We consider that the SEA should also make reference to designated sites located in Wales which may be potentially affected by the Plan options.</p> <p><b>Section 4.1.4: Water (p. 32)</b> The SEA focuses on the United Utilities supply area. However, the SEA should also consider water source areas in Wales such as Lake Vyrnwy.</p> <p><b>Section 4.1.4: Water (p. 34 – 35 including Table 5.5)</b> We consider that information relating to water availability should also refer to those Catchment Abstraction Management Strategies (CAMS) which relate to those areas from which water is derived to supply the United Utilities supply area. We therefore recommend that the SEA should also refer to the Severn Corridor CAMS which provides water availability information relating to the Vyrnwy water source.</p> <p><b>Section 4.1.4: Water (p. 38 including Figure 4.7)</b> Figure 4.7 should be amended to also include the rivers:</p> <ul style="list-style-type: none"> <li>▪ Cownway, Marchant and Vyrnwy, which are intakes for the Lake Vyrnwy source; and</li> <li>▪ the river Dee.</li> </ul> <p><b>Section 4.1.4: Water (p. 37-39)</b> Lake Vyrnwy is a water source to the United Utilities supply area, which lies within the Severn River Basin Management Plan. United Utilities also abstracts water from the Dee. We therefore recommend that the SEA also refers to the Severn River Basin Management Plan and the Dee River Basin Management Plan.</p> <p><b>Section 4.1.4: Water (p. 42)</b> In addition to recognising the potential risk of flooding to residential and commercial properties, we recommend that the SEA should also make</p>	<p>Reference to additional sites located outside the North West that may be potentially affected by the Plan options has been included in the baseline section of the Environmental Report (Section 2.2).</p> <p>Reference to water sources in Wales such as Lake Vyrnwy has been included within the baseline section of the Environmental Report (Section 2.2).</p> <p>Reference to the Severn Corridor CAMS has been included within the baseline section of the Environmental Report (Section 2.2).</p> <p>This figure has been taken from a secondary source and in consequence cannot be amended. However, information in respect of the ecological status of water sources linked to Wales has been provided where appropriate and available.</p> <p>Reference to the Severn and Dee RBMPs has been included within the baseline section of the Environmental Report (Section 2.2).</p> <p>The risk of flooding in respect of United Utilities' infrastructure (and consequential disruption to water supply and increased pollution incidents) has been acknowledged</p>

Section	Consultee Response	Response/Action
	<p>reference to the risk of flooding to United Utilities' infrastructure and the potential for consequential disruption to water supply, and potential pollution incidents.</p>	<p>within the baseline section of the Environmental Report (Section 2.2).</p>
<p>Section 5: Draft Assessment Framework</p>	<p><b>Section 4.1.4: Water (p. 41)/Section 5 Table 5.1 (p. 71)</b>                      The Water Framework Directive includes the aim to protect and improve the ecology of the water environment. We therefore recommend that improving the ecological status of water bodies should also be identified as a key water issue that is relevant to the Plan.</p> <p><b>Section 4.1.5: Air Quality and Climate (p. 48)/Section 5 Table 5.1 (p. 71)</b>                      We recommend that climate change adaptation should be clearly identified as a Key Climate Change issue in the SEA.</p> <p><b>Table 5.4: Proposed Assessment Objectives</b>                      SA Objective 3 (Water – Quantity and Quality)</p> <p>We consider that the proposed assessment Objectives and Guide Questions should be amended to reflect the ecological objectives of the Water Framework Directive to protect and improve the ecology of the water environment.</p> <p>We therefore recommend that the Objective is amended by inserting “, <i>and the ecological status of waterbodies</i>” at its end.</p> <p>In support of the proposed amendment to the Objective, we recommend the following as an additional guide question in the assessment framework for Water (Quantity and Quality):</p> <p><i>What impact will the option have on the ecological status of water bodies?</i></p> <p><b>Table 5.9: Proposed Definitions of Significance</b></p>	<p>The need to improve the ecological status of water bodies has been identified as a key issue.</p> <p>The baseline and Table 5.1 identify the need to take into account and where possible mitigate for the potential effects of climate change as a key sustainability issues. However, wording has been amended to read: “<i>The need to take into account and where possible adapt to the potential effects of climate change.</i>”</p> <p>The following additional issue has also been identified: <i>The need to increase environmental resilience to the effects of Climate Change.</i>”</p> <p>SA Objective 3 has been amended in accordance with this response.</p> <p>An additional guide question in relation to the impact of options on the ecological status of water bodies has been included in the Assessment Framework.</p> <p>No change. This reflects the underlying assumption that, for those objectives highlighted, no significant positive effects are likely to have been identified during the assessment and</p>

Section	Consultee Response	Response/Action
	<p><u>Objectives 2, 3, 4, 5, 6, 10</u></p> <p>There seems to be a typographical error in the 'Illustrative Guidance' text where impacts are described as 'Significant Positive'. We suggest that the 'Illustrative Guidance' is amended by replacing "No" with "The".</p> <p><u>Objective 3</u></p> <p>Further to our comments to 'Table 5.4 – Water' above, we recommend that the definitions of significance should also reflect Water Framework Directive compliance. We therefore suggest that 'Illustrative Guidance' is amended accordingly, and suggest the following as additional guidance in assessing significance of impact:</p> <p>Significant positive impact – option results in addressing failure of WFD Good Ecological Status (GES)/ Good Ecological Potential (GEP).</p> <p>Significant negative impact - option results in deterioration of WFD classification.</p> <p>Neutral – option will not lead to a change in WFD classification.</p>	<p>in consequence, illustrative threshold guidance has not been provided.</p> <p>The criteria in respect of SEA Objective 3 has been revised to reflect the specific comment above.</p> <p>Agreed. Definitions of significance have been amended to reflect WFD compliance.</p>

**Table A.2 Natural England**

Section	Consultee Response	Response/Action
Executive Summary	<p><b>Table S1: Key Economic, Social and Environmental Issues relevant to the dWRMP</b></p> <p>Issues under heading of landscape should include protection of National Parks as well as AONBs as they are very significant issues within the UU area.</p> <p><b>Table S2: Proposed Assessment Objectives and Guide Questions</b> Proposed assessment objective and guide questions: Biodiversity – for consistency and accuracy should say “Will the option protect and enhance the most importance sites for nature conservation (e.g. internationally or nationally designated sites for nature conservation) as per duties above. The wording might also include – Is the option likely to affect the conservation status of any SPAs/SACs, Ramsar Site, component habitats or species, or affect the favourable condition of SSSIs or NNRs?</p>	<p>Agreed. Reference to National Parks has been included as a key issue under the heading of landscape within the NTS.</p> <p>The following Assessment Framework guide question has been amended to read: <i>Will the option avoid-damage-to protect and enhance where possible the most important sites for nature conservation (e.g. internationally or nationally designated conservation sites such as SACs, SPAs, Ramsar and SSSIs)?</i></p> <p>The suggested additional guide question relating to the impact of options on the conservation status of designated sites has not been included in the revised Assessment Framework. Although not explicitly stated, it is considered that this is already captured under the existing guide question.</p>
Section 1: Introduction	<p>SEA and HRA processes need to be iterative in terms of development of plan options and also aligned as per Fig 3.1 of the UKWIR guidance. It would be helpful to explain relationship between the two more clearly in the SEA. 1.4.1 states that ‘potential significant effects on European designated sites are to be assessed separately through a Habitats Regulations Assessment’. Whilst a separate clear HRA report will be needed – the two assessment processes would not be entirely separate as the results of the HRA would need to inform the SEA and the iterative process of WRMP development.</p>	<p>Noted. The purpose of the statement was to make clear that UU acknowledge that there are two distinct assessment and reporting processes (SEA and HRA) which will be undertaken to meet two separate statutory requirements (the Environmental Assessment of Plans and Programmes Regulations 2004 and the Conservation of Habitats and Species Regulations 2010).</p> <p>However, whilst distinct, we fully endorse the comment that the two assessments are related. The SEA has utilised the findings of the HRA to inform the assessment of effects from the WRMP feasible and preferred options against the biodiversity objective. To this end there is a specific guide question within the revised SEA assessment framework that is designed to enable us to draw on the HRA “<i>Will the option protect and enhance where possible the most important sites for nature conservation (e.g. internationally or nationally designated conservation sites such as SACs, SPAs, Ramsar and SSSIs)?</i>” Similarly in the illustrative guidance on significance, a significant negative effect is defined as ‘<i>The</i></p>

Section	Consultee Response	Response/Action
<p>Section 2: Overview of United Utilities' Water Resources Management Plan</p>	<p>References to the 2009 WRMP should be qualified by explaining where further review of the measures identified will now be needed – I found 1.3 a little confusing in this respect. It says that “measures identified within the Final 2009 WRMP will inform the next WRMP”</p> <p><b>Section 2.2: United Utilities' Water Resources Management Plan (p. 8)</b></p> <p>We noticed an inconsistency in the figures quoted for supply from Cumbria – here it says almost one third of water supplies in Integrated Zone come from Wales, with just over one third from sources in Cumbria. But on page 34 the text suggests that 1800MI/d of the total for the RZ comes from Cumbria?</p> <p><b>Section 2.2.2: Potential Water Management Options (p. 11)</b></p> <p>Should this include transfer between/across UU resource zones as well as adjacent water companies?</p> <p>Does increasing capacity at existing water treatment works assume greater abstraction?</p> <p>Demand management options – these should include wider publicity and public awareness campaigns to ensure people make the link between the environmental sensitivities of the sources of supply and their own domestic or business usage.</p> <p>Promotion of water meters could usefully be targeted at areas where current percentages are low and environmental benefits proportionally high – e.g. W Cumbria.</p> <p>Increase leakage detection would also be linked to increased metering.</p>	<p><i>option would have a 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'.</i></p> <p>Further information was provided to Natural England on the response (in an email from Alex Melling, dated 2<sup>nd</sup> November 2012).</p> <p>More detailed explanation in respect of the relationship between the SEA and HRA has been provided in Section 1 of the Environmental Report.</p> <p>Noted. This text has been removed in the Environmental Report.</p> <p>Noted. This inconsistency has been addressed in revised text covering an overview of the Water Resource Management Plan in the Environmental Report.</p> <p>The list of potential management options is for illustrative purposes only and is therefore not exhaustive. However, the SEA Environmental Report has included a detailed list of options assessed. United Utilities welcomes comments in respect of proposed options and these will be considered in the development of the dWRMP.</p>

Section	Consultee Response	Response/Action
Section 3: Review of Plans and Programmes	Should include UU Drought Plan and CAMs.	The plans and programmes identified have been included in the Environmental Report (Section 2.1) and Appendix B.
Section 4: Baseline	<p><b>Section 4.1.2: Biodiversity (p. 20)</b></p> <p>Just to clarify that the area of SSSI land in the North west region is 208,000 ha. However, we noted that some UU land is actually in other regions so this figure will not be a comprehensive total. For a full assessment of potential environmental impacts this would need to look at all the catchment areas from which water is collected.</p> <p><b>Section 4.1.2: Biodiversity (p. 26)</b></p> <p>Just to note that Natural England is also a key partner in the large landscape scale grazing restoration project referred to at Helvellyn and Fairfield SSSI.</p> <p><b>Section 4.1.4: Water (p. 36/Table 4.5)</b></p> <p>We had asked whether this was up to date – has CAMs been reviewed – is that data and info up to date?</p> <p><b>Section 4.1.4: Water (p. 37)</b></p> <p>Stage 3 HMWB investigation schemes – do we have a list/details of these?</p> <p><b>Section 4.1.5: Air Quality and Climate (p. 48)</b></p> <p>Suggest an issue/objective along the lines of ‘increasing environmental resilience’ in addition to ‘mitigating’ the effects of climate change. We want to ensure the environment is able to adapt to and absorb the effects of climate change so that adverse impacts are minimised as well as considering measures to mitigate any impacts.</p>	<p>Noted. Area of SSSI land in the North West region has been amended.</p> <p>Noted. Reference to Natural England has been included.</p> <p>No change proposed. The information presented in Table 4.5 is based on the latest information available via the Environment Agency’s website.</p> <p>No change proposed. The information provided in Section 4.1.4 is considered to be sufficiently detailed for the purposes of the SEA.</p> <p>United Utilities will respond to this request directly with Natural England.</p> <p>The following additional issue has been identified: “<i>The need to increase environmental resilience to the effects of Climate Change.</i>”</p> <p>The following specific guide question has been included within the Assessment Framework: “<i>Will the option increase environmental resilience to the effects of climate change?</i>”</p>
	<b>Section 4.1.6: Human Environment (p. 56)</b>	Noted.

Section	Consultee Response	Response/Action
	<p>We asked a number of question around predictions of population increase and other potential demands on the water supply system and how future demand forecasting is achieved.</p> <p><b>Section 4.1.7: Material Assets and Resource Use</b></p> <p>At the meeting it was mentioned that UU does not abstract as much as 1900MI/d so it would be useful to check this figure is still correct.</p> <p>The text states that per capita consumption has reduced by 7 litres but does not state what the current figure is. The graph suggests it is just over 131litres/hd/d.</p> <p>We have a number of questions around the issues of demand management, metering and leakage levels etc and welcome the opportunity to discuss these as a separate meeting.</p> <p><b>Section 4.1.9: Landscape</b></p> <p>For information and reference, NE now has some standard advice around the proposed boundary changes to the Lake District National Park and Yorkshire Dales National Park. We suggest it would be useful to make some reference to the proposed boundary changes in the text, including references on P70 – future trends and key sustainability issues. The advice/standard wording is as follows:</p> <p>Please note that the proposal on which you are consulting is located within/ adjacent to an area that is included within a tract of land subject to an Order varying the boundaries of the Yorkshire Dales/ Lake District National Park made under s.5 of the National Parks and Access to the Countryside Act, 1949 and submitted for confirmation to the Secretary of State for Environment, Food and Rural Affairs in April 2012. The Orders will not take effect unless they are confirmed (with or without modifications) by the Secretary of State. It is expected that the Secretary of State will make a statement shortly regarding the way forward, which may include a Public Inquiry.</p> <p>If the Order(s) is/are confirmed by the Secretary of State then the area in question will be:</p> <ul style="list-style-type: none"> <li>▪ 'National Park' for planning purposes; and</li> <li>▪ responsibility for strategic planning, development control, listed buildings consents, as well as minerals and waste planning will transfer to the</li> </ul>	<p>Figures quoted have been revised within the Environmental Report.</p> <p>Discussion on demand management measures is outside the SEA. United Utilities has subsequently discussed these questions with Natural England directly.</p> <p>Agreed. Reference to proposed changes to National Park boundaries has been included within the baseline section of the Environmental Report (Section 2.2).</p>



Section	Consultee Response	Response/Action
Section 5: Draft Assessment Framework	<p>relevant National Park Authority (subject to any transitional arrangements as to transfer of powers and applicability of relevant plans as the Secretary of State may determine).</p> <p>In the meantime it is Natural England's expectation that the area being subject to a National Park variation Order will be treated as a material consideration by the relevant planning authority and the evidence in support of that Order will be considered relevant in determining any impact of the proposed development on the area's special qualities.</p> <p>All the relevant documents, including maps, detailed assessments, analysis of consultation responses and relevant Natural England Board papers can be accessed via the following link: <a href="http://www.naturalengland.org.uk/lakestodales">www.naturalengland.org.uk/lakestodales</a>.</p> <p>If you would like to discuss this with a Natural England officer please contact David Vose, Project Manager - Tel: 07900 608492, Email: <a href="mailto:David.Vose@naturalengland.org.uk">David.Vose@naturalengland.org.uk</a></p> <p><b>Table 5.4: Proposed Assessment Objectives</b> SA Objective 12 (Landscape)</p> <p>Landscape objectives should include mention of National Parks.</p> <p><b>Table 5.4: Proposed Assessment Objectives</b> SA Objective 1 (Biodiversity)</p> <p>As previously – will the option protect and enhance nationally and internationally designated sites.</p> <p><b>Table 5.7: Key to Assessment Matrices</b></p> <p>We noted the inconsistent terminology with reference to the following definitions in table 5.9.</p>	<p>No change. A guide question relating to impacts on National Parks has already been included in the Assessment Framework against the landscape objective.</p> <p>The following Assessment Framework guide question has been amended to read: <i>Will the option avoid damage to protect and enhance where possible the most important sites for nature conservation (e.g. internationally or nationally designated conservation sites such as SACs, SPAs, Ramsar and SSSIs)?</i></p> <p>Noted. Reference to “Very strong” has been replaced by “Significant” to better reflect SEA Directive terminology.</p>
Appendix A: Review of Plans and Programmes	<p>Comments as before that this should include UU's Drought Plan and also CAMs. It would also be appropriate to consider including the statutory duties under the legislation as detailed above – under the 'relationships and influences on the WRMP and the SEA. Also appropriate to mention the proposed national park extensions.</p>	<p>Noted. The Drought Plan and CAMs have been included within Appendix B of the Environmental Report.</p> <p>The proposed extensions to the National Parks have been considered within the baseline section, as detailed above.</p>

Section	Consultee Response	Response/Action
General Comments	<p>Need to ensure that the HRA and SEA assessment processes are integrated together where relevant and with those for the UU drought plan – the two processes need to be as aligned as possible in view of the close relationship between the plans and the current major issues around West Cumbria. Presumably drought triggers are set in the WRMP? The WRMP is what gives the resilience in times ahead of drought etc...Also very significant in relation to how the HRA progresses in each case. (NB Further info provided by Alex Melling in e-mail on 2 November)</p> <p>We think the SEA could helpfully include a statement to explain UU's statutory duties under the following legislation:</p> <p><b>International sites:</b> Regulation 9(5) of the Conservation of Habitats and Species Regulations 2010 ("Habitats Regulations") requires every competent authority, in the exercise of any of its functions, to have regard to the requirements of the Habitats Directive, so the Plan must demonstrate how this has been achieved.</p> <p>Please note that the amendments to the Conservation of Habitats and Species Regulations, 2010 came into force on the 16th August 2012. These amendments are referred to as the Conservation of Habitats and Species (Amendment) Regulations 2012. Though most amendments are related to marine sites and species, Regulation 9 is slightly amended. In particular I refer you to the competent and appropriate authority duty to exercise their functions so as to secure compliance with the directive in relation to, amongst other things, the Water Resources Act 1991. It may therefore be worth referring to these amendments as well as the 2010 Habitats Regulations.</p> <p><b>SSSIs:</b> Section 28G of the Wildlife and Countryside Act 1981, as inserted by Section 75 of and Schedule 9 to the Countryside and Rights of Way Act 2000, places a duty on public authorities, including water companies, to take reasonable steps consistent with the proper exercise of their functions to further the conservation and enhancement of SSSIs. The Plan and SEA should record this duty amongst the principles underpinning the Plan. Again the Plan should make it clear how protection and enhancement issues affecting SSSIs have been taken into account in the process of reviewing, selecting and assessing drought options.</p> <p><b>Biodiversity and Protected Species:</b> Under Section 40 of the Natural Environment and Rural Communities Act 2006 every public authority, including statutory undertakers, must in the exercise of its functions have regard so far as is consistent with the proper exercise of those functions to the purpose of conserving</p>	<p>Statutory duties have been identified within the baseline section of the Environmental Report (Section 2.2).</p> <p>Noted. Preparation of the Drought Plan is a separate process (the WRMP will not set triggers) however; the SEA has taken account of the Drought Plan where appropriate (i.e. Appendix B and the assessment of cumulative effects).</p> <p>Noted. A statement has been included within the baseline section of the Environmental Report setting out United Utilities' statutory duties.</p>

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<b>Section</b>	<b>Consultee Response</b>	<b>Response/Action</b>
	<p>biodiversity. Conserving biodiversity in this context includes restoring or enhancing a population or habitat. The Plan and SEA should record this duty amongst the principles underpinning the Plan and set out how it has been achieved. In addition the Plan assessment should address any potential impacts on species protected under UK legislation or European legislation.</p>	

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**Table A.3 Countryside Council for Wales**

Section	Consultee Response	Response/Action
Executive Summary	<p>For information, CCW would welcome information as to how much of the 1900 million litres of potable water supplied each day by United Utilities is derived from sources in Wales.</p> <p><b>Table S1: Key Economic, Social and Environmental Issues relevant to the dWRMP</b> (Biodiversity)</p> <p>CCW would suggest that ecological connectivity and working within environmental limits and capacities should also be identified as key issues for biodiversity both within supply and source areas</p> <p><b>Table S1: Key Economic, Social and Environmental Issues relevant to the dWRMP</b> (Geology and Soils)</p> <p>CCW would suggest that the need to maintain soil function in both supply and source areas should be identified as a 'key issue'.</p> <p><b>Table S1: Key Economic, Social and Environmental Issues relevant to the dWRMP</b> (Water – Quantity and Quality)</p> <p>CW notes and supports the key issues identified but would suggest it needs to be made explicit that these issues are relevant in both supply and source areas.</p> <p><b>Table S1: Key Economic, Social and Environmental Issues relevant to the dWRMP</b> (Human Environment)</p> <p>CCW would suggest that emphasis needs to be placed on the need to supply 'sustainable' water resources and ensure resilience of water supply/treatment infrastructure against climate change effects. The need to ensure that WRMP measures do not impact on human health or adversely affect economics should apply in both source and supply areas.</p>	<p>No change. Information has been included within the baseline section of the Environmental Report (Section 2.2).</p> <p>Ecological connectivity and working within environmental limits and capacities has been identified as key issues for biodiversity both within supply and source areas.</p> <p>The need to maintain soil function in both supply and source areas has been included within the baseline section (Section 2.2) of the Environmental Report (and NTS).</p> <p>Noted. The key issues identified have been revised to reflect that they relate to both supply and source areas.</p> <p>Noted. Issues have been revised to reflect comments.</p>

Section	Consultee Response	Response/Action
Section 1: Introduction	<p><b>Table S1: Key Economic, Social and Environmental Issues relevant to the dWRMP</b> (Material Assets)</p> <p>CCW would suggest that a key issue should be the sustainable use of resources, not just efficient use.</p>	Agreed. Issue has been amended to reflect comments.
	<p><b>Table S1: Key Economic, Social and Environmental Issues relevant to the dWRMP</b> (Cultural Heritage)</p> <p>The need to protect and enhance features of cultural heritage should apply to both source and supply areas.</p>	Noted. Issues have been revised to reflect comments.
	<p><b>Table S1: Key Economic, Social and Environmental Issues relevant to the dWRMP</b> (Landscape)</p> <p>Clarification would be welcomed as to whether 'the area' refers to supply areas or also includes source areas.</p>	The geographical extent of issues have been clarified (to reflect both supply and source areas).
	<p><b>Table S2: Proposed Assessment Objectives and Guide Questions</b> In general, CCW welcomes and supports the proposed SEA Objectives however, clarification is required as to whether these objectives refer to United Utilities' supply areas or whether source areas e.g. in Wales are also to be considered against these objectives. CCW would also suggest that additional consideration needs to be given, within Objectives, to working within environmental capacities and limits.</p>	<p>Noted. The geographical scope of the assessment has been clarified to highlight that this relates to both supply and source areas.</p> <p>SA Objective 1 (Biodiversity) has been amended to read: "<i>To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits.</i>"</p>
	<p><b>Section 1.1: Context</b></p> <p>CCW welcomes the acknowledgement that 'water companies operating wholly or partly in Wales are required to carry out an SEA', and look forward to working with United Utilities during this assessment process.</p>	Noted. No action required.
	<p><b>Section 1.4.1: Requirement for SEA of the Draft Water Resources Management Plan</b></p> <p>CCW welcomes and supports the intention to carry out HRA in respect of both European Sites in England and Wales and looks forward to working with United Utilities during this process.</p>	Noted. No action required.
	<p><b>Section 1.6: Commenting on this Report</b></p>	Noted. The Welsh Government has been consulted on the

Section	Consultee Response	Response/Action
<p>Section 2: Overview of United Utilities' Water Resources Management Plan</p>	<p>It should be noted that under Regulation 4 of the Environmental Assessment of Plans and Programmes Regulations 2004, it is a requirement that, for plans and programmes affecting Wales, consultation is undertaken with the Countryside Council for Wales and the Welsh Government, not Cadw as indicated in this section. In addition, the Environment Agencies in Wales and England are to be considered separately. Whilst there is no statutory requirement under the Environmental Assessment of Plans and Programmes Regulations 2004 for the EA (Wales) to be consulted separately from the EA in England, CCW welcomes the intention to undertake full consultation with relevant environmental bodies in Wales. Clarification would however be welcomed as to whether the Welsh Government have been included within this consultation process as required.</p> <p><b>Section 2.2: United Utilities' Draft Water Resources Management Plan</b></p> <p>CCW notes that almost one third of water supplies in the Integrated Zone are sourced in Wales. Further information on the origin and magnitude of these supplies would be welcomed.</p> <p><b>Section 2.2: United Utilities' Draft Water Resources Management Plan (Figure 2.1)</b></p> <p>In the light of the requirement for water companies operating wholly or partly in Wales to engage in the SEA process, CCW would suggest that, in addition to United Utilities' supply area, a map is provided in respect of United Utilities' source areas e.g. in Wales.</p> <p><b>Section 2.2.2: Potential Water Management Options</b></p> <p>With regard to potential 'transfers of water from adjacent water companies with a supply/demand surplus', CCW would welcome clarification as to whether any such proposals for bulk transfer relate to water resources derived from water companies operating in Wales e.g. Severn Trent, Dwr Cymru/Welsh Water and/or Dee Valley Water.</p>	<p>Scoping Report.</p> <p>Further information in respect of Welsh sources has been provided.</p> <p>Where relevant, figures within the baseline section of the Environmental Report now extend to include United Utilities' source areas in North Wales.</p> <p>No change proposed. The list of potential management options is for illustrative purposes only and is therefore not exhaustive.</p> <p>The plans and programmes identified have been included within the Environmental Report (Section 2.1) and Appendix B.</p>
<p>Section 3: Review of Plans and Programmes</p>	<p>Reference should be made to the most recent 'version' of the Birds Directive.</p>	<p>The plans and programmes identified have been included within the Environmental Report (Section 2.1) and Appendix B.</p>

Section	Consultee Response	Response/Action
<p>Section 4: Baseline</p>	<p>Within the section on National Plans and Programmes, consideration should be given to relevant plans and programmes in Wales including the Wales Spatial Plan, the Wales BAP, the Natural Environment Framework, TAN 5 etc. CCW is disappointed that no reference has been made to many local and regional plans and programmes in Wales that may also be of relevance e.g. Local Development Plans.</p> <p><b>Section 4.1.1: Introduction (p. 19)</b></p> <p>CCW notes and, in principle, welcomes the statement that 'the importance of water supplies derived from North East Wales have also been acknowledged and appropriate baseline information for this area has also been included'. However, in subsequent information provided on the biodiversity baseline, CCW can find no evidence of information being provided for source areas in North East Wales.</p> <p><b>Section 4.1.2: Biodiversity</b></p> <p>The section on statutorily designated sites makes no explicit reference to relevant sites in North Wales and no reference is made to United Utilities' holdings in Wales. Figures 4.1, 4.24.3 and 4.4 similarly make no reference to designated i.e. sites in Wales (with the exception of the Dee Estuary).</p> <p>CCW would suggest that full consideration needs to be given to biodiversity interests and issues within source areas and United Utilities land holdings in Wales.</p> <p><b>Section 4.1.3: Geology and Soils</b></p> <p>See comments above on 4.1.1. Clarification is required regarding the suggestion that 'the north east of Wales is made up of significant areas of carboniferous limestone'. Further information is required on soils and soil function issues within source areas and United Utilities' holdings in Wales.</p> <p>Further information should be provided regarding United Utilities' reservoirs, WTW and WWTW and other water supply and treatment infrastructure within Wales.</p> <p><b>Section 4.1.4: Water</b></p> <p>In addition to the North West (of England), reference should be made to the status of water sources in Wales, in particular the water supplied by Wales to the 6.5 million people within the Integrated Resource Zone.</p>	<p>Noted. Baseline information for North East Wales has been included where appropriate.</p> <p>Information in respect of designated sites in Wales has been provided where relevant.</p> <p>Information in respect of biodiversity issues in Wales has been provided where relevant to the assessment of likely significant effects.</p> <p>Additional information in respect of geology and soils in Wales has been provided in the baseline section of the Environmental Report (Section 2.2).</p> <p>Additional information in respect of United Utilities' land holdings in Wales has been provided.</p> <p>Reference to the status of water sources in Wales has been provided.</p>



Section	Consultee Response	Response/Action
	<p><b>Figure 4.6</b></p> <p>CCW would suggest this map indicated not only supply areas but also source zones.</p>	<p>Where relevant, figures within the baseline section of the Environmental Report now extend to include United Utilities' source areas in North Wales.</p>
	<p><b>Table 4.5</b></p> <p>CCW notes that for the River Dee, which is an SAC, only one out of 4 units is described as 'water available', the other three being either 'no water available' or 'over licensed'. Clarification is required whether the over licensed units will be or have been considered in the context of the Review of Consents process for the Dee. In addition, CCW would suggest, given that this river is designated partly for its migratory fish species, that additional information be provided regarding the location of those units described as 'water available', 'no water available' and 'over licensed'. CCW notes that although information is provided on the RoC 'sustainability reductions' are provided for Haweswater and Thirlmere in the Integrated Resource Zone, no figures or information has been provided in respect of the RoC for the River Dee SAC. Clarification is required regarding this apparent omission.</p>	<p>Noted. Detail with respect to the inclusion of the River Dee in the RoC programme is a matter for the Environment Agency.</p>
	<p><b>Figure 4.7</b></p> <p>Information should be provided on the ecological status for water sources within or ecologically linked to Wales e.g. the River Dee.</p> <p>CCW would suggest that, whilst WFD targets for 'good ecological status' might serve for non-designated rivers, additional and possibly more stringent criteria may need to be applied in those rivers and estuaries that are also European Sites e.g. the River Dee.</p>	<p>Information in respect of the ecological status of water sources linked to Wales (e.g. the River Dee) has been provided where appropriate and available.</p> <p>This figure presents information on the ecological status or potential for rivers, canals and surface water transfers. It is provided as part of the baseline description for the water topic and references the range of criteria (from bad to high). It is not proposed to narrow the criteria presented in this figure.</p> <p>The need to improve the ecological status of water bodies has been identified as a key issue. The definitions of significance contained have also been amended to reflect WFD compliance.</p>
	<p><b>Section 4.1.5: Air Quality and Climate</b></p> <p>CCW would suggest that an additional 'key sustainability issue' be added with regard for the need to ensure that water supply and water treatment infrastructure is climate change resilient.</p>	<p>The baseline and key issue identify the need to take into account and where possible mitigate for the potential effects of climate change as a key sustainability issues. However, wording has been amended to read: <i>"The need to take into account and where possible adapt to the potential effects of climate change."</i></p>

Section	Consultee Response	Response/Action
Section 5: Draft Assessment Framework	<p><b>Section 4.1.8 (including Figure 4.14): Cultural Heritage</b></p> <p>This section and map make no references to cultural heritage features and assets that are within United Utilities land holdings in Wales. CCW would suggest that this baseline needs to consider cultural heritage assets not only in the United Utilities' supply area but also in source areas.</p>	<p>Baseline information has been provided in respect of assets in source areas where relevant to the assessment of likely significant effects</p>
	<p><b>Section 4.1.9 (including Figures 4.15/16)</b></p> <p>This section and map make no references to landscape designations, features and assets that are within United Utilities' land holdings in Wales.</p> <p>CCW would suggest that this baseline needs to consider landscape assets not only in the United Utilities' supply area but also in source areas.</p>	<p>Baseline information has been provided in respect of assets in source areas where relevant to the assessment of likely significant effects.</p>
	<p><b>Table 5.1: Key Economic, Social and Environmental Issues relevant to the dWRMP</b></p> <p>See comments above on Table S.1.</p>	<p>See responses above in respect of Table S1.</p>
	<p><b>Table 5.2: Key Policy Objectives Identified in Other Plans and Programmes Relevant to the Assessment of the WRMP</b></p> <p>See comments above on Table S.2. It is noted that the sources provided appear to relate solely to England.</p>	<p>This table has been amended to reflect the additional Welsh plans and programmes reviewed.</p>
	<p><b>Table 5.4: Proposed Assessment Objectives and Guide Questions</b></p> <p>See comments above on Table S.2.</p> <p><b>Section 5.5: Definitions of Significance</b></p> <p>CCW notes, with some concern, the intention to interpret the significance of effects in the context of quantitative and semi-quantitative thresholds. CCW would not normally recommend the use of thresholds in the context of 'significance' notably because the nature and magnitude of effects is determined by the particular sensitivities of the receiving environment. In addition, CCW would suggest that the use of quantitative thresholds does not enable clear and transparent consideration of cumulative effects.</p> <p>It is suggested that a number of the 'illustrative guidance' presented would also be difficult to 'prove' or 'disprove' and/or are open to interpretation.</p>	<p>See responses above in respect of Table S1.</p> <p>No change proposed. Definitions of significance have been identified to help guide the assessment and provide transparency in respect of what constitutes a significant effect.</p>

**Table A.5 English Heritage**

Section	Consultee Response	Response/Action
General Comments	The SEA is a high level document and has some useful general statements regarding cultural heritage assets, future trends and key sustainability issues.	Noted.
Section 4: Baseline	<p><b>Section 4.1.8: Cultural Heritage</b></p> <p>My only concern at this stage is that Section 4.1.8 concentrates, at first, exclusively on designated cultural assets. It should also mention the (much greater number of) undesignated assets, many of which may be of considerable significance (some of them of national quality, although not formally designated). There is no need to list or quantify them here, but reference should be made to their existence and to the Historic Environment Records (HERs) held by local authorities. The HERs include assets, both designated and undesignated, and should be consulted in more detailed stages of the Water Resources Management Plan, so it would be helpful to have them flagged up at this SEA stage. The subsequent paragraphs concerning Future Trends and Key Sustainability Issues are fine, as they do not specify that cultural heritage assets are restricted to those on a national register.</p>	Noted. Reference to undesignated assets has been made in the baseline section of the Environmental Report.

**Table A.6 CADW**

<b>Section</b>	<b>Consultee Response</b>	<b>Response/Action</b>
General Comments	Having looked through the plan, it is too broad for any specifically Welsh Historic Environment issues to be relevant.  The contents of the SEA Scoping Report have been noted, however, in this instance, Cadw will defer to the comments of English Heritage who have the primary interest.	Noted.

**Table A.7 Scoping Meeting**

Section	Consultee Response	Response/Action
Section 4: Baseline	<b>Section 4.1.4: Water (p. 34)</b>	Error noted. Figures relating to water supply to the IRZ has been amended.
	Figures relating to water supply to the IRZ to be checked.	
	<b>Section 4.1.4: Water (p. 32)</b>	Noted. Information in respect of the River Dee has been provided where available.
	River Dee to be included in terms of consents for supply area.	
	<b>Section 4.1.6: Human Environment (p. 56)</b>	Error noted and has been addressed.
	Amend typo in respect of the North West's projected population (should read 992,000).	
	<b>Section 4.1.7: Material Assets and Resource Use (p. 58, Table 4.13)</b>	This table has been amended to reflect response.
	Replace "In Balance" with 100%.	
	<b>Section 4.1.7: Material Assets and Resource Use (p. 59)</b>	This section has been amended to reflect response.
	Amend text to state that "...customers have been entitled to trial water meters free of charge".	
Add following text to last sentence - "although demand for meters is expected to decline over the plan period as the proportion of households without meters decreases".		
<b>Section 4.1.7: Material Assets and Resource Use (p. 62)</b>	This section has been amended to reflect response.	
Amend baseline evolution to reflect the fact that water demand is projected to decrease and not increase over the plan period. This is a result of metering, non-household demand decrease, improved demand management (e.g. amendments to Part G of the Building Regs), even allowing for population increase.		
3 <sup>rd</sup> bullet- add "in some zones".		
<b>Section 4.1.8: Cultural Heritage (p. 63)</b>	Noted. Reference to undesignated assets has been made within the baseline section of the Environmental Report.	
Should refer to undesignated cultural heritage assets and Historic Environment		

Section	Consultee Response	Response/Action
General Comments	Records held by local authorities.	Agreed. Reference to proposed changes to National Park boundaries has been included within the baseline section of the Environmental Report.
	<p><b>Section 4.1.9: Landscape (p. 70)</b></p> <p>Reference to the proposed extension to the National Park should be made under the evolution of the baseline (Landscape).</p> <p>The need to protect National Parks as an issue under Landscape.</p>	<p>The following Assessment Framework guide question has been amended to read: <i>Will the option avoid damage to protect and enhance where possible the most important sites for nature conservation (e.g. internationally or nationally designated conservation sites such as SACs, SPAs, Ramsar and SSSIs)?</i></p>
	<p><b>Table 5.4: Proposed Assessment Objectives</b> SA Objective 1 (Biodiversity)</p> <p>Add guide question: Will the option protect and enhance designated sites?</p>	<p>The following additional guide question has been included in the Assessment Framework: <i>Will the option be resilient to future changes in resources (both financial and human)?</i></p>
	<p><b>Table 5.4: Proposed Assessment Objectives</b> SA Objective 8 (Human Environment)</p> <p>Add guide question: Will the option be resilient to future changes in resources (both financial and human)?</p>	<p>Noted. Reference to "Very strong" has been replaced by "Significant" to better reflect SEA Directive terminology.</p>
	<p><b>Table 5.7: Key to Assessment Matrices</b></p> <p>Reference to "Very strong" to be replaced by "Significant" to better reflect SEA Directive terminology.</p>	<p>Noted. Baseline information for Wales has been included where relevant to the assessment of likely significant effects.</p>
	<p>The geographic scope of the baseline should be extended where appropriate (e.g. to reflect land management in Wales).</p> <p>The assessment tables/commentary should make a distinction between short and long term effects was highlighted</p>	<p>Noted. The assessment has included consideration of short and long term effects, as required under the SEA Directive.</p>





## Revised SEA Assessment Framework

Amendments to the SEA Assessment Framework made as a result of the consultation process are shown in Table A.8 below.

Additions to the assessment framework are shown in **red text**.

Deletions are shown as **red text that is struckthrough**

**Table A.8 Amendments to the SEA Assessment Framework following Consultation on the Scoping Report**

Topic Area	SEA Objective	Guide Questions
<b>Biodiversity</b>	To protect and enhance biodiversity, key habitats and species, <b>working within environmental capacities and limits</b>	<i>Will the option <del>avoid damage to</del> <b>protect and enhance where possible</b> the most important sites for nature conservation (e.g. internationally or nationally designated conservation sites such as SACs, SPAs, Ramsar and SSSIs)?</i>
		<i>Will the option <b>protect and enhance</b> non-designated sites and local biodiversity?</i>
		<i>Will the option <del>protect and enhance biodiversity, and</del> provide opportunities for new habitat creation or restoration and link existing habitats as part of the development process?</i>
		<i>Will the option lead to a change in the ecological quality of habitats due to changes in groundwater/river water quality and/or quantity?</i>
<b>Geology and Soils</b>	To ensure the appropriate and efficient use of land and protect soil quality	<i>Will additional land be required for the development or implementation of the option or will the option require below ground works leading to land sterilisation?</i>
		<i>Will the option utilise previously developed land?</i>
		<i>Will the option <b>protect and enhance</b> protected sites designated for their geological interest and wider geodiversity?</i>
		<i>Will the option minimise the loss of best and most versatile soil?</i>
		<i>Will the option minimise conflict with existing land use patterns?</i>
		<i>Will the option minimise land contamination?</i>
<b>Water – Quantity and Quality</b>	To protect and enhance the quantity and quality of surface and groundwater resources <b>and the ecological status of water bodies</b>	<i>Will the option minimise the demand for water resources?</i>
		<i>Will the option <b>protect and improve</b> surface, groundwater, estuarine and coastal water quality?</i>
		<i>Will the option result in changes to river flows?</i>
		<i>Will the option result in changes to groundwater levels?</i>
		<i><b>Will the option affect the ecological status of water bodies?</b></i>
<b>Water – Flood Risk</b>	To reduce the risk of flooding	<i>Will the option have the potential to cause or exacerbate flooding in the catchment area now or in the future?</i>

Topic Area	SEA Objective	Guide Questions
<b>Air Quality</b>	To minimise emissions of pollutant gases and particulates and enhance air quality	<i>Will the option have the potential to help alleviate flooding in the catchment area now or in the future?</i>
		<i>Will the option be at risk of flooding now or in the future?</i>
		<i>Will the option adversely affect local air quality as a result of emissions of pollutant gases and particulates?</i>
		<i>Will the option exacerbate existing air quality issues (e.g. in Air Quality Management Areas)?</i>
		<i>Will the option maintain or enhance ambient air quality, keeping pollution below Local Air Quality Management thresholds?</i>
<b>Climate Change</b>	To limit the causes and potential consequences of climate change	<i>Will the option reduce the need to travel or encourage sustainable modes of transport?</i>
		<i>Will the option reduce or minimise greenhouse gas emissions?</i>
		<i>Will the option have new infrastructure that is energy efficient or make use of renewable energy sources?</i>
		<i>Will the option contribute positively to adaptation to climate change?</i>
<b>Human Environment - Health</b>	To ensure the protection and enhancement of human health	<i>Will the option increase environmental resilience to the effects of climate change?</i>
		<i>Will the option ensure the continuity of a safe and secure drinking water supply?</i>
		<i>Will the option affect opportunities for recreation and physical activity?</i>
		<i>Will the option maintain surface water and bathing water quality within statutory standards?</i>
<b>Human Environment - Social and Economic Well-Being</b>	To maintain and enhance the economic and social well-being of the local community	<i>Will the option adversely affect human health by resulting in increased nuisance and disruption (e.g. as a result of increased noise levels)?</i>
		<i>Will the option ensure sufficient infrastructure is in place for predicted population increases?</i>
		<i>Will the option ensure sufficient infrastructure is in place to sustain a seasonal influx of tourists?</i>
		<i>Will the option help to meet the employment needs of local people?</i>
		<i>Will the option ensure that an affordable supply of water is maintained and vulnerable customers protected?</i>
		<i>Will the option improve access to local services and facilities (e.g. sport and recreation)?</i>
		<i>Will the option contribute to sustaining and growing the local and regional economy?</i>
		<i>Will the option avoid disruption through effects on the transport network?</i>
		<i>Will the option be resilient to future changes in resources (both financial and human)?</i>

Topic Area	SEA Objective	Guide Questions
<b>Material Assets and Resource Use - Water Resources</b>	To ensure the sustainable and efficient use of water resources	<i>Will the option lead to reduced leakage from the supply network?</i>
		<i>Will the option improve efficiency in water consumption?</i>
<b>Material Assets and Resource Use - Resource Use</b>	To promote the efficient use of resources	<i>Will the option seek to minimise the demand for raw materials?</i>
		<i>Will the option reduce the total amount of waste produced and the proportion of waste sent to landfill?</i>
		<i>Will the option encourage the use of sustainable design and materials?</i>
		<i>Will the option reduce or minimise energy use?</i>
<b>Cultural Heritage</b>	To protect and enhance cultural and historic assets	<i>Will the option conserve or enhance historic buildings, places, conservation areas and spaces that enhance local distinctiveness, character and the appearance of the public realm?</i>
		<i>Will the option avoid or minimise damage to archaeologically important sites?</i>
		<i>Will the option affect public access to, or enjoyment of, features of cultural heritage?</i>
<b>Landscape</b>	To protect and enhance landscape character	<i>Will the option avoid adverse effects on, and enhance where possible, protected/designated landscapes (including woodlands) such as National Parks or AONBs?</i>
		<i>Will the option protect and enhance landscape character, townscape and seascape?</i>
		<i>Will the option affect public access to existing landscape features?</i>
		<i>Will the option minimise adverse visual impacts?</i>



# 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
<b>The Aarhus Convention</b>	
<b>United Nations Economic Commission for Europe (1998) Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters</b>	
<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>
<b>The Bathing Waters Directives</b>	
<b>Council Directive 76/160/EEC of 8 December 1975 concerning the quality of bathing water and Directive 2006/7/EC of the European Parliament and of the Council of 15 February 2006 concerning the management of bathing water quality and repealing Directive 76/160/EEC</b>	
<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"> <li>- the physical, chemical and microbiological parameters;</li> <li>- the mandatory limit values and indicative values for such parameters;</li> <li>- the minimum sampling frequency and method of analysis or inspection of such water.</li> </ul> <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>	<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>
<b>EU Birds Directive (2009/147/EC)</b>	
<p>The Directive provides a framework for the conservation and management of, and human interactions with, wild birds in Europe. It sets broad objectives for a wide range of activities, although the precise legal mechanisms for their achievement are at the discretion of each Member State (in the UK delivery is via several different statutes). The Directive applies to the UK and to its overseas territory of Gibraltar.</p> <p>The main provisions of the Directive include:</p> <ul style="list-style-type: none"> <li>- 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).</li> <li>- 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</li> </ul>	<p>The WRMP should ensure that wild bird populations are enhanced</p> <p>The SEA assessment framework should include for the protection of wild birds.</p>

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<p>form a network of European protected areas known as Natura 2000).</p> <ul style="list-style-type: none"> <li>- The establishment of a general scheme of protection for all wild birds (Article 5).</li> <li>- Restrictions on the sale and keeping of wild birds (Article 6).</li> <li>- Specification of the conditions under which hunting and falconry can be undertaken (Article 7). (Huntable species are listed on Annex II of the Directive).</li> <li>- Prohibition of large-scale non-selective means of bird killing (Article 8).</li> <li>- 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.</li> <li>- Encouragement of certain forms of relevant research (Article 10 and Annex V).</li> <li>- Requirements to ensure that introduction of non-native birds do not threatened other biodiversity (Article 11).</li> </ul>	
<b>The Bern Convention</b>	
<b><i>Council Decision 82/72/EEC of 3 December 1981 concerning the conclusion of the Convention on the conservation of European wildlife and natural habitats</i></b>	
<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 principle objectives are:</p> <ul style="list-style-type: none"> <li>- To conserve wild flora and fauna and their natural habitats, especially those species and habitats whose conservation requires the co operation of several States;</li> <li>- To promote such co operation. Particular emphasis is given to endangered and vulnerable species, including endangered and vulnerable migratory species;</li> <li>- 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.</li> </ul> <p>Targets for Contracting Parties are:</p> <ul style="list-style-type: none"> <li>- 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;</li> <li>- Undertaking in its planning and development policies, and in its measures against pollution, to have regard to the conservation of wild flora and fauna;</li> <li>- Promoting education and disseminating general information on the need to conserve species of wild flora and fauna and their habitats.</li> </ul>	<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>
<b>The Bonn Convention (or CMS)</b>	
<b><i>The Convention on the Conservation of Migratory Species of Wild Animals</i></b>	
<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"> <li>- Should promote, co-operate in and support research relating to migratory species;</li> <li>- Shall endeavour to provide immediate protection for migratory species;</li> <li>- Shall endeavour to conclude Agreements covering the conservation and management of migratory species included in Appendix II.</li> </ul> <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>
<b><i>The Cancun Agreement (2011)</i></b>	
<p>The decisions adopted by the 16th include a shared vision to keep global temperature rise to below two degrees Celsius, with the objectives to be reviewed as to whether it needs to be strengthened in</p>	<p>The WRMP should aim to reduce emissions.</p>



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future on the basis of the best scientific knowledge available (including possibility of 1.5 degree limit).	The SEA assessment framework should include greenhouse gas emissions.
<b>Council Directive 76/464/EEC of 4 May 1976 on pollution caused by certain dangerous substances discharged into the aquatic environment of the Community</b>	
<p>The Directive (and subsequent daughter Directives) control the release of dangerous substances to water and is administered in England and Wales by the Environment Agency. Its objective is to regulate potential aquatic pollution by chemicals. The Directive will be integrated in the Water Framework Directive.</p> <p>The Directive (and subsequent daughter Directives) sets out emission limit values and quality objectives for certain polluting substances and a requirement for Member States to establish pollution reduction programmes including water quality objectives for other polluting substances.</p>	<p>The WRMP should not increase concentrations of listed dangerous substances.</p> <p>The SEA assessment framework should include water quality.</p>
<b>Council of Europe (2000) European Landscape Convention</b>	
<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> <ul style="list-style-type: none"> <li>- The aims of the Convention are to promote landscape protection, management and planning, and to organise European co-operation on landscape issues.</li> </ul> <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. 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.</p> <p>Natural England is leading the implementation of the ELC in England and has worked with Defra and English Heritage to produce <i>A Framework for Implementation in England</i>, published in October 2007. This framework seeks to further strengthen the protection, management and planning of England's landscapes, by providing a structure for action plans that will be prepared by any interested partners and stakeholders. CCW note that in Wales the <i>European Landscape Convention</i> commitments are implemented within existing mechanisms that we have for dealing with our landscapes, building on all the work we have done to date.</p>	<p>The WRMP should take landscape into account.</p> <p>The SEA assessment framework should include landscape.</p>
<b>Council of Europe (2003) European Soils Charter</b>	
Sets out common principles for protecting soils across the EU and will help the EU Member States to better protect the soil on their territory and to use it in a sustainable way.	<p>The WRMP should take the effects on soil into account.</p> <p>The SEA assessment should consider the effects soil.</p>
<b>The Drinking Water Directive</b> <b>Council Directive 98/83/EC of 3 November 1998 on the quality of water intended for human consumption</b>	
<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>

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<b>EU Biodiversity Strategy (1998)</b>	
<p>This strategy aims to anticipate, prevent and attack the causes of significant reduction or loss of biodiversity at the source.</p> <p>Targets for biodiversity are set by member states.</p>	<p>The WRMP should promote this aim by e.g. promoting biodiversity and avoiding/reducing habitat fragmentation.</p> <p>The SEA assessment framework should include the protection of biodiversity.</p>
<b>European Commission (2006) Thematic Strategy for Soil Protection</b>	
<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"> <li>- when soil is used and its functions are exploited, action has to be taken on soil use and management patterns; and</li> <li>- when soil acts as a sink/receptor of the effects of human activities or environmental phenomena, action has to be taken at source.</li> </ul> <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>
<b>European Commission Ambient Air Quality and Cleaner Air for Europe (2008) (Directive 2008/50/EC)</b>	
<p>The Directive:</p> <ul style="list-style-type: none"> <li>- defines and establishes objectives for ambient air quality to avoid, prevent or reduce harmful effects on human health and the environment as a whole;</li> <li>- assesses the ambient air quality in Member States using common methods and criteria;</li> <li>- 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;</li> <li>- ensures that such information on ambient air quality is made available to the public;</li> <li>- seeks to maintain air quality where it is good and improving it in other cases; and</li> <li>- promotes increased cooperation between the Member States in reducing air pollution.</li> </ul>	<p>The WRMP should contribute towards achieving air quality standards set out in the Directive.</p> <p>The SEA assessment framework should include air quality.</p>
<b>The Environmental Liability Directive Directive 2004/35/CE of the European Parliament and of the Council of 21 April 2004 on environmental liability with regard to the prevention and remedying of environmental damage</b>	
<p>The Directive seeks to prevent and remedy environmental damage - specifically, damage to habitats and species protected by EC law, damage to water resources, and land contamination which presents a threat to human health. Based on the 'polluter pays' principle where polluters should bear the cost of remediating the damage they cause to the environment, or of measures to prevent imminent threat of damage.</p> <p>No specific targets are set.</p>	<p>The WRMP will need to have regard to the requirements of the Directive.</p> <p>The SEA assessment framework should include the protection and enhancement of the natural environment (to include biodiversity and water resources).</p>
<b>The Environment Noise Directive (Directive 2002/49/EC)</b>	
<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</p>	<p>The WRMP will need to have regard to the requirements of the END.</p>

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<p>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. 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"> <li>- 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</li> <li>- 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</li> <li>- 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.</li> <li>- 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.</li> </ul> <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 SEA assessment framework should include for the protection against excessive noise.</p>
<p>The European Climate Change Programme is the Commission's main instrument to discuss and prepare the further development of the EU's climate policy</p> <p>The ECCP II consists of 5 working groups:</p> <p>1) ECCP I review:</p> <ul style="list-style-type: none"> <li>- review the implementation of climate change related EU-wide policies and measures;</li> <li>- assess their concrete implementation in the Member States and the resulting actual and projected emission reductions;</li> <li>- identify new opportunities for potential emission reductions.</li> </ul> <p>2) Aviation:</p> <ul style="list-style-type: none"> <li>- In order to mitigate the climate impacts of aviation, EU has introduced legislation to include aviation in the EU emissions trading scheme (EU ETS).</li> </ul> <p>3) CO2 and cars:</p> <ul style="list-style-type: none"> <li>- Limit value curve;</li> <li>- Phasing-in of requirements;</li> <li>- Lower penalty payments for small excess emissions until 2018;</li> <li>- Long-term target;</li> <li>- Eco-innovations.</li> </ul> <p>4) Carbon capture and storage:</p> <ul style="list-style-type: none"> <li>- The Commission is currently developing a programme of work aiming to ensure the technology of carbon capture and storage, both within the EU and internationally.</li> </ul> <p>5) Adaptation:</p> <p>As part of exploring options to improve Europe's resilience to climate change effects and defining the European Union role in climate change adaptation the European Commission is undertaking the following activities:</p> <ul style="list-style-type: none"> <li>- ECCP II working group on Impacts and Adaptation;</li> <li>- Impacts on water cycle and water resources management and prediction of extreme events;</li> <li>- Marine resources and coastal zones and tourism;</li> </ul>	<p>The WRMP should contribute towards the key issues set out in the Commission's climate change programme</p> <p>The SEA should include objectives relating to emissions, carbon reduction, and adaptation to climate change.</p>

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<ul style="list-style-type: none"> <li>- Human health;</li> <li>- Agriculture and forestry;</li> <li>- Biodiversity;</li> <li>- Regional planning, built environment, public and energy infrastructure, Structural funds;</li> <li>- Urban planning and construction;</li> <li>- Development cooperation;</li> <li>- Role of insurance industry;</li> <li>- Building national strategies for adaptation (country reports);</li> <li>- Developing the Green Paper on "Adapting to climate change in Europe - options for EU action";</li> <li>- Undertaking an extensive research project into adaptation and mitigation options;</li> <li>- Hosting a conference on climate change adaptation; and</li> <li>- Hosting workshops in three European countries in 2007.</li> </ul> <p>6) EU Emission Trading System review:</p> <ul style="list-style-type: none"> <li>- The Commission provides guidance on the application of VAT (pdf ~13K) to emission allowances. DG Environment also provides its interpretation on the use of next phase allowances under Article 16(4), second sentence, of the Emissions Trading Directive.</li> </ul>	
<p><b>European Commission (2007) Addressing the challenge of water scarcity and droughts in the European Union</b></p> <p><i>Communication from the Commission to the European Parliament and the Council(COM/2007/0414)</i></p>	
<p>This Communication builds upon an in-depth assessment of water scarcity and droughts in the EU and presents an initial set of policy options to increase water efficiency and water savings. These options are as follows:</p> <ul style="list-style-type: none"> <li>- Putting the right price tag on water;</li> <li>- Allocating water and water-related funding more efficiently;</li> <li>- Improving drought risk management;</li> <li>- Considering additional water supply infrastructures;</li> <li>- Fostering water efficient technologies and practices;</li> <li>- Fostering the emergence of a water-saving culture in Europe;</li> <li>- Improve knowledge and data collection.</li> </ul> <p>The policy options are underpinned by a set of more detailed actions/targets to be implemented at the EU and national level which have been the subject of subsequent annual reviews. The most recent review was published in 2011 for the period May 2009 to May 2010 which, amongst other elements, sets out the Commission's progress in reviewing policy on water scarcity and drought. The main building blocks of the water scarcity and drought policy review are:</p> <ul style="list-style-type: none"> <li>- Water efficiency (in agriculture and the urban environment);</li> <li>- Better planning (demand management, land use planning, drought observatory and indicator development, enhancing integration of WS&amp;D in the River Basin Management Plans (RBMPs) and in sectoral policies); and</li> <li>- Adequate implementation instruments (such as financing water efficiency, water pricing, water allocation).</li> </ul> <p>The review will, together with an analysis of the Implementation of the Water Framework Directive and a review of the vulnerability of environmental resources such as water, biodiversity and soil to climate change impacts and man-made pressures, be integrated into a planned "Blueprint to safeguard European waters".</p>	<p>The WRMP should take into account the policy options set out in the Communication where appropriate as well as the key themes which underpin the ongoing review of water scarcity and drought.</p> <p>The SEA assessment framework should include objectives, indicators and targets that relate to water resources and drought.</p>
<p><b>European Commission (2008) Waste Framework Directive (Directive 2008/98/EC)</b></p>	
<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,</p>	<p>The WRMP should seek to ensure the protection of human health and the environment in relation to waste</p>

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<p>treatment, storage and tipping of waste. Some key objectives include:</p> <ul style="list-style-type: none"> <li>- The recovery of waste and the use of recovered materials as raw materials should be encouraged;</li> <li>- 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;</li> <li>- 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;</li> <li>- Waste management plans should be drawn up in the Member States;</li> <li>- Movements of waste should be reduced;</li> <li>- Ensure a high level of protection and effective control;</li> <li>- 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;</li> <li>- That proportion of the costs not covered by the proceeds of treating the waste must be defrayed in accordance with the "polluter pays" principle.</li> </ul>	<p>management</p> <p>The SEA assessment should include objectives on the protection of human health and the environment</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"> <li>- Environmental protection;</li> <li>- Social equity and cohesion;</li> <li>- Economic prosperity; and</li> <li>- Meeting our international responsibilities.</li> </ul> <p>The following key challenge areas include a number of targets in achieving their respective objectives:</p> <ul style="list-style-type: none"> <li>- Climate Change and clean energy;</li> <li>- Sustainable Transport;</li> <li>- Sustainable consumption and production;</li> <li>- Conservation and management of natural resources;</li> <li>- Public Health;</li> <li>- Social inclusion, demography and migration;</li> <li>- Global poverty and sustainable development challenges.</li> </ul>	<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>
The Floods Directive	
<i>Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risks</i>	
<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. Then for each zone draw up flood risk maps by 2013 and establish flood risk management plans focused on prevention, protection and</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>

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preparedness by 2015.	
<b>The Freshwater Fish Directive</b> <i>Directive 2006/44/EC of the European Parliament and of the Council of 6 September 2006 on the quality of fresh waters needing protection or improvement in order to support fish life</i>	
<p>The Freshwater Fish Directive seeks to protect those freshwater bodies identified by member states as being suitable to support fish populations. It sets physical and chemical water quality objectives for salmonid waters and cyprinid waters. It is implemented in England &amp; Wales through The Surface Water (Fishlife) (Classification) Regulations 1997 (as amended*).</p> <p>*The Regulations were amended in 2003.</p> <p>The standards constitute legal limits.</p> <p>The existing Freshwater Fish Directive is to be repealed by the Water Framework Directive 2000/60/EC (WFD) in 2013.</p>	<p>The WRMP should comply with the national legislation produced further to the Directive.</p> <p>The SEA assessment framework should include water quality. SEA baseline information could include relevant water quality information (i.e. the number of water bodies that do not comply with legal standards).</p>
<b>The Groundwater Directive</b> <i>Council Directive 80/68/EEC of 17 December 1979 on the protection of groundwater against pollution caused by certain dangerous substances</i>	
<p>The Groundwater Directive aims to protect groundwater from discharges and disposals of certain dangerous substances to groundwater. The Directive is transposed into UK law by the Groundwater Regulations 1998. The Directive will be fully integrated into the Water Framework Directive by 2013.</p> <p>Substances controlled by the Regulations fall into two lists - lists 1 and 2. List 1 includes chemicals that have been selected on the basis of their toxicity, persistence and bioaccumulation. List 2 includes groups and families of chemicals that have a deleterious effect on the aquatic environment. The purpose of the Directive is to eliminate pollution from list 1 substances and reduce pollution from list 2 substances.</p> <p>The existing Groundwater Directive is to be repealed by the Water Framework Directive 2000/60/EC (WFD) in 2013.</p>	<p>The WRMP will need to comply with the requirements of the Directive and the relevant national legislation.</p> <p>The SEA assessment should include an objective relating to the effects of options on ground water quality.</p>
<b>The Habitats Directive</b> <i>Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora</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>
<b>The Integrated Pollution Prevention and Control Directive 2008/1/EC</b>	
<p>The Directive requires certain activities with a high pollution potential to have a permit. This permit can only be issued if certain environmental conditions are met, so that the companies themselves bear responsibility for preventing and reducing any pollution they may cause.</p> <p>Operators of industrial installations covered by Annex I of the IPPC Directive are required to obtain an authorisation (environmental permit) from the authorities in the EU countries. About 52,000 installations are covered by the IPPC Directive in the EU.</p>	<p>The WRMP will need to comply with the requirements of the Directive and the relevant national legislation.</p> <p>The SEA assessment should include an objective relating to the prevention of pollution to air, land and water.</p>
<b>The Kyoto Protocol (1997)</b>	



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<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 37 industrialized countries and the European community for reducing greenhouse gas (GHG) emissions. These amount to an average of five per cent against 1990 levels over the five-year period 2008-2012.</p> <p>European Union and its member states have agreed to a reduction of emissions from 1990 levels of - 8 per cent over the period 2008-2012.</p>	<p>The WRMP should aim to reduce emissions.</p> <p>The SEA assessment framework should include objectives/guide questions related to reducing greenhouse gas emissions.</p>
<b>Landfill of Waste Directive (99/31/EC)</b>	
<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 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 per cent of the total generated in 1995 by 2006, 50 per cent by 2009 and 35 per cent by 2016.</p>	<p>The WRMP should take the effects on waste to landfill into account.</p> <p>The SEA assessment should consider the effects on water, soil, air, human health and waste.</p>
<b>The Nitrates Directive</b> <b>Council Directive of 12 December 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources (91/676/EEC)</b>	
<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 consideration of water quality.</p>
<b>The Ramsar Convention on Wetlands</b>	
<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 waterbirds, 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'</i> (Ramsar COP8, 2002).</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"> <li>- 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;</li> <li>- 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;</li> <li>- 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;</li> </ul>	<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>

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<ul style="list-style-type: none"> <li>- 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;</li> <li>- Membership: All countries eligible for accession to have joined the Ramsar Convention by 2015.</li> </ul> <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 Webportal 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>	
<b>Renewable Energy Directive (2009/28/EC)</b>	
<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.</p> <p>From 1 January 2017, biofuels and bioliquids share in emissions savings should be increased to 50 per cent.</p>	<p>The WRMP should contribute towards increasing the proportion of energy from renewable energy sources where appropriate.</p> <p>The SEA assessment framework should include consideration of use of energy from renewable energy sources.</p>
<b>A Resource-Efficient Europe – Flagship Initiative Under the Europe 2020 Strategy</b> <i>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"> <li>- boost economic performance while reducing resource use;</li> <li>- identify and create new opportunities for economic growth and greater innovation and boost the EU's competitiveness;</li> <li>- ensure security of supply of essential resources; and</li> <li>- fight against climate change and limit the environmental impacts of resource use.</li> </ul> <p>The key components of the long-term framework will come in the form of a series of coordinated roadmaps to:</p> <ul style="list-style-type: none"> <li>- Outline what the EU needs to do to create a low-carbon economy in 2050, cutting greenhouse gas emissions by 80-95 per cent, as part of global efforts to fight climate change, while improving energy security and promoting sustainable growth and jobs;</li> <li>- Analyse how the EU can create an energy system by 2050 which is low-carbon, resource-efficient, secure and competitive. This should provide the necessary certainty for investors, researchers, policy makers and regulators;</li> <li>- Present a vision for a low-carbon, resource-efficient, secure and competitive transport system by 2050 that removes all obstacles to the internal market for transport, promotes clean technologies and modernises transport networks;</li> <li>- Define medium and long-term objectives and means for achieving them with the main aim to decouple economic growth from resource use and its environmental impact.</li> </ul>	<p>The WRMP should take into account the objectives of the Flagship Initiative.</p> <p>The SEA assessment framework should include objectives, indicators and targets that relate to resource use.</p>



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<b>The Shellfish Waters Directive</b>	
<i>Directive 2006/113/EC of the European Parliament and of the Council of 12 December 2006 on the quality required of shellfish waters</i>	
<p>The Directive aims to protect and improve shellfish waters in order to protect shellfish life and growth, therefore contributing to the quality of shellfish products directly edible by man.</p> <p>It sets physical, chemical and microbiological water quality requirements that designated shellfish waters must either comply with (Mandatory standards) or endeavour to meet (guideline standards).</p> <p>The directive will be replaced in 2013 by the Water Framework Directive.</p>	<p>The WRMP should have regard to protection and enhancement of shellfish waters by complying with the requirements of the Directive.</p> <p>The SEA assessment framework should include consideration of water quality.</p>
<b>The Sixth Community Environment Action Programme</b>	
<i>Decision No 1600/2002/EC of the European Parliament and of the Council of 22 July 2002 laying down the Sixth Community Environment Action Programme</i>	
<p>The 6th EAP sets out the framework for environmental policy-making in the European Union for the period 2002-2012 and outlines actions that need to be taken to achieve them. The Programme establishes environmental priorities and objectives for a Community response focusing in particular on climate change, nature and biodiversity, environment and health and quality of life, and natural resources and wastes.</p> <p>The programme sets out actions against seven thematic strategies:</p> <ul style="list-style-type: none"> <li>- air pollution;</li> <li>- the marine environment;</li> <li>- soil;</li> <li>- waste prevention and recycling;</li> <li>- natural resources;</li> <li>- the urban environment;</li> <li>- pesticides.</li> </ul>	<p>The WRMP should contribute towards achieving national targets for climate change, nature and biodiversity, environment and health and quality of life, and natural resources and wastes.</p> <p>The SEA assessment framework should include air pollution, the marine environment, soil, waste prevention and recycling, natural resources, the urban environment and pesticides.</p>
<b>UN Millennium Declaration (2000)</b>	
<p>In the Millennium Declaration, the UN General Assembly adopted key objectives under each of the following headings:</p> <ul style="list-style-type: none"> <li>- Values and Principles;</li> <li>- Peace, Security and Disarmament;</li> <li>- Development and Poverty Eradication;</li> <li>- Protecting our Common Environment;</li> <li>- Human Rights, Democracy and Good Governance;</li> <li>- Protecting the Vulnerable;</li> <li>- Meeting the Special Needs of Africa;</li> <li>- Strengthening the United Nations.</li> </ul> <p>A number of actions were included under each of the headings. e.g. to take concerted action against international terrorism, and to accede as soon as possible to all the relevant international conventions was included under the peace, security and disarmament heading.</p>	<p>The WRMP should contribute towards protecting the environment and protecting the vulnerable.</p> <p>The SEA should be consistent with the objectives of the Declaration.</p>
<b>UN Millennium Development Goals (2002)</b>	
<p>The Millennium Development Goals (MDGs) were developed out of the eight chapters of the United Nations Millennium Declaration, signed in September 2000. There are eight time-bound goals that, when achieved, will end extreme poverty worldwide by 2015:</p> <ul style="list-style-type: none"> <li>- End Hunger;</li> <li>- Universal Education;</li> </ul>	<p>The WRMP should be consistent with the Millennium Development Goals, particularly those relating to environmental sustainability and health.</p> <p>The SEA assessment framework should include sustainable access to</p>

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<ul style="list-style-type: none"> <li>- Gender Equity;</li> <li>- Child Health;</li> <li>- Maternal Health;</li> <li>- Combat HIV/AIDS;</li> <li>- Environmental Sustainability;</li> <li>- Global Partnership.</li> </ul> <p>Targets are included under each of the goals. For the Environmental Sustainability goal this includes:</p> <ul style="list-style-type: none"> <li>- Integrate the principles of sustainable development into country policies and programmes; reverse loss of environmental resources;</li> <li>- Reduce by half the proportion of people without sustainable access to safe drinking water.</li> </ul>	<p>safe drinking water.</p>
<p><b>The Urban Waste Water Directive</b> <i>Council Directive 91/271/EEC of 21 May 1991 concerning urban waste-water treatment</i></p>	
<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 &amp; 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 &amp; 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>
<p><b>The Water Framework Directive</b> <i>Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy</i></p>	
<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"> <li>- 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;</li> <li>- Promote sustainable water use based on a long-term protection of available water resources;</li> <li>- Enhance protection and improvement of the aquatic environment, inter alia, 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;</li> <li>- Ensure the progressive reduction of pollution of groundwater and prevent its further pollution;</li> <li>- Contribute to mitigating the effects of floods and droughts.</li> </ul> <p>Key targets and indicators relevant to the WRMP and SEA are:</p> <ul style="list-style-type: none"> <li>- Achievement of good ecological status and good surface water chemical status by 2015;</li> <li>- Achievement of good ecological potential and good surface water chemical status for heavily modified water bodies and artificial water bodies;</li> <li>- Prevention of deterioration from one status class to another;</li> <li>- Achievement of water-related objectives and standards for protected areas;</li> <li>- Achievement of good groundwater quantitative and chemical status by 2015;</li> <li>- Prevention of deterioration from one status class to another;</li> <li>- Reversal of any significant and sustained upward trends in pollutant concentrations and prevent</li> </ul>	<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 objectives/guide questions relating to water quality, water resources, sustainable water use, and biodiversity.</p>

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<p>or limit input of pollutants to groundwater;</p> <ul style="list-style-type: none"> <li>- Achievement of water related objectives and standards for protected areas.</li> </ul>	
The Wild Birds Directive	
<i>Council Directive of 2 April 1979 on the conservation of wild birds (79/409/EEC)</i>	
<p>The Directive relates to the conservation of all species of naturally occurring birds in the wild state in the European territory of the Member States to which the Treaty applies, including the designation of certain habitats as Special Protection Areas. It covers the protection, management and control of these species and lays down rules for their exploitation, and also the prevention of pollution/deterioration of habitats or any disturbances affecting the birds.</p> <p>The Directives sets out that the preservation, maintenance and re-establishment of biotopes and habitats shall include primarily the following measures:</p> <ul style="list-style-type: none"> <li>- Creation of protected areas;</li> <li>- Upkeep and management in accordance with the ecological needs of habitats inside and outside the protected zones;</li> <li>- Re-establishment of destroyed biotopes;</li> <li>- Creation of biotopes.</li> </ul>	<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>
<i>The World Summit on Sustainable Development, Johannesburg (September 2002)</i>	
<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.</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>
<i>EU Biodiversity Strategy to 2020 (2012)</i>	
<p>In March 2010, the EU agreed to an EU vision and 2020 mission for biodiversity:</p> <ul style="list-style-type: none"> <li>- By 2050, EU biodiversity and the ecosystem services it provides – its natural capital – are protected, valued and appropriately restored for biodiversity's intrinsic value and for their essential contribution to human wellbeing and economic prosperity, and so that catastrophic changes caused by the loss of biodiversity are avoided;</li> <li>- Halt the loss of biodiversity and the degradation of ecosystem services in the EU by 2020, and restore them insofar as is feasible, while stepping up the EU contribution to averting global biodiversity loss.</li> </ul> <p>The European Commission adopted a new EU Biodiversity strategy to help meet this goal. This strategy provides a framework for action on biodiversity over the next decade and covers the following key areas:</p> <ul style="list-style-type: none"> <li>- Conserving and restoring nature;</li> <li>- Maintaining and enhancing ecosystems and their services;</li> <li>- Ensuring the sustainability of agriculture, forestry and fisheries;</li> <li>- Combating invasive alien species;</li> <li>- Addressing the global biodiversity crisis.</li> </ul>	<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>



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<b>DECC (2010) CRC Energy Efficiency Scheme</b>	
<p>The CRC Energy Efficiency Scheme is a new Government backed legislative carbon emissions trading scheme and will cover large business and public sector organisations. CRC is intended to have a significant impact on reducing UK carbon emissions and offers the potential to save money through energy efficiency. It is designed to drive changes in behaviour and infrastructure, generate corporate awareness of the detrimental impacts of carbon emissions, and improve energy management practice.</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>
<b>DECC (2011) National Policy Statements for Energy Infrastructure</b>	
<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"> <li>- Overarching NPS for Energy (EN1);</li> <li>- Fossil Fuel Electricity Generating Infrastructure NPS (EN2);</li> <li>- Renewable Energy Infrastructure NPS (EN3) ;</li> <li>- Gas Supply Infrastructure &amp; Gas and Oil Pipelines NPS (EN4);</li> <li>- Electricity Networks Infrastructure NPS (EN5);</li> <li>- Nuclear Power Generation NPS (EN6).</li> </ul> <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>Two sites are identified in the United Utilities area (Heysam and Sellafield) as being potentially suitable for the deployment of a new nuclear power station. .</p> <p>The NPSs reiterate and are underpinned by the target to cut greenhouse gas emissions by at least 80 per cent 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 United Utilities area. This may include the potential development of nuclear power stations at Heysham and Sellafield.</p> <p>The SEA should consider the cumulative effects of the WRMP and any major energy proposals which may affect water resources in the United Utilities area.</p>
<b>Defra (2000) Waterways for Tomorrow</b>	
<p>The key objective of this document is the promotion of waterways, encouraging their use and development whilst maximising the opportunities the waterways offer for leisure and recreation as a catalyst for urban and rural regeneration and for freight transport. The strategy also encourages the innovative use of waterways such as water transfer and telecommunication.</p>	<p>The WRMP should contribute towards meeting the objective of the strategy.</p> <p>The SEA assessment framework should ensure that consideration is given to the potential effects of the WRMP.</p>
<b>Defra (2004) Rural Strategy</b>	
<p>The strategy sets out rural and countryside policy, and draws upon from lessons learnt following the rural white paper. It's objectives are:</p> <p>Economic and Social Regeneration – supporting enterprise across rural England, but targeting greater resources at areas of greatest need:</p> <ul style="list-style-type: none"> <li>- Building on the economic success of the majority of rural areas; and</li> <li>- Tackling the structural economic weaknesses and accompanying poor social conditions.</li> </ul> <p>Social Justice for All – tackling rural social exclusion wherever it occurs and providing fair access to services and opportunities for all rural people:</p> <ul style="list-style-type: none"> <li>- Social priorities are to ensure fair access to public services and affordable; and</li> <li>- In both more and less prosperous areas, to tackle social exclusion wherever it occurs.</li> </ul> <p>Enhancing the Value of our Countryside – protecting the natural environment for this and future generations.</p> <p>There are no formal targets or indicators.</p>	<p>The implementation of the WRMP may have an effect upon rural communities and the countryside. The WRMP should seek to take into account the needs of rural communities.</p> <p>The SEA should include objectives that take into account the economic and social needs of communities across the United Utilities area, which should include rural communities. The SEA should also include guide questions regarding the maintenance and enhancement of landscapes, natural resources</p>

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	and biodiversity.
<b>Defra (2005) <i>Making Space for Water: Taking forward a new Government strategy for flood and coastal erosion risk management in England (first Government response to 2004 consultation)</i></b>	
<p>The programme seeks to embed flood and coastal erosion risk management across a range of Government policies, including planning, urban and rural development, agriculture, transport, nature conservation and conservation of the historic environment.</p> <p>Objectives:</p> <ul style="list-style-type: none"> <li>- To reduce the threat of flooding to people and their property; and</li> <li>- To deliver the greatest environmental, social and economic benefit, consistent with the Government's sustainable development principles.</li> </ul> <p>Targets:</p> <p>No formal targets or indicators.</p>	<p>The WRMP may have some linkages with this strategy.</p> <p>The SEA should seek to ensure that flood risk in the area is not adversely affected by the implementation of the WRMP.</p>
<b>Defra (2006) <i>Shoreline Management Plan Guidance</i></b>	
<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 the Welsh Government's strategy for managing flooding and coastal erosion.</p> <p>The guidance includes the following objectives:</p> <ul style="list-style-type: none"> <li>- set out the risks from flooding and erosion to people and the developed, historic and natural environment within the SMP area;</li> <li>- identify opportunities to maintain and improve the environment by managing the risks from floods and coastal erosion;</li> <li>- identify the preferred policies for managing risks from floods and erosion over the next century;</li> <li>- identify the consequences of putting the preferred policies into practice;</li> <li>- set out procedures for monitoring how effective these policies are;</li> <li>- inform others so that future land use, planning and development of the shoreline takes account of the risks and the preferred policies;</li> <li>- discourage inappropriate development in areas where the flood and erosion risks are high; and</li> <li>- meet international and national nature conservation legislation and aim to achieve the biodiversity objectives.</li> </ul>	<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>
<b>Defra (2007) <i>The Air Quality Strategy for England, Scotland, Wales and Northern Ireland</i></b>	
<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>
<b>Defra (2009) <i>The Groundwater (England and Wales) Regulations 2009</i></b>	
<p>The Groundwater Regulations are designed to implement a daughter directive to the European Water Framework Directive and prevent or limit the inputs of polluting substances into groundwater. Substances controlled under these regulations fall into two categories:</p> <p>a) Hazardous substances, defined as those which are toxic, persistent or liable to bioaccumulate must be prevented from entering groundwater. Substances in this list may be disposed of to the ground, under a permit, but must not reach groundwater. They include pesticides, sheep dip, solvents, hydrocarbons, mercury, cadmium and cyanide.</p> <p>b) Non-hazardous pollutants are less dangerous, and can be discharged to groundwater under a permit, but must not cause pollution. Examples include sewage, trade effluent and most wastes. Non-hazardous pollutants include any substance capable of causing pollution and the list is much</p>	<p>The WRPM will need to comply with the requirements of the Regulations where appropriate.</p> <p>The SEA assessment should include an objective relating to the effects of options on groundwater quality.</p>



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wider than the previous List 2 substances.	
<b>Defra (2011) Safeguarding our Soils – A Strategy for England</b>	
<p>The strategy is underpinned by the following vision:</p> <p>By 2030, all England's soils will be managed sustainably and degradation threats tackled successfully. This will improve the quality of England's soils and safeguard their ability to provide essential services for future generations.</p> <p>Achieving this vision will mean that:</p> <ul style="list-style-type: none"> <li>- agricultural soils will be better managed and threats to them will be addressed;</li> <li>- soils will play a greater role in the fight against climate change and in helping us to manage its impacts;</li> <li>- soils in urban areas will be valued during development, and construction practices will ensure vital soil functions can be maintained; and</li> <li>- pollution of our soils is prevented, and our historic legacy of contaminated land is being dealt with.</li> </ul>	<p>The WRPM should seek to protect soil quality where appropriate.</p> <p>The SEA assessment should include an objective relating to the effects of options on soils.</p>
<b>Defra (2012) National Policy Statement for Waste Water</b>	
<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 although these do not fall within the United Utilities or neighbouring areas and are therefore unlikely to influence, or be influenced by, the WRMP.</p>	<p>The WRMP should consider any unforeseen NSIP proposals that come forward prior to adoption which may affect water resources in the United Utilities 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 United Utilities area.</p>
<b>Environment Agency (2005) Cleaner Coasts, Healthier Seas: EA Marine Strategy</b>	
<p>This is EA's Marine Strategy which aims to create cleaner coasts and healthier seas by:</p> <ul style="list-style-type: none"> <li>- Promoting sustainable development;</li> <li>- Integrating management between land and sea;</li> <li>- Providing efficient regulation of our coasts and coastal waters;</li> <li>- Ensuring that we all value our coastal and marine environment.</li> </ul>	<p>This WRMP should take the effects of the options on the coast and sea into account.</p> <p>The SEA assessment should note if the options have specific effects on the coastal or marine environment.</p>
<b>Environment Agency (2008) Better Sea Trout and Salmon Fisheries: Our Strategy for 2008-2021</b>	
<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"> <li>1 Self-sustaining sea trout and salmon in abundance in more rivers</li> <li>2 Economic and social benefits optimised for sea trout and salmon fisheries</li> <li>3 Widespread and positive partnerships, producing benefits</li> </ol> <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 per cent 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>
<b>Environment Agency (2009) Corporate Strategy 2010-2015: Creating a Better Place</b>	
<p>This strategy sets out the EA's plans for 2010 to 2015. The strategy is underpinned by the following five themes:</p>	<p>The WRMP should take the aims and success measures into account.</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>1. Act to reduce climate change and its consequences;</p> <p>2. Protect and improve air, land and water quality;</p> <p>3. Work with people and communities to create better places;</p> <p>4. Work with businesses and the public sector to use resources wisely;</p> <p>5. Be the best we can.</p> <p>The strategy includes a number of success measures. Those measures that are particularly relevant targets to the WRMP include:</p> <ul style="list-style-type: none"> <li>- Surface, ground and coastal waters and wetlands have achieved or are improving toward 'good status' or 'good potential' under the Water Framework Directive;</li> <li>- Over-abstraction within water bodies is reduced and fewer abstractions cause environmental damage;</li> <li>- Bathing waters meet the standards required under European law;</li> <li>- Water companies deliver agreed improvements as outlined in their Asset Management Plans.</li> </ul> <p>Average water use per person in households and for industrial processes and business uses is reduced.</p>	<p>Include guide questions in the SEA assessment framework to reflect climate change adaptation and mitigation, protecting and improving air, land and water quality, people and communities and using resources wisely. Monitoring measures could include those targets set out in the strategy.</p>
<b>Environment Agency (2009) <i>Water for People and the Environment: Water Resource Strategy for England and Wales</i></b>	
<p>EA's water resources strategy sets out how EA 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 'Future Water', and in Wales, the Welsh Government's 'Environment Strategy for Wales'.</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"> <li>- Ecology is more resilient to climate change because abstraction pressures have been reduced and a diverse network of habitats has been allowed to develop;</li> <li>- The resilience of supplies and critical infrastructure is increased to reduce the impacts of climate change;</li> <li>- Flexible and incremental solutions in water resources management allow adaptation to climate change as it happens;</li> <li>- 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;</li> <li>- Greenhouse gas emissions from using water resources are minimised and properly considered in future decisions;</li> <li>- Measures will be in place to make sure that water bodies achieve Water Framework Directive objectives;</li> <li>- Abstraction is sustainable, the environment is protected and improved and supplies remain secure;</li> <li>- Environmental problems caused by historic unsustainable abstractions are resolved;</li> <li>- Catchment management is integrated so that impacts on water resources and the water environment are managed together;</li> <li>- The twin track approach of resource development with demand management is adopted in all sectors of water use;</li> <li>- In England, the average amount of water used per person in the home is reduced to 130 litres each day by 2030;</li> <li>- The Environment Agency targets and adapts its approach to reflect the location and timing of pressures on water resources;</li> <li>- In England, water companies implement near-universal metering of households, starting in areas of serious water stress;</li> </ul>	<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>



National Plans and Programmes	
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<ul style="list-style-type: none"> <li>- Leakage from mains and supply pipes is reduced;</li> <li>- New and existing homes and buildings are more water efficient;</li> <li>- Water resources are allocated efficiently and are shared within regions where there are areas of surplus;</li> <li>- Water pricing for the abstraction and use of water acts as an incentive for the sustainable use of water resources;</li> <li>- Abstractors and users make informed choices to use water more efficiently;</li> <li>- Innovative tariffs are adopted by water companies to maximise savings and minimise issues of affordability;</li> <li>- The needs of wildlife, fisheries, navigation and recreation, as well as the environment and abstractors, are fully taken into account when allocating water resources;</li> <li>- Innovative technology is developed to improve water efficiency by all water users.</li> </ul> <p>The strategy includes a number of actions for EA and others to develop targets for water reduction and efficiency.</p>	
<b>Environment Agency (2009) <i>Water for People and the Environment: Water Resource Strategy for Wales</i></b>	
<p>The Environment Agency's strategy for Wales sets out how the EA believe that water resources should be managed within the framework set out by the Welsh Assembly Government's 'Environment Strategy for Wales' and its 'Strategic Policy Position Statement on Water'. The objectives are the same as those outlined above in the strategy for England and Wales, although the following two objectives:</p> <ul style="list-style-type: none"> <li>- In England, the average amount of water used per person in the home is reduced to 130 litres each day by 2030;</li> <li>- In England, water companies implement near-universal metering of households, starting in areas of serious water stress;</li> </ul> <p>Are replaced by the following objective:</p> <ul style="list-style-type: none"> <li>- The average amount of water used per person in the home is reduced.</li> </ul>	<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>
<b>Environment Agency (2011) <i>Environment Agency Corporate Plan 2011-2015</i></b>	
<p>This plan sets out the EA's priorities for the next four years. These priorities are grouped around five themes, as follows:</p> <ul style="list-style-type: none"> <li>- Act to reduce climate change and its consequences</li> </ul> <p>We will play a full part in helping to reduce greenhouse gas emissions, help people and wildlife adapt to climate change, and put climate change at the heart of everything we do.</p> <ul style="list-style-type: none"> <li>- Protect and improve water, land and air</li> </ul> <p>We will maintain and improve water quality, promote more sustainable land management, protect and enhance wildlife, and improve the way we work as a regulator to protect people and benefit the environment, while minimising costs to businesses.</p> <ul style="list-style-type: none"> <li>- Work with people and communities to create better places</li> </ul> <p>We will reduce the risks to people, households and businesses from flooding and help people to improve, protect, value and enjoy their local environment.</p> <ul style="list-style-type: none"> <li>-Work with businesses and other organisations to use resources wisely</li> </ul> <p>We will further our understanding of the best environmental options for managing waste and promote more efficient and sustainable use of resources.</p> <ul style="list-style-type: none"> <li>- Be the best we can</li> </ul> <p>We will improve the way we work with customers and partners and involve communities. We will use compelling evidence and knowledge to support decision-making and use the funding available to us to maximise outcomes for people and the environment, while minimising our own environmental impact.</p> <ul style="list-style-type: none"> <li>- We will continue to drive efficiency to deliver value for money.</li> </ul>	<p>The SEA and WRMP should consider the EA's priorities.</p>
<b>Environment Agency Wales (2011) <i>Environment Agency Wales Corporate Plan 2011-2015:</i></b>	

<b>National Plans and Programmes</b>	
<b>Purpose of the Document, including Objectives and Targets relevant to the Water Resources Management Plan and SEA</b>	<b>Relationships and Influences on the WRMP and the SEA</b>
<b><i>Working together for a better environment</i></b>	
This plan sets out how Environment Agency Wales will contribute to sustainable development in Wales up to 2015. The plan is underpinned by the same principles as the EA Corporate Plan detailed above.	The SEA and WRMP should consider the EA's priorities.
<b><i>Environment Agency (2012) Water Resources Planning Guidelines</i></b>	
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.  Consultation has recently been undertaken on revised guidelines published in March 2012, with final guidelines published in June 2012.	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.
<b><i>Environment Agency (undated) Restoring Sustainable Abstraction Programme</i></b>	
EA 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. EA 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.
<b><i>Environment Agency (various) Drought Plans</i></b>	
Drought Plans prepared by the EA: <ul style="list-style-type: none"><li>- outline how the EA will manage water resources during a drought and defines their role and responsibilities;</li><li>- aim to reconcile the competing interests of the environment, the need for public water supply and other abstractions;</li><li>- show what additional environmental monitoring the EA will carry out;</li><li>- provide a framework for liaison with water companies, awareness campaigns and determination of drought permits;</li><li>- range from high-level activities where they co-ordinate drought management over England and Wales to a local level where they outline specific operational activities.</li></ul> Those plans particularly relevant to the United Utilities area include the Head Office Drought Plan (covering England and Wales), Drought Plans for the North West as well as area plans for Yorkshire and the North East, Midlands and Anglian regions and the Environment Agency Wales Drought plan.	The WRMP should, where appropriate, take into account and accord with the provisions contained within the EA Drought Plans listed.  The SEA assessment framework should include an objective/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. Data contained within the plans listed may inform the baseline and assessment of plan options.
<b><i>HM Government (1979) Reservoirs Act</i></b>	
The Reservoirs Act 1975 provides a legal framework to ensure the safety against failure of large raised reservoirs.  The Reservoirs Act 1975 applies to reservoirs that hold at least 25,000 cubic metres of water above natural ground level.  Safety legislation for reservoirs in the United Kingdom was introduced in 1930 after several reservoir disasters had resulted in loss of life. This law was superseded by the Reservoirs Act 1975.  Under the Reservoirs Act 1975 reservoir owners (undertakers) have ultimate responsibility for the safety of their reservoirs.  Reservoir owners must appoint a panel engineer (a specialist civil engineer who is qualified and experienced in reservoir safety) to supervise the design and construction of the reservoir, to continuously supervise the reservoir when built (supervising engineer) and to carry out periodic inspections (inspecting engineer).	The WRMP must ensure full compliance with the Act.
<b><i>HM Government (1981) Wildlife and Countryside Act</i></b>	
The Act makes it an offence (with exceptions) to;	The WRMP must ensure full

<b>National Plans and Programmes</b>	
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<ul style="list-style-type: none"> <li>- Intentionally kill, injure or take any wild bird or their eggs or nests;</li> <li>- Intentionally kill, injure, or take, possess, or trade in any wild animal listed in Schedule 5;</li> <li>- Prohibits interference with places used for shelter or protection, or intentionally disturbing animals; and</li> <li>- Pick, uproot, trade in, or possess (for the purposes of trade) and wild plant listed in Schedule 8.</li> </ul> <p>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.</p>	<p>compliance with the Act.</p> <p>The SEA should ensure a positive contribution to the wildlife within the operational area.</p>
<b>HM Government (1991) Water Resources Act</b>	
<p>The Water Resources Act applies to England and Wales and established the National Rivers Authority (now the Environment Agency) to regulate water pollution, water resources, flood defence, fisheries and navigation. The Act covers water abstraction and impounding and discharges to surface and groundwaters and coastal waters.</p>	<p>The WRMP must ensure full compliance with the Act</p>
<b>HM Government (1994) UK Biodiversity Action Plan (BAP)</b>	
<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 following aims to maintain and, where practicable, to enhance:</p> <ul style="list-style-type: none"> <li>- The overall populations and natural ranges of native species and the quality and range of wildlife habitats and ecosystems;</li> <li>- Internationally and nationally important and threatened species, habitats and ecosystems;</li> <li>- Species, habitats and natural and managed ecosystems that are characteristic of Kent;</li> <li>- The biodiversity of natural and semi-natural habitats, where this has diminished over 3 recent decades, and</li> <li>- Public awareness of, and involvement in, conserving biodiversity.</li> </ul>	<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>
<b>HM Government (2000) Countryside and Rights of Way Act 2000</b>	
<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 country 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>
<b>HM Government (2003) Water Act 2003</b>	
<p>The four broad aims of the Act are</p> <ul style="list-style-type: none"> <li>- the sustainable use of water resources;</li> <li>- strengthening the voice of consumers;</li> <li>- a measured increase in competition; and</li> <li>- the promotion of water conservation.</li> </ul> <p>It amends the Water Industry Act 1991 so that water companies:</p> <ul style="list-style-type: none"> <li>- are given a duty to prepare and publicise drought plans;</li> <li>- are placed under a duty to agree and publicise water resource management plans; and</li> <li>- are placed under an enforceable duty to further water conservation.</li> </ul> <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>
<b>HM Government (2005) UK Sustainable Development Strategy</b>	
<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.</p> <p>This is implemented with 4 key priorities:</p>	<p>The WRMP and SEA must consider and implement the key priorities and objectives of the strategy</p>

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<ul style="list-style-type: none"> <li>- Sustainable consumption and production;</li> <li>- Climate change;</li> <li>- Natural resource protection;</li> <li>- Sustainable communities.</li> </ul>	
<b>HM Government (2006) <i>Climate Change and Sustainable Energy Act 2006</i></b>	
<p>The Act was enacted after the publication of the UK Climate Change Programme (2006). It places an obligation on the government to report to Parliament on greenhouse gas emissions in the UK and action taken by Government to reduce these emissions.</p>	<p>The WRMP should take into account carbon emissions associated with the options.</p> <p>The SEA could include an objective/guide question in the assessment framework to reduce greenhouse gas/carbon dioxide emissions. Consider whether the monitoring arrangements can be utilised to monitor the effects of the WRMP.</p>
<b>HM Government (2006) <i>Natural Environment and Rural Communities Act 2006</i></b>	
<p>The Act makes provision for bodies concerned with the natural environment and rural communities to make provision in connection with wildlife SSSI, National Parks and the Broads; to amend the law relating to rights of way to make provision as to the inland Waterways Amenity Advisory Council; to provide for flexible administrative arrangements in connection with functions relating to the environment and rural affairs and certain other functions; and connected purposes.</p>	<p>The WRMP and SEA should have regard to protected wildlife sites and rights of way.</p>
<b>HM Government (2008) <i>Climate Change Act 2009</i></b>	
<p>This Act aims:</p> <ul style="list-style-type: none"> <li>- to improve carbon management and help the transition towards a low carbon economy in the UK; and</li> <li>- 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.</li> </ul> <p>The Act seeks greenhouse gas emission reductions through action in the UK and abroad of at least 80 per cent by 2050, and reductions in CO<sub>2</sub> emissions of at least 26 per cent by 2020, against a 1990 baseline. The 2020 target will be reviewed soon after Royal Assent to reflect the move to all greenhouse gases and the increase in the 2050 target to 80 per cent.</p> <p>Further the Act provides for a carbon budgeting system which caps emissions over five year periods, with three budgets set at a time, to set out our trajectory to 2050. The first three carbon budgets will run from 2008-12, 2013-17 and 2018-22, and must be set by 1 June 2009.</p>	<p>The WRMP should take into account carbon emissions associated with the options.</p> <p>The SEA could include an objective/guide question in the assessment framework to reduce greenhouse gas/carbon dioxide emissions. Consider whether the monitoring arrangements can be utilised to monitor the effects of the WRMP.</p>
<b>HM Government (2009) <i>Marine and Coastal Access Act 2009</i></b>	
<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>
<b>HM Government (2010) <i>Conservation of Habitats &amp; Species Regulations 2010 (as amended 2011)</i></b>	
<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 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>The WRMP must ensure full compliance with the Regulations.</p> <p>The SEA should take into account the effects of the actions on biodiversity</p>

<b>National Plans and Programmes</b>	
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<b>HM Government (2010) <i>Environmental Permitting (England and Wales) Regulations 2010 SI 675</i></b>	
Provides a system for environmental permits and exemptions for industrial activities, mobile plant, waste operations, mining waste operations, water discharge activities, groundwater activities and radioactive substances activities. It also sets out the powers, functions and duties of the regulators.	The WRMP should accord with these Regulations.
<b>HM Government (2010) <i>Flood and Water Management Act 2010</i></b>	
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.  Does not contain any targets.	The WRMP should be in conformity with the Act.  The SEA should include objectives relating to flooding and water use.
<b>HM Government (2011) <i>UK Marine Policy Statement</i></b>	
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:  <ul style="list-style-type: none"> <li>- Achieving a sustainable marine economy;</li> <li>- Ensuring a strong, healthy and just society;</li> <li>- Living within environmental limits;</li> <li>- Promoting good governance;</li> <li>- Using sound science responsibly.</li> </ul> Does not contain any targets.	The WRMP should take into account its effects on coastal areas.  The SEA assessment should take into account the effects of the actions on the coast/marine environment where relevant.
<b>HM Government (2011) <i>Water for Life: White Paper</i></b>	
<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.  Water for Life 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.  The publication of a draft Water Bill, to reform the water industry in England and Wales, was announced in the Queen's Speech on the 9 May 2012 and will deliver legislative commitments set out in the Water White Paper.	WRMP should ensure that future water management is resilient, efficient and customer focused  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.
<b>Ofwat (2008) <i>Water Supply and Demand Policy</i></b>	
Summarised the key areas of water supply and demand, focusing on water efficiency, leakage, metering, and climate change.	The WRMP should ensure it balances demand and supply issues.  The SEA assessment framework should ensure that consideration is given to the socio-economic and environmental impact of any demand and supply policies.
<b>DCLG (2011) <i>Planning Policy Statement 10: Planning for Sustainable Waste Management</i></b>	
PPS10 provides guidance for sustainable waste management, moving the management of waste up the 'waste hierarchy' of prevention, preparing for reuse, recycling, other recovery, and disposing only as a last resort.	The WRMP should ensure that where applicable it accords with the principles of sustainable waste management



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<p>The PPS requires that Regional planning bodies and all planning authorities should, to the extent appropriate to their responsibilities, prepare and deliver planning strategies that:</p> <ul style="list-style-type: none"> <li>- help deliver sustainable development through driving waste management up the waste hierarchy, addressing waste as a resource and looking to disposal as the last option, but one which must be adequately catered for;</li> <li>- provide a framework in which communities take more responsibility for their own waste, and enable sufficient and timely provision of waste management facilities to meet the needs of their communities;</li> <li>- help implement the national waste strategy, and supporting targets, are consistent with obligations required under European legislation and support and complement other guidance and legal controls such as those set out in the Waste Management Licensing Regulations 1994;</li> <li>- help secure the recovery or disposal of waste without endangering human health and without harming the environment, and enable waste to be disposed of in one of the nearest appropriate installations;</li> <li>- reflect the concerns and interests of communities, the needs of waste collection authorities, waste disposal authorities and business, and encourage competitiveness;</li> <li>- protect green belts but recognise the particular locational needs of some types of waste management facilities when defining detailed green belt boundaries and, in determining planning applications, that these locational needs, together with the wider environmental and economic benefits of sustainable waste management, are material considerations that should be given significant weight in determining whether proposals should be given planning permission;</li> <li>- ensure the design and layout of new development supports sustainable waste management.</li> </ul>	<p>The SEA assessment framework should ensure that consideration is given to sustainable waste management.</p>
<b>DCLG (2012) National Planning Policy Framework</b>	
<p>The National Planning Policy Framework sets out the Government's planning policies for England and how these are expected to be applied</p> <p>At the heart of the National Planning Policy Framework is a presumption in favour of sustainable development, which should be seen as a golden thread running through both plan-making and decision-taking.</p> <p>For decision-taking this means:</p> <ul style="list-style-type: none"> <li>- approving development proposals that accord with the development plan without delay; and</li> <li>- where the development plan is absent, silent or relevant policies are out of date, granting permission unless: <ul style="list-style-type: none"> <li>▪ any adverse impacts of doing so would significantly and demonstrably outweigh the benefits, when assessed against the policies in this Framework taken as a whole; or</li> <li>▪ specific policies in this Framework indicate development should be restricted.</li> </ul> </li> </ul>	<p>The WRMP should ensure that where applicable it accords with the principles of the NPPF i.e. sustainable development.</p> <p>The SEA assessment framework should ensure that consideration is given to the principles of sustainable development.</p>
<b>HM Government (2011) Natural Environment White Paper</b>	
<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"> <li>- improve the quality of the natural environment across England;</li> <li>- move to a net gain in the value of nature;</li> <li>- arrest the decline in habitats and species and the degradation of landscapes;</li> <li>- protect priority habitats;</li> <li>- safeguard vulnerable non-renewable resources for future generations;</li> <li>- support natural systems to function more effectively in town, in the country and at sea; and</li> <li>- create an ecological network which is resilient to changing pressures.</li> </ul> <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>	<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>
<b>Defra (2011) Biodiversity 2020: A Strategy for England's Wildlife and Ecosystem Services</b>	
<p>Biodiversity 2020 builds on the Natural Environment White Paper and provides a comprehensive picture of how the Government is implementing the international and EU commitments. It sets out the strategic direction for biodiversity policy for the next decade on land (including rivers and lakes) and</p>	<p>The WRMP should seek to protect and enhance biodiversity, particularly designated sites.</p>

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at sea.	The SEA assessment framework should include objectives, indicators and targets that cover biodiversity.
<b>Welsh Government (2004) <i>Technical Advice Note 15: Development and Flood Risk</i></b>	
TAN 15 sets out a precautionary framework to guide planning decisions. The approach seeks to first, direct new development away from those areas which are at high risk of flooding and, second, where development has to be considered in high risk areas (Zone C), allow only those developments which can be justified to be located within such areas.	The WRMP should take account of flood risk management.  The SEA should include a guide question relating to flood risk.
<b>Welsh Government (2008) <i>One Wales One Planet: The Sustainable Development Scheme for Wales</i></b>	
<p>One Wales One Planet seeks to build on the two previous Sustainable Development Schemes. It sets out proposals to promote sustainable development, how the Welsh Government will make sustainable development a reality for people in Wales, and the benefits that people will see from this, particularly in less well-off communities.</p> <p>The strategy states that the Welsh Government is committed to working in partnership with others and notes that businesses can:</p> <ul style="list-style-type: none"> <li>- Develop resource efficiency within the organisation and through supply chains, improving productivity and competitiveness;</li> <li>- Reduce waste;</li> <li>- Develop environmental and sustainability policies and targets;</li> <li>- Monitor performance and resource use and report publicly on them;</li> <li>- Engage with the workforce in both adopting sustainable practices and encouraging employees to become sustainable champions in their own communities;</li> <li>- Engage with and support local communities.</li> </ul>	<p>The WRMP should consider effects of options on sustainable development in Wales.</p> <p>The SEA should include guide questions relating to improving resource efficiency, reducing waste, monitoring and public reporting, encouraging sustainable practices among the workforce and engaging with and supporting local communities. The SEA should include proposals for monitoring the effects of the WRMP on the environment and sustainability and could utilise targets that arise from this document.</p>
<b>Welsh Government (2008) <i>People, Places, Futures: The Wales Spatial Plan 2008 Update</i></b>	
<p>The <i>Wales Spatial Plan</i> provides the context and direction of travel for local development plans and the work of local service boards. The 2008 update brings the <i>Wales Spatial Plan</i> into line with <i>One Wales</i>, and gives status to the area work which has developed since 2006. The key themes of the update (and the <i>Wales Spatial Plan</i> before it) are set out below:</p> <p><b>Building Sustainable Communities</b></p> <p>Our future depends on the vitality of our communities as attractive places to live and work. We need to reduce inequalities between communities whilst retaining their character and distinctiveness.</p> <p><b>Promoting a Sustainable Economy</b></p> <p>We need an innovative, high value-added economy for Wales which utilises and develops the skills and knowledge of our people; an economy which both creates wealth and promotes the spreading of that prosperity throughout Wales; an economy which adds to the quality of life as well as the standard of living and the working environment.</p> <p><b>Valuing our Environment</b></p> <p>The quality of our natural environment has an intrinsic value as a life support system, but also promotes wellbeing for living and working and contributes to our economic objectives. Safeguarding and protecting our natural and historic assets, and enhancing resilience to address the challenges of climate change, will enable us to attract people to our communities and provide the wellbeing and quality of life to encourage them to stay and preserve the foundations for the future.</p> <p><b>Achieving Sustainable Accessibility</b></p> <p>We will develop access in ways that protect the environment, encourage economic activity, widen employment opportunities, ensure quality services and integrate the social, environmental and economic benefits that travel can have.</p> <p><b>Respecting Distinctiveness</b></p> <p>A cohesive identity which sustains and celebrates what is distinctive about Wales, in an open and outward-looking way, is central to promoting Wales to the World, as well as to our future economic</p>	<p>The WRMP should have regard to the key themes of the <i>Wales Spatial Plan Update</i>.</p> <p>The SEA objectives should cover the key themes set out in the <i>Wales Spatial Plan Update</i>.</p>



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competitiveness and social and environmental wellbeing.	
Welsh Government (2008) <i>Wales Environment Strategy Action Plan 2008 - 2011</i>	
This second Environment Strategy Action Plan sets out rolling actions until 2010, to facilitate a more strategic approach to environmental improvement, and recognise the longer-term nature of environmental action and change. The Action Plan sets out actions under the headings: biodiversity, marine, access and recreation, flood and water management, ecosystems services, research and evidence, the historic environment, people and the environment, partnership and environmental quality. Actions set against Welsh Water relate to flood management, although other actions could be relevant.	<p>The WRMP should aim to contribute to the Wales Environment Strategy Action Plan.</p> <p>The SEA assessment should include effects of options on biodiversity, marine, access and recreation, flood and water management, the historic environment, people and the environment and environmental quality. Indicators are set out against actions which could be used to monitor the effects of the WRMP.</p>
Welsh Government (2009) <i>Technical Advice Note 5: Nature Conservation and Planning</i>	
<p>Technical Advice Note 5 sets out how the planning system should contribute to protecting and enhancing biodiversity and geological conservation. It stipulates that the planning system should:</p> <ul style="list-style-type: none"> <li>- work to achieve nature conservation objectives through a partnership between local planning authorities, Countryside Council for Wales (CCW), the Environment Agency Wales, voluntary organisations, developers, landowners and other key stakeholders;</li> <li>- integrate nature conservation into all planning decisions looking for development to deliver social, economic and environmental objectives together over time;</li> <li>- ensure that the UK's international and national obligations for site, species and habitat protection are fully met in all planning decisions;</li> <li>- look for development to provide a net benefit for biodiversity conservation with no significant loss of habitats or populations of species, locally or nationally;</li> <li>- help to ensure that development does not damage, or restrict access to, or the study of, geological sites and features or impede the evolution of natural processes and systems especially on rivers and the coast; and</li> <li>- plan to accommodate and reduce the effects of climate change by encouraging development that will reduce damaging emissions and energy consumption and that help habitats and species to respond to climate change.</li> </ul>	<p>The WRMP should seek to protect and enhance biodiversity and geodiversity.</p> <p>SEA objectives should reflect the need to conserve and, where possible, enhance, biodiversity and geodiversity.</p>
Welsh Government (2010) <i>Climate Change Strategy for Wales and First Annual Progress Report (2012)</i>	
<p>The Climate Change Strategy for Wales sets out the Welsh Government's policy intentions in relation to climate change and expands on the commitments set out in One Wales.</p> <p>The strategy re-iterates the One Wales commitments to 3 per cent annual carbon reductions and sets out, that by 2020, the Welsh Government expect to see:</p> <ul style="list-style-type: none"> <li>- Businesses have reduced energy costs and emissions;</li> <li>- Employees actively engaged in reducing emissions from their workplaces;</li> <li>- Consumers demanding low carbon goods and services and concerned about sustainability performance of businesses;</li> <li>- Growth of social enterprises and community businesses providing low carbon goods and services locally;</li> <li>- More businesses operating, and people employed, in businesses that provide low carbon goods and services.</li> </ul> <p>The Progress Report provides a qualitative assessment of the progress made in delivering the sector actions.</p>	<p>The WRMP should incorporate climate change mitigation and adaptation measures, e.g. reducing carbon emissions.</p> <p>The SEA should include a guide question relating to mitigation and adaptation to climate change.</p>
Welsh Government (2010) <i>Flood and Coastal Erosion Risk Management: Development of a National Strategy for Wales – Consultation Document</i>	
The Welsh Government aims to develop a system for flood and coastal erosion risk management in	The WRMP should reflect the

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<p>Wales that:</p> <ul style="list-style-type: none"> <li>- Embeds sustainable development as the key principle for informing decisions and which is reflected in an approach that promotes the wellbeing of people in Wales and addresses the needs of the economy and the environment.</li> <li>- Is focussed on the needs of individuals, communities and businesses and which recognises that different groups have different needs and varying capacity to deal with flood risk and that the service they receive must be tailored accordingly.</li> <li>- Promotes equality and does not exacerbate poverty.</li> <li>- Is based upon a holistic understanding of the risks and consequences of all sources of flooding and areas of coastal erosion.</li> <li>- Considers the full range of risk management responses. Facilitates long term resource planning.</li> <li>- Allows prioritisation of investment, resources and actions.</li> </ul> <p>To support the development of this system, the following objectives are identified:</p> <ul style="list-style-type: none"> <li>- Reducing the impacts on individuals, communities and businesses from flooding and coastal erosion.</li> <li>- Raising awareness of and engaging people in the response to flood and coastal erosion risk.</li> <li>- Providing an effective and sustained response to flood and coastal erosion events.</li> <li>- Prioritising investment in the most at risk communities.</li> </ul>	<p>actions identified within the Strategy for water companies.</p> <p>The SEA should include an objective/ guide question(s) relating to flood and coastal erosion risk management.</p>
<b>Welsh Government (2010) A Living Wales – A New Framework for Our Environment, Our Countryside and Our Seas (Consultation Document)</b>	
<p>The Welsh Government is developing a Natural Environment Framework (NEF) which is to have a stronger focus on sustainable land and marine management in Wales and will adopt an ecosystems approach.</p> <p>This consultation document sets out the principles which are to underpin the NEF. These are as follows:</p> <ul style="list-style-type: none"> <li>- To secure sustainable and integrated management of land and water by making the long-term health of ecosystems and the services they provide central to decision making; and, by doing this</li> <li>- To make optimum use of our finite land and water resources and ensure Wales' natural and cultural capital assets are maintained and enhanced.</li> </ul>	<p>The WRMP should support the delivery of the NEF. Where appropriate, it should take into account the outcomes of ongoing work in support of the NEF, particularly the emerging evidence base and any changes to regulatory and management regimes.</p> <p>The SEA objectives should reflect the principles of the emerging NEF.</p>
<b>Welsh Government (2010) A Low Carbon Revolution: The Welsh Assembly Government Energy Policy Statement</b>	
<p>This policy statement sets out the Welsh Government's ambitions for low carbon energy in Wales. It comprises the following aims/targets:</p> <ul style="list-style-type: none"> <li>- a step-change in the energy efficiency performance of all housing stock in Wales;</li> <li>- a significant proportion of our energy to be generated locally or domestically;</li> <li>- to promote the optimum use of offshore wind around the coast of Wales in order to deliver a further 15 kWh/d/p of capacity by 2015/16;</li> <li>- to test the appropriateness and cost effectiveness of steps to exploit the tidal range of the Severn estuary;</li> <li>- to capture at least 10 per cent (8 kWh/d/p) of the potential tidal stream and wave energy off the Welsh coastline by 2025;</li> <li>- to have 4.5 kWh/d/p of installed onshore wind generation capacity by 2015/2017;</li> <li>- to support small scale hydro and geothermal schemes where they are environmentally acceptable in order to generate at least 1 kWh/d/p;</li> <li>- to deliver by 2020 up to 6 kWh/d/p in Wales of electricity from biomass – 50 per cent indigenous/50 per cent imported – and a heat potential of 2-2.5 kWh/d/p in Wales;</li> <li>- that any new fossil fuel plants should be carbon capture ready with fully developed plans for carbon capture and storage; and that these plants maximise efficiency through use of waste heat and co-firing where appropriate;</li> <li>- to maximise the short and long-term benefits for Wales' economy and society of the move to a low carbon energy system.</li> </ul>	<p>The WRMP should reflect the aims of policy statement.</p> <p>The SEA objectives should reflect the Government's ambitions for low carbon energy in Wales.</p>
<b>Welsh Government (2011) Planning Policy Wales (Edition 4)</b>	

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<p>Planning Policy Wales sets out the land use planning policies of the Welsh Government. It is supplemented by a series of Technical Advice Notes and procedural advice given in National Assembly for Wales/Welsh Office circulars. It sets out key policy objectives for Local Development Plans (LDPs) in Wales which reflect the sustainable development agenda.</p>	<p>Options recommended in the WRMP will need to confirm to LDPs.</p> <p>The SEA objectives should reflect the Welsh Government's commitments to sustainable development.</p>
<b>Welsh Government (2011) Strategic Policy Position Statement on Water</b>	
<p>The Welsh Government published its first Strategic Policy Position Statement on Water in 2009 with the purpose of providing Ofwat, the water companies, regulators and other interested parties a clear steer on the Welsh Government's priorities for water in the context of the water price review. This revised Statement updates the position reflecting key developments over the last two years and highlights areas that will be a priority in the future in the context of the following themes:</p> <ul style="list-style-type: none"> <li>- Customers at the heart of delivery;</li> <li>- Working together and planning for the future;</li> <li>- Drinking water quality;</li> <li>- Charging and metering;</li> <li>- Protecting the environment;</li> <li>- Meeting obligations;</li> <li>- Effective management of water resources in Wales;</li> <li>- Twenty first century drainage systems;</li> <li>- Market reform and competition;</li> <li>- Secure supplies and building up resilience;</li> <li>- Global water responsibility.</li> </ul>	<p>The WRMP should be closely aligned to Welsh Government's Policy Position Statement on Water.</p> <p>The SEA assessment framework should include objectives/ sub-objectives relating to water efficiency.</p>
<b>Welsh Government (2011) Water Policy in Wales (Written Statement)</b>	
<p>This Statement provides an overview of progress in the delivery of water and sewerage services in Wales. Amongst other elements, it reaffirms the Welsh Government's commitments in respect of reducing the percentage of people identified as having water affordability issues and the adoption of an ecosystem approach to the management of water, focusing on ecosystem services in addition to meeting our European environmental obligations.</p>	<p>The WRMP should be closely aligned to Welsh Government's Policy position on Water.</p> <p>The SEA assessment framework should include objectives/ sub-objectives relating to water quality and affordability.</p>
<b>Welsh Government (2011) Welsh Government Policy Statement: Preparing for a Changing Climate</b>	
<p>This Policy Statement sets out how the Welsh Government will implement relevant provisions of the Climate Change Act 2008. It provides technical advice on how to assess climate risks and how to develop adaptation plans and in this context Welsh Water is identified as a key reporting authority.</p>	<p>The WRMP should incorporate climate change mitigation and adaptation measures where appropriate.</p> <p>The SEA should include a guide question relating to mitigation and adaptation to climate change.</p>
<b>Welsh Government (2012) Proposals for a Sustainable Development Bill</b>	
<p>The Sustainable Development Bill aims to strengthen the Welsh Government's approach to sustainable development and change their existing commitments to a legal duty. This consultation paper includes proposals to:</p> <ul style="list-style-type: none"> <li>- Legislate to make sustainable development the central organising principle of the Welsh Government and public bodies in Wales; and</li> <li>- Create an independent sustainable development body for Wales.</li> </ul> <p>The consultation will inform the Sustainable Development Bill White Paper prior to introduction of the Bill itself which is anticipated to take place in Autumn 2013.</p>	<p>Whilst the proposed sustainable development duty is unlikely to apply to water companies, the WRMP should consider effects of options on sustainable development in Wales.</p> <p>The SEA should help to deliver sustainable development through the balanced assessment of the WRMP.</p>

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<b>Welsh Government (2012) <i>Sustaining a Living Wales: A Green Paper on a New Approach to Natural Resource Management in Wales</i></b>	
<p>This Green Paper sets out, and seeks views on, proposals for the management and regulation of the environment in Wales. The consultation will principally inform the proposed Environment and Planning Bills.</p> <p>The central proposal is to move to an ecosystem approach to environmental regulation and management which is expected to:</p> <ul style="list-style-type: none"> <li>- improve the resilience and diversity of the environment and its supporting biodiversity;</li> <li>- provide simpler and more cost-effective regulation;</li> <li>- offer greater certainty for decision-makers.</li> </ul> <p>In this context, the Green Paper is underpinned by the aim to <i>“ensure that Wales has increasingly resilient and diverse ecosystems that deliver environmental, economic and social benefits now and in the future.”</i></p>	<p>The WRMP should consider effects of options on resource use and management in Wales. Where appropriate, it should take into account the proposals set out in the Green Paper, particularly any changes to regulatory and management regimes.</p> <p>The SEA should include objectives/guide questions relating to sustainable resource use.</p>

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<b>Water Company (various) Drought Plans</b>	
<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"> <li>- United Utilities Draft Drought Plan;</li> <li>- Dee Valley Water Draft Drought Plan;</li> <li>- Welsh Water Drought Plan</li> <li>- Severn Trent Water Drought Plan;</li> <li>- Yorkshire Water Drought Plan.</li> <li>- Northumbrian Water Drought Plan</li> </ul> <p>A brief overview of those plans currently publicly available is provided below.</p> <p><b>United Utilities Draft Drought Plan:</b> The draft Plan identifies that the West Cumbria Resource Zone is the most sensitive to drought due to its short (75 days) critical period. For the Integrated Resource Zone, applications for drought permits/orders would be made following the commencement of voluntary water use restrictions. However for the West Cumbria and North Eden Resource Zones, drought permit/order applications would occur concurrently with the commencement of voluntary water use restrictions as drought permits/orders have to be in place in these zones when the final drought trigger is reached to allow UU to continue to abstract water. There are no drought permit/order options for the Carlisle Resource Zone.</p> <p>The assessment of water supply security indicates that with a repeat of the worst drought on record, even taking into account the forecast impacts of climate change, reservoirs will not empty but will reach very low levels. Before reaching these very low levels, the Plan highlights that it is necessary to take action to conserve water supplies in case the drought is more severe than any previously recorded. Consequently, water use restrictions and drought permits/orders need to be implemented before reaching the very lowest reservoir levels to safeguard water supplies.</p> <p><b>Severn Trent Water Drought Plan:</b> Severn Trent Water have previously had an agreement for United Utilities to provide them with up to 12Ml/d of treated water from Oswestry, however this agreement terminated on 31<sup>st</sup> March 2010 when Severn Trent had a new source at Nescliffe near Shrewsbury to make up this loss. The variable use of Vyrnwy Reservoir that provides a bulk supply to United Utilities has been discussed in relation to the regulation support it provides the River Severn particularly in time of drought. Severn Trent has identified six locations where drought permits will be requested including the Tittesworth Reservoir and River churnet close the boundary with the United Utilities area. A variation to the compensation requirements from Tittesworth Reservoir and Deep Haye Valley will be requested, along with a variation to the Leek Groundwater Unit abstraction licences to assist the refill of Tittesworth.</p> <p><b>Northumbrian Water Drought Plan:</b> The overall conclusions are that Northumbrian Water do not anticipate any major problems as the Kielder Supply Scheme ensures there is sufficient raw water available to the majority of water treatment sites and where this is not the case actions are proposed which will provide potable water to all customers. This means that Northumbrian Water do not anticipate requiring any Drought Orders or Permits. The Plan states that one of the main benefits of having the Kielder Transfer Scheme is the ability to transfer raw water around the area to manage resources such as reservoir or river levels.</p> <p>Northumbrian Water's Drought Plan does not rely on receiving increased supplies from any of the neighbouring water companies.</p> <p><b>Dee Valley Water Drought Plan</b> – not available on website</p> <p><b>Yorkshire Water Drought Plan (draft)</b> The Yorkshire Water region is bordered by four water companies; Anglian Water, Severn Trent Water, United Utilities and Northumbrian Water. They maintain a routine dialogue with each of these companies and in the event of drought would contact the relevant company water resource managers regarding their water supply situation and options for cross border support. The opportunities between Yorkshire Water, Anglian Water and United Utilities are minimal. Yorkshire has identified two sites in relative close proximity to the borders of the United Utilities area where drought permits may be requested. Silsden Reservoir where an application for drought order or permit to allow abstraction up to 10Ml/d which could be transferred via a pipeline,</p>	<p>The WRMP will need to be in accordance with United Utilities' emerging Drought Plan and plans of neighbouring companies, taking into account those triggers and supply and demand side options which are relevant to the United Utilities 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>

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<p>into the Nidd Aqueduct. There is also a drought option to reduce the compensation release from Silsden Reservoir. At Boshaw Whams Reservoir (not currently in use) an existing licence authorises a daily average transfer of 0.151 MI/d (max 0.45 MI/d) to Holme Styes reservoir. This licence is not currently in use but is an option in a drought to provide compensation to rivers affected by other drought options. A drought order or permit application would be required for an increased daily maximum abstraction to 7.0MI/d.</p> <p><b>Welsh Water Drought Plan</b> – not yet available on Welsh Water’s website</p>	
Water Company (various) Water Resources Management Plans	
<p>Water Resources Management Plans have been produced by all water companies to fulfil their requirements under the Water Act 2003. The United Utilities Water Resource Management Plan was published in 2009 and set out the following objectives: The document is currently being revised.</p> <ul style="list-style-type: none"> <li>- To identify the best possible water resources and demand strategy that achieves the required level of water supply reliability for our customers, whilst protecting the environment and minimising the impact on customer water bills;</li> <li>- To adapt to meet the challenge of climate change. In accordance with our Strategic Direction Statement, this will be achieved by helping our customers manage their use of water more efficiently, tackling leakage, and developing a more resilient supply system;</li> <li>- To ensure that abstraction from our water resources is sustainable, and resilient to meet the challenge of increasing drought risk arising from climate change. Our strategy for significantly reducing demand ensures sustainable water abstraction and makes important contributions to climate change mitigation and adaptation;</li> <li>- To ensure our plans deliver the needs and priorities of our customers and other stakeholders, by taking account of their views throughout our planning.</li> </ul> <p>Those neighbouring Water Resource Management Plans relevant to the plan are:</p> <ul style="list-style-type: none"> <li>- Dee Valley Water Draft Water Resources Management Plan (January 2009);</li> <li>- Severn Trent Water Final Water Resources Management Plan (June 2010);</li> <li>- Yorkshire Water Final Water Resources Management Plan (December 2009);</li> <li>- Northumbrian Water Final Water Resources Management Plan (January 2010);</li> <li>- Welsh Water – Final Water Resources Management Plan (October 2011).</li> </ul> <p><b>Dee Valley Water</b> supplies water to around 250,000 customers in the Chester/Wrexham area, located in 3 water resource zones. The company has not identified any supply demand deficits and consequently no preferred options are included in the company strategy that will draw water from resources in the North West.</p> <p><b>Severn Trent Water</b> supplies water to 7.4 million customers in the Midlands, located in 6 water resource zones. Those adjoining the United Utilities Area are Staffs and E Shropshire, Oswestry and East Midlands. No preferred options are included in the company’s strategy that will draw water from resources in the United Utilities zone. .</p> <p><b>Yorkshire Water</b> The final WRMP presents three resource zones which make up the Yorkshire Water Region; Grid Surface Water Zone, which adjoins the united utilities area, East Surface Water Zone and the East Ground Water Zone. Yorkshire water plans to connect the East GWZ to the Grid SWZ through construction of a new pipeline to be completed by 2011/12. The East GWZ will then become part of the Grid SWZ to make two water resource zones.</p> <p>At the draft plan stage, Yorkshire Water forecast a deficit in the supply demand balance however this was revised and the water company are no longer forecasting a supply/demand deficit and will remain in surplus throughout the planning period to 2034/35.</p> <p><b>Welsh Water</b> Welsh Water delivers water supply services to most of Wales and some parts of England and supplies water to around 3 million people</p> <p>The Welsh Water area is divided into 24 Water Resource Zones (WRZs). The ten WRZs in North Wales serve half a million people living mainly in Chester and Deeside, Anglesey, the Bangor and Caernarfon area and the north coastal strip from Llandudno to Prestatyn. These WRZs are closest to the United Utilities area.</p> <p>The WRMP identifies deficits at some point in the next 25 years are forecast for three WRZs, in south Wales which are unlikely to have any implications for United Utilities.</p> <p><b>Northumbria Water</b> – The Northumbrian Water WRMP identifies 2 water resource zones; Kielder WRZ and Berwick WRZ. The Kielder WRZ lies adjacent to the UU area. The WRZ is predicted to remain in surplus of supply to the forecast demands through the end of the plan period.</p>	<p>The WRMP should take account of neighbouring plans where appropriate.</p> <p>The SEA should include an objective/guide question relating to water resources.</p>
Environment Agency (2012) Managing Drought in the North West	
<p>The Environment Agency’s drought plan for the north west sets out the indicators the EA currently</p>	<p>The WRMP should take account of</p>



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<p>use to classify the different stages of drought. This plan sets out:</p> <ul style="list-style-type: none"> <li>which organisations are involved in managing drought and what their responsibilities are</li> <li>the impacts of drought on businesses and communities</li> <li>the Environment Agency's commitments</li> <li>how to find out further information and how we can work together.</li> </ul> <p>The Environment Agency's regional drought plans are voluntary and are not required under statutory legislation, nor under regulatory or administrative provision.</p>	<p>the Environment Agency's regional drought plan where appropriate.</p> <p>The SEA should include an objective/guide question relating to water resources.</p>
<b>Environment Agency (July 2009) Water for People and the Environment: Water Resources Strategy Regional Action Plan for the North West.</b>	
<p>The Action Plan takes the aims and objectives of the national Water Resources Strategy and identifies regional actions that will enable the following:</p> <ul style="list-style-type: none"> <li>- water to be abstracted, supplied and used efficiently;</li> <li>- the water environment to be restored, protected and improved so that habitats and species can better adapt to climate change;</li> <li>- supplies to be more resilient to the impact of climate change, including droughts and floods;</li> <li>- water to be shared more effectively between abstractors;</li> <li>- improved water efficiency in new and existing buildings;</li> <li>- water to be valued, and for prices to act as an incentive for efficient use, while safeguarding vulnerable sectors of society;</li> <li>- additional resources to be developed where and when they are needed in the context of a twin-track approach with demand management;</li> <li>- sustainable, low carbon solutions to be adopted;</li> <li>- stronger integration of water resources management with land, energy, food and waste</li> </ul> <p>This plan considers local pressures and priorities. The top priorities for the North West Region are:</p> <ul style="list-style-type: none"> <li>- Responding to climate change and population growth by ensuring the resilience of water supply in the future;</li> <li>- Enhancing and promoting our understanding of the links between water usage and associated energy use and carbon emissions;</li> <li>- Ensuring sustainable levels of abstraction in all catchments;</li> <li>- Meeting the objectives of the WFD and ensuring all water bodies achieve the required 'good' status/potential.</li> </ul>	<p>The WRMP should consider the priorities set out by the Environment Agency.</p> <p>The SEA should include an objective/guidance question relating to water resources.</p>
<b>Government Office North West (2008) North West of England Plan: Regional Spatial Strategy to 2012</b>	
<p>The government announced its intention to revoke regional strategies in 2010 and intend to revoke them completely in 2013, however until that date they remain a material consideration in planning matters. The North West RSS provided a regional framework for development and investment up to 2012 and until July 2010 formed part of the statutory development plan for the North West Region. The RSS is underpinned by the following principles:</p> <ul style="list-style-type: none"> <li>- promote sustainable communities;</li> <li>- promote sustainable economic development;</li> <li>- make the best use of existing resources and infrastructure;</li> <li>- manage travel demand, reduce the need to travel, and increase accessibility;</li> <li>- marry opportunity and need;</li> <li>- promote environmental quality;</li> <li>- mainstreaming rural issues;</li> <li>- reduce emissions and adapt to climate change</li> </ul> <p>The RSS is committed to using natural and man made resources actively, prudently and efficiently as well as protecting and enhancing the Region's natural environmental assets. The Strategy promotes a more integrated approach to delivering a better environment through land and water management, including a better relationship between new development, water resources and flood risk and adaptation to the impacts of climate change.</p> <p>The RSS sets a target to deliver 416,000 additional dwellings 2003-2021 across the North West.</p>	<p>The WRMP should consider the provisions in the RSS which encourage the prudent use of natural resources and promote adaptation to climate change.</p> <p>The SEA should include an objective/guidance question relating to water resources and to climate change. .</p>
<b>4NW (2010) Future North west: Our Shared Priorities</b>	
<p>Future North West: Our Shared Priorities sets out a clear course of action for the North West over the next 20 years. It builds on the North West's strengths and unique offer and also on future challenges and issues to be faced in the future. The document sets out the following vision:</p>	<p>The WRMP should consider climate change and resource efficiency. The</p>



Regional Plans and Programmes	
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<p>“The quality of life for the people of the North West will be excellent and the area will become more prosperous, more equitable and low carbon. By 2030 it will be a better place to live, learn, work, visit and invest in”.</p> <p>The Plan is set out around four themes. Theme 1 is the most relevant to the WRMP and seeks to capitalise on the opportunities of moving to low carbon economy and society and address climate change and resource efficiency. Theme 4 addresses housing and states that there is consensus that around 23,000 new homes will be needed on average every year to support the North West’s growing communities and economic ambitions. The plans sets out a key objectives to ensure the availability in the right locations of land (including Brownfield sites) for new housing that supports sustainable economic growth, and is consistent with the phasing of critical infrastructure and transport provision</p>	<p>WRMP should also consider the level of housing need identified in considering future water demand.</p> <p>The SEA should include an objective/guidance question relating to climate change and resource efficiency.</p>
<b>Climate Change North West (undated) <i>Rising to the Challenge A North West Climate Change Action Plan for England’s North West 2010-2012:</i></b>	
<p>The Plan sets out a vision of a low carbon and well adapting north west by 2020 underpinned by the following objectives:</p> <ul style="list-style-type: none"> <li>- Reduce greenhouse gas emissions;</li> <li>- Adapt to unavoidable climate change;</li> <li>- Capitalise on opportunities for economic growth.</li> </ul> <p>Priorities for action include :</p> <ul style="list-style-type: none"> <li>- Clean and secure energy;</li> <li>- Smarter use of carbon;</li> <li>- A well adapting region.</li> </ul> <p>Note: responsibility for the delivery of the Climate Change Action Plan rests with the Regional Strategy Team which has now been disbanded.</p>	<p>The WRMP should consider the provisions of the Climate Change Action Plan</p> <p>The SEA should include an objective/guidance question which reflects climate change.</p>
<b>4NW (2006) <i>North West Regional Economic Strategy</i></b>	
<p>This strategy sets out the vision for a dynamic, sustainable international economy, which competes on the basis of knowledge, advanced technology and an excellent quality of life for all. There are three major drivers to improving the Northwest’s economic performance and achieving the overall goals of the vision:</p> <ul style="list-style-type: none"> <li>- Improving productivity and growing the market – particularly in terms of economic output per person employed. This means both retaining and increasing the number of higher added-value jobs in the region by investing in innovation, R&amp;D, leadership and higher level skills;</li> <li>- Growing the size and capability of the workforce – getting more people into work, especially in the most deprived areas, amongst disadvantaged communities and areas remote from growth. This means ensuring people have the skills to work, linking people to nearby job opportunities and encouraging more new businesses; and</li> <li>- • Creating the right conditions for sustainable growth and private sector investment – through investing in the region’s environment, culture, infrastructure and communities. This underpins everything in the strategy.</li> </ul>	<p>There may be some economic effects associated with the implementation of the WRP and the future management of water resources in the North West. This may have an impact upon some of the aims set out in this plan</p> <p>The SEA should seek to address the potential effects of the WRP implementation upon the local and regional economy</p>
<b>Government Office for the North West (2004), <i>Action for Sustainability – Regional Sustainable Development Framework</i></b>	
<p>Action for Sustainability (AfS) is the North West’s Regional Sustainable Development Framework and is used to inform sustainability appraisals of regional plans and strategies. It is however under review at the present time and is due to be replaced by alternative programmes.</p> <p>The framework provides ten priorities and long term goals:</p> <ul style="list-style-type: none"> <li>- Sustainable transport and access reducing the need to travel and allowing access for all to places, goods and services;</li> <li>- Sustainable production and consumption, ensuring energy and resources are used both efficiently and effectively by all;</li> <li>- Social equity, that respects, welcomes and celebrates diversity and allows all communities and generations a representative voice;</li> <li>- Biodiversity and landscapes that are valued in themselves and for their contribution to the region’s economy and quality of life;</li> <li>- Active citizenship that empowers people and enables them to contribute to issues that affect the wider community;</li> </ul>	<p>The WRP should seek to take into account all of the themes regarding sustainable development as outlined in this plan.</p> <p>The SEA should seek to work towards all goals of sustainable development, including sustainable consumption and production, social equity, protection of natural resources and biodiversity and minimising contributions towards climate change. There should also be objectives relating to social, community and economic issues across the region.</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"> <li>- A culture of Lifelong Learning that allows people to fulfil their duties and potential in a global society by acquiring new skills, knowledge and understanding;</li> <li>- Cultural distinctiveness, nurturing and celebrating diversity to create a vibrant and positive image;</li> <li>- An active approach to reducing our contribution to climate change whilst preparing for potential impacts;</li> <li>- Healthy communities where people enjoy life, work and leisure and take care of themselves and others; and</li> <li>- Enterprise and innovation, harnessing the region's educational and scientific resources and the creative and entrepreneurial skills of its people to achieve sustainable solutions.</li> </ul>	
North West Development Agency (2006), <i>North West Sustainable Energy Strategy</i>	
<p>The North West Sustainable Energy Strategy sets out the energy challenge that faces the North West, and demonstrates how different sectors across the region can act to address this challenge head on, whilst also achieving wider economic, social and environmental objectives.</p> <p><b>Objectives:</b> To make the North West a leading region for sustainable energy practices by meeting the following goals:</p> <ul style="list-style-type: none"> <li>- Improving energy efficiency and eliminating energy wastage in all areas of activity across the region;</li> <li>- Accelerating the transition to sustainable forms of energy and achieving regional renewable energy deployment targets.</li> <li>- Setting the region on a course to reduce greenhouse gas emissions by at least 60% by 2050;</li> <li>- Eliminating fuel poverty by ensuring that all householders have access to affordable warmth and decent housing;</li> <li>- Contributing to the region's economy by harnessing business innovation and employment opportunities arising from sustainable energy practices; and</li> <li>- Communicating views, experiences and examples from the region to improve national and international policy frameworks.</li> </ul>	<p>The effective management of water resources may provide opportunities to promote energy efficiency, eliminate energy wastage and the use of sustainable energy.</p> <p>The implementation of the WRP may also provide opportunities to share good practice and experience with internal and external stakeholders.</p> <p>The SEA should seek to promote energy efficiency, eliminate energy waste and encourage the use of sustainable energy sources.</p>
4NW (2010) <i>The Updated Regional Waste Strategy for North West England</i>	
<p>The strategy is an update of the 2004 Regional Waste Strategy. It aims to 'contribute to the sustainable development of the North West region by promoting and supporting waste management infrastructure, facilities and systems which reduce harm to the environment (including reducing impacts on climate change), improve the efficiency of resources, stimulate investment and maximise economic opportunities in line with specific targets. The objectives of the strategy area as follows:</p> <ul style="list-style-type: none"> <li>- Ensure that waste management infrastructure, facilities and systems are developed in accordance with the principles of sustainable development, the low carbon agenda and integrated waste management at the highest practicable level in the Government's waste hierarchy, by: <ul style="list-style-type: none"> <li>- Preventing waste;</li> <li>- Maximising the re-use of materials for the same or a different purpose;</li> <li>- Increasing the proportion of recycling and composting of waste;</li> <li>- Provision of treatment capacity for hazardous waste;</li> <li>- Production of refuse derived fuels from waste;</li> <li>- Recovering energy from residual waste and refuse derived fuels;</li> </ul> </li> <li>- Maintaining sufficient landfill capacity for the disposal of final residues following treatment and recovery including the recovery of energy from landfill gas where practicable;</li> <li>- Provide a clear framework for stakeholders to guide the future development of waste management in the Northwest and to support local authority Municipal Waste Management Strategies and private investment decisions;</li> <li>- Deliver waste planning policy in the Northwest so that it is consistent with, and contributes to, the overall aims of the National Waste Strategy 2007, the Regional Spatial Strategy and the Sustainable Consumption and Production Action Plan for the Northwest;</li> <li>- Maximise the opportunities for Northwest businesses arising from sustainable waste</li> </ul>	<p>The implementation of the WRP may have an effect upon resource efficiency which have may have an indirect effect upon the creation of waste in the region.</p> <p>The SEA should seek to ensure the most efficient usage of resources, seek to minimise waste production, promoting re-use and recycling and maximising opportunities for energy recovery.</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**

- management, including the not-for-profit sector;
- Ensure that this Strategy offers a clear, transparent and informative approach that is valued by local and regional stakeholders and is supported by local communities;
  - Ensure there is sufficient flexibility in this Strategy to incorporate changes to targets, legislation and improvements to technologies for handling wastes;
  - Reduce environmental effects of waste management through the implementation of Strategic Environmental Assessment, sustainability Appraisal and Appropriate Assessment to ensure the protection and conservation of the environment across land, air and water.

Sub-regional/ Local 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
<b>AONB Management Units (various) AONB Management Plans</b>	
<p>The following AONBs are present in the United Utilities area:</p> <ul style="list-style-type: none"> <li>- Anrnside and Silverdale;</li> <li>- Forest of Bowland;</li> <li>- North Penines;</li> <li>- Solway Coast.</li> </ul> <p>The management plans for AONBs contain actions to ensure the protection and enhancement of the landscape.</p>	<p>WRMP options within AONBs should be consistent with the management plan.</p> <p>The SEA assessment framework should consider the effects of options on landscapes, including designated landscapes.</p>
<b>Environment Agency (2011) North West of England and North Wales Shoreline Management Plan SMP2</b>	
<p>This second generation Shoreline Management Plan is for the shoreline which extends between Great Orme's Head in North Wales and the Scottish Border. It provides a large scale assessment of the risks associated with erosion and flooding at the coast. It also presents policies to help manage these risks to people and the developed, historic and natural environment in a sustainable manner.</p>	<p>WRMP options should take into account the policies and actions of the SMP.</p> <p>Where appropriate, the SEA should consider the cumulative effect of SMP policies and actions and WRMP options.</p>
<b>Environment Agency (various) Catchment Abstraction Management Strategies</b>	
<p>Catchment Abstraction Management Strategies (CAMS) set out how the EA will manage the water resources of a catchment and contribute to implementing the WFD. CAMS within the United Utilities are include:</p> <ul style="list-style-type: none"> <li>- Derwent , West Cumbria and Duddon</li> <li>- Douglas</li> <li>- Eden and Esk</li> <li>- Kent</li> <li>- Leven and Crake</li> <li>- Lower Mersey and Alt</li> <li>- Lune</li> <li>- Mersey and Bollin</li> <li>- Northern Manchester</li> <li>- Ribble (including Crossens Catchment)</li> <li>- Sankey and Glaze</li> <li>- Tame, Goyt and Etherow</li> <li>- Weaver and Dane</li> <li>- Wyre</li> <li>- Dee</li> </ul>	<p>The WRMP should take CAMS into account.</p> <p>The SEA should include a guide question relating to sustainable water use.</p>
<b>Environment Agency (various) Catchment Flood Management Plans</b>	
<p>Catchment Flood Management Plans (CFMPs) give an overview of the flood risk across each river catchment. They recommend ways of managing those risks now and over the next 50-100 years. CFMPs consider all types of inland flooding, from rivers, ground water, surface water and tidal flooding, but not flooding directly from the sea, (coastal flooding), which is covered in Shoreline Management Plans. They also take into account the likely impacts of climate change, the effects of how we use and manage the land, and how areas could be developed to meet our present day needs without compromising the ability of future generations to meet their own needs.</p> <p>Those CFMPs present in the United Utilities area are:</p>	<p>The WRMP should take CFMPs into account.</p> <p>The SEA should include a guide question relating to flood risk.</p>

Sub-regional/ Local Plans and Programmes	
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<ul style="list-style-type: none"> <li>- Derwent;</li> <li>- Eden;</li> <li>- South West Lakes;</li> <li>- Kent and Leven;</li> <li>- Lune;</li> <li>- Wyre;</li> <li>- Ribble;</li> <li>- Alt Crossens</li> <li>- Irwell</li> <li>- Mersey Estuary;</li> <li>- Upper Mersey;</li> <li>- Weaver Goway.</li> </ul>	
<b>Environment Agency (various) River Basin Management Plans</b>	
<p>River Basin Management Plans (RBMPs) set out how the water environment will be managed and provide a framework for more detailed decisions to be made. RBMPs set out a more integrated approach to river basin management based on the following principles:</p> <ul style="list-style-type: none"> <li>- Integrate and streamline plans and processes;</li> <li>- Set out a clear, transparent and accessible process of analysis and decision-making;</li> <li>- Focus at the river basin district level;</li> <li>- Work in partnership with other regulators;</li> <li>- Encourage active involvement of a broad cross-section of stakeholders;</li> <li>- Make use of the alternative objectives to deliver sustainable development;</li> <li>- Use Better Regulation principles and consider the cost-effectiveness of the full range of possible measures;</li> <li>- Seek to be even handed across different sectors of society and sectors of industry;</li> <li>- Seek to be even handed and transparent in the management of uncertainty;</li> <li>- Develop methodologies and refine analyses as more information becomes available.</li> </ul>	<p>The WRMP should reflect the broad objectives of these plans.</p> <p>The SEA objectives should reflect the need to manage water resources on a catchment basis in a sustainable manner.</p>
<b>Environment Agency (various) Salmon Action Plans</b>	
<p>Salmon action plans are based on river catchments to help improve the survival of salmon populations.</p>	<p>The WRMP should consider the effect of options on salmon populations.</p> <p>The SEA assessment framework should include a guide question relating to the effects of options on fish.</p>
<b>Local Biodiversity Action Plans (LBAPs), including Species and Habitats Action Plans (various)</b>	
<p>Each Local Biodiversity Action Plan works on the basis of partnership to identify local priorities and to determine the contribution they can make to the delivery of the national Species and Habitat Action Plan targets. They include targets for increasing and enhancing biodiversity.</p> <p>Species Action Plans set objectives with regard specific species and set out proposed actions and targets along with which agency will be responsible for carrying them out.</p> <p>Habitat Action Plans sets objectives with regard specific UK habitats and sets out proposed actions targets along with which agency will be responsible for carrying them out.</p> <p>Local Biodiversity Actions Plans relevant to the United Utilities area are:</p> <ul style="list-style-type: none"> <li>- Cumbria;</li> <li>- Greater Manchester;</li> <li>- Lancashire ;</li> </ul>	<p>WRMP options should take into account LBAP objectives.</p> <p>The SEA assessment should consider effects of options on biodiversity and outline enhancement and mitigation opportunities where these are identified.</p>

Sub-regional/ Local 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"> <li>- Cheshire;</li> <li>- North Merseyside;</li> <li>- Bolton;</li> <li>- Stockport;</li> <li>- Powys.</li> </ul>	
Local Planning Authority (various) Land Use Plans	
<p>The United Utilities area covers a large number of Local Planning Authorities. These have been identified as:</p> <ul style="list-style-type: none"> <li>- Cheshire East;</li> <li>- Cheshire West and Chester;</li> <li>- Halton Borough Council;</li> <li>- Warrington Borough Council;</li> <li>- Allerdale Borough Council;</li> <li>- Copeland Borough Council;</li> <li>- Barrow In-Furness Borough Council;</li> <li>- Carlisle City Council;</li> <li>- Cumbria County council;</li> <li>- Eden District Council;</li> <li>- South Lakeland District Council;</li> <li>- Bolton Metropolitan Borough Council;</li> <li>- Bury Metropolitan Borough Council;</li> <li>- Manchester City Council;</li> <li>- Oldham Metropolitan Borough Council;</li> <li>- Rochdale Metropolitan Borough Council;</li> <li>- Salford City Council;</li> <li>- Stockport Metropolitan Borough Council;</li> <li>- Tameside Metropolitan Borough Council;</li> <li>- Trafford Metropolitan Borough;</li> <li>- Wigan Metropolitan Borough Council;</li> <li>- Blackburn with Darwen Borough Council;</li> <li>- Blackpool Council;</li> <li>- Burnley Borough Council;</li> <li>- Chorley Borough Council;</li> <li>- Fylde Borough Council;</li> <li>- Hyndburn Borough Council;</li> <li>- Lancashire County Council;</li> <li>- Lancaster City Council;</li> <li>- Pendle Borough Council;</li> <li>- Preston City Council;</li> <li>- Ribble Valley Borough;</li> <li>- Rossendale Borough Council;</li> <li>- South Ribble Borough Council;</li> <li>- West Lancashire Borough Council;</li> <li>- Wyre Borough Council;</li> <li>- Knowsley Metropolitan Borough Council;</li> </ul>	<p>WRMP options should be consistent with the Land Use Plans of those local authorities that will be affected by the option.</p>

<b>Sub-regional/ Local Plans and Programmes</b>	
<b>Purpose of the Document, including Objectives and Targets relevant to the Water Resources Management Plan and SEA</b>	<b>Relationships and Influences on the WRMP and the SEA</b>
<ul style="list-style-type: none"> <li>- Liverpool City Council;</li> <li>- Sefton Council;</li> <li>- St. Helens Metropolitan Borough Council;</li> <li>- Wirral Metropolitan Borough Council;</li> <li>- Lake District National Park Authority</li> <li>- Peak District National Park Authority;</li> <li>- Yorkshire Dales National Park Authority.</li> </ul> <p>Additionally, Local Development Plans prepared by local authorities in Wales may also be relevant to the WRMP and SEA. Those plans of particular relevance include, for example:</p> <ul style="list-style-type: none"> <li>- Wrexham County Borough Council;</li> <li>- Flintshire County Council;</li> <li>- Powys County Council; and</li> <li>- Denbighshire County Council.</li> </ul> <p>The main objectives of the existing and emerging Land Use Plans in these areas are related to the sustainable development of the area.</p>	
<b>Outline Water Cycle Studies (various)</b>	
<p>Water cycle studies identify tensions between growth proposals, particularly housing development, and environmental requirements, and identify potential solutions to addressing them. Outline Water Cycle Studies have been prepared for Mid Mersey (Warrington Borough Council, Halton Borough Council and St. Helens Council), Cheshire West and Chester and Central Lancaster and Blackpool Councils have jointly prepared an Outline Water Cycle Study</p> <p>The strategic objectives for Outline Water Cycle Studies are to:</p> <ul style="list-style-type: none"> <li>- Identify whether environmental resources can cope with further development, with particular reference to Water Framework Directive targets and UKCP09 climate change projections (i.e. can growth be accommodated without breaching water quality and abstraction limits);</li> <li>- Identify if, where, and when development might overload existing infrastructure, and if capacity exists for development without the need for additional infrastructure;</li> <li>- Identify if, where, and when new infrastructure or management interventions are needed to allow development;</li> <li>- Establish effective liaison with adjoining Growth Point areas to enable any potential cumulative impacts on the water environment to be identified;</li> <li>- Identify any potential impacts of development on the specially designated conservation sites and watercourses in the specified areas and other sites or features of significant nature conservation importance resulting from additional abstraction and wastewater discharge;</li> <li>- Contribute to the evidence base for the Local Development Framework Core Strategies, the Infrastructure Plans and the Habitats Regulations Appropriate Assessments for the relevant local authorities.</li> </ul>	<p>The WRMP should take into account any water cycle studies completed for identified growth areas (Mid Mersey, Cheshire West and Chester, Central Lancashire and Blackpool).</p> <p>The SEA assessment framework should include an objective relating to the efficient management of water.</p>
<b>National Park Management Plans (various)</b>	
<p>The following National Parks are present in the United Utilities area:</p> <ul style="list-style-type: none"> <li>- Lake District;</li> <li>- Peak District;</li> <li>- Yorkshire Dales.</li> </ul> <p>The Snowdonia National Park Management Plan may also be relevant.</p> <p>The management plans for National Parks contain actions to ensure the protection and enhancement of the landscape and natural environment of these areas.</p>	<p>WRMP options within the National Parks should be consistent with the respective management plan.</p> <p>The SEA assessment framework should consider the effects of options on landscapes and the natural environment, including designated areas. Proposed extensions to the National Park boundaries should also be recognised where appropriate.</p>





# Appendix C

## Definitions of Significance



# Definitions of Significance

Objective	Key Questions	Effect	Description	Illustrative Guidance
1. To protect and enhance biodiversity, key habitats and species	<p>Will the option avoid damage to the most important sites for nature conservation (e.g. internationally or nationally designated conservation sites such as SACs, SPAs, Ramsar and SSSIs)?</p> <p>Will the option protect and enhance non-designated sites and local biodiversity?</p> <p>Will the option protect and enhance biodiversity, and provide opportunities for new habitat creation or restoration and link existing habitats as part of the development process?</p> <p>Will the option lead to a change in the ecological quality of habitats due to changes in groundwater/river water quality and/or quantity?</p>	++	Significant Positive	The option would result in a major enhancement of the quality of designated habitats due to changes in flow or groundwater levels or water quality. The option would result in a major increase in the population of a priority species.
		+	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 or water quality. The option would result in a minor increase in the population of a priority species.
		0	Neutral	The option would not result in any effects on European, national designated or non designated sites and/or species.
		-	Negative	The option would 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).
		--	Significant Negative	The option would have a 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).
		?	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	<p>Will additional land be required for the development or implementation of the option or will the option require below ground works leading to land sterilisation?</p> <p>Will the option utilise previously developed land?</p> <p>Will the option protect and enhance protected sites designated for their geological interest and wider geodiversity?</p> <p>Will the option minimise the loss of best and most versatile soil?</p> <p>Will the option minimise conflict with existing land use patterns?</p> <p>Will the option minimise land contamination?</p>	++	Significant Positive	No option is expected to have a significant positive effect on achieving this objective.
		+	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.
		0	Neutral	The option has no effect on soils or land use.
		-	Negative	The option is not located on a brownfield site and/or results in a minor loss of best and most versatile soils, or is in conflict with existing land use. The option results in land contamination.
		--	Significant Negative	The option is not located on a brownfield site and/or results in a major loss of best and most versatile soils, or is in conflict with existing land use. The option results in land contamination.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.
3. To protect and enhance the quantity and quality of surface and groundwater resources	<p>Will the option minimise the demand for water resources?</p> <p>Will the option protect and improve surface, groundwater, estuarine and coastal water quality?</p> <p>Will the option result in changes</p>	++	Significant Positive	Option results in addressing failure of WFD Good Ecological Status/Good Ecological Potential.
		+	Positive	The option achieves savings through demand management and does not require abstraction to achieve design capacity.
		0	Neutral	The option would have no discernable effect on river flows or surface/coastal water quality or on groundwater quality or levels. The option will not lead to a change in WFD classification.

Objective	Key Questions	Effect	Description	Illustrative Guidance
4. To reduce the risk of flooding	to river flows? Will the option result in changes to groundwater levels?	-	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.
		--	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 WFW 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.
	Will the option have the potential to cause or exacerbate flooding in the catchment area now or in the future?	++	Significant Positive	No options are expected to have a significant positive effect on achieving this objective.
		+	Positive	The option has the potential to help alleviate flooding in the catchment.
	Will the option have the potential to help alleviate flooding in the catchment area now or in the future?	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 now or in the future?	-	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.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.
	5. To minimise emissions of pollutant gases and particulates and enhance air quality	Will the option adversely affect local air quality as a result of emissions of pollutant gases and particulates?	++	Significant Positive
Will the option exacerbate existing air quality issues (e.g. in Air Quality Management Areas)?		+	Positive	The option will lead to a minor improvement in local air quality from a reduction in concentrations of pollutants identified in the national air quality objectives and/or have a positive effect on local communities and biodiversity due to a reduction in air and odour pollution and particulate deposition.
Will the option maintain or enhance ambient air quality, keeping pollution below Local Air Quality Management thresholds?		0	Neutral	The option will have no discernable effect on air quality.
Will the option reduce the need to travel or encourage sustainable modes of transport?		-	Negative	The option will result in a minor decrease in local air quality and/or have a negative effect on local communities and biodiversity due to an increase in air and odour pollution and particulate deposition.
		--	Significant Negative	The option will cause a significant decrease in local air quality (e.g. leading to an exceedence of Air Quality Objectives for designated pollutants and the designation of a new Air Quality Management Area). The option will have a strong and sustained negative effect on local communities and biodiversity due to significant increase in air and odour pollution and particulate deposition.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.
6. To limit the causes, and potential consequences of climate		Will the option reduce or minimise greenhouse gas emissions?	++	Significant Positive
	Will the option have new	+	Positive	The option will result in a sustained decrease in greenhouse gas emissions (100-999 tonnes CO <sub>2</sub> e/a) and will increase resilience/decrease vulnerability to climate change effects.

Objective	Key Questions	Effect	Description	Illustrative Guidance
change	infrastructure that is energy efficient or make use of renewable energy sources? Will the option contribute positively to adaptation to climate change?	0	Neutral	The option would have no discernable effect on greenhouse gas emissions, nor would the option increase resilience/decrease vulnerability to climate change effects.
		-	Negative	The option will result in a minor or temporary major increase in greenhouse gas emissions (100-999 tonnes CO <sub>2</sub> e) or the option does not increase resilience/decrease vulnerability to climate change effects.
		--	Significant Negative	The option will result in major or long term increases in greenhouse gas emissions (>1000 tonnes CO <sub>2</sub> e) and the option does not increase resilience/decrease vulnerability to climate change effects.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.
		++	Significant Positive	The option leads to a major increase in design capacity (>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.
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 affect opportunities for recreation and physical activity? Will the option maintain surface water and bathing water quality within statutory standards? Will the option adversely affect human health by resulting in increased nuisance and disruption (e.g. as a result of increased noise levels)?	+	Positive	The option leads to a minor increase in design capacity (5-10 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.
		0	Neutral	No option is expected to have a neutral effect on achieving this objective.
		-	Negative	The option results in the deterioration of surface water or bathing water quality and has a temporary effect on human health (e.g. noise).
		--	Significant Negative	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).
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.
8. To maintain and enhance the economic and social well-being of the local community	Will the option ensure sufficient infrastructure is in place for predicted population increases? Will the option ensure sufficient infrastructure is in place to sustain a seasonal influx of tourists? Will the option help to meet the employment needs of local people? Will the option ensure that an affordable supply of water is maintained and vulnerable customers protected? Will the option improve access to local services and facilities (e.g. sport and recreation)? Will the option contribute to sustaining and growing the local and regional economy? Will the option avoid disruption through effects on the transport network?	++	Significant Positive	The option results in a significant increase in construction jobs (capital spend of >£10m). The option creates new, and significantly enhances existing recreational facilities within the operational area. The option provides an additional design capacity of >10 MI/d.
		+	Positive	The option results in an increase in construction jobs (capital spend £5-9.9m). The option enhances existing recreational facilities within the operational area. The option provides an additional design capacity of 1-10 MI/d.
		0	Neutral	The option has no effect on local employment opportunities, the regional or local economy, or on recreational facilities. The option provides an additional design capacity of <1 MI/d.
		-	Negative	The option reduces the availability and quality of existing recreational facilities within the operational area. It is not expected that any options will have a negative effect on employment opportunities, the economy or design capacity.
		--	Significant Negative	The option results in the removal of existing recreational facilities within the operational area. It is not expected that any options will have a negative effect on employment opportunities, the economy or design capacity.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.

Objective	Key Questions	Effect	Description	Illustrative Guidance
9. To ensure the sustainable and efficient use of water resources	Will the option lead to reduced leakage from the supply network?	++	Significant Positive	The option involves reducing leakage from the supply network or is a water efficiency option with a design capacity of >5 MI/d.
	Will the option improve efficiency in water consumption?	+	Positive	The option involves reducing leakage from the supply network or is a water efficiency option with a design capacity of <5 MI/d.
	Will the option seek to minimise the demand for raw materials?	0	Neutral	The option is not a leakage reduction or water efficiency option.
		-	Negative	No options are expected to result in a negative effect on achieving this objective.
		--	Significant Negative	No options are expected to result in a significant negative effect on achieving this objective.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.
10. To promote the efficient use of resources.	Will the option seek to minimise the demand for raw materials?	++	Significant Positive	No options are expected to result in a significant positive effect on achieving this objective.
	Will the option reduce the total amount of waste produced and the proportion of waste sent to landfill?	+	Positive	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.
	Will the option encourage the use of sustainable design and materials?	0	Neutral	The option will largely rely on existing infrastructure and only require small quantities of additional materials to realise design capacity. No additional energy use required.
	Will the option reduce or minimise energy use?	-	Negative	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. The option results in a minor increase in energy consumption.
		--	Significant Negative	The option will require significant new infrastructure that can not be provided through the re-use or recycling of waste materials. There are no opportunities for sustainable design or the use of sustainable materials. The option results in a major increase in energy consumption.
		?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.
11. To protect and enhance cultural and historic assets	Will the option conserve or enhance historic buildings, places, conservation areas and spaces that enhance local distinctiveness, character and the appearance of the public realm?	++	Significant Positive	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: <ul style="list-style-type: none"> <li>• Securing repairs or improvements to heritage assets, especially those identified in the English Heritage Buildings/Monuments at Risk Register;</li> <li>• Improving interpretation and public access to important heritage assets.</li> </ul> There will be no damage to known archaeology or geologically important sites.
	Will the option avoid or minimise damage to archaeologically important sites?	+	Positive	The option will result in enhancements to heritage assets and/or their setting, whether designated or not. There will be no damage to known archaeology or geologically important sites.
	Will the option affect public access to, or enjoyment of, features of cultural heritage?	0	Neutral	The option will have no effect on cultural heritage assets or archaeology.
		-	Negative	The option will result in the loss of significance of undesignated heritage assets and/or their setting, notwithstanding remedial recording of any elements affected. There will be limited damage to known, undesignated archaeology or geologically important sites with a consequent loss of significance only partly mitigated by archaeological investigation.



Objective	Key Questions	Effect	Description	Illustrative Guidance
12. To protect and enhance landscape character	<p>Will the option avoid adverse effects on, and enhance where possible, protected/designated landscapes (including woodlands) such as National Parks or AONBs?</p> <p>Will the option protect and enhance landscape character, townscape and seascape?</p> <p>Will the option affect public access to existing landscape features?</p> <p>Will the option minimise adverse visual impacts?</p>	--	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"> <li>Demolition or further deterioration in the condition of designated heritage assets especially those identified in the English Heritage Buildings/Monuments at Risk Register;</li> <li>Loss of public access to important heritage assets and lack of appropriate interpretation.</li> </ul> <p>There will be major damage to known, designated archaeology or geologically 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.
		++	Significant Positive	The option results in new, above ground infrastructure that significantly enhances the local landscape, townscape or seascape.
		+	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 its setting.
		-	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 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 D

## Feasible Options Assessment Matrices



# Feasible Options Assessment Matrices

Appendix D presents the findings of the assessment of the feasible options for the West Cumbria WRZ. The types of feasible options considered in the assessment can be broadly categorised as follows:

- supply side measures (e.g. increasing capacity at an existing groundwater source);
- demand management (e.g. water metering or household visits to install water efficiency measures); and
- leakage reduction and network metering measures (e.g. repairing pipes).

A list of the feasible options assessed under each option type is provided below:

Ref	Option	Design Capacity (M/d)
<b>Supply Side Options</b>		
WC01	Thirlmere Transfer into West Cumbria	80
WC02	River Derwent Abstraction	4
WC04	Wastwater (negotiate part abstraction licence)	10
WC05	Development of New Boreholes in West Cumbria Aquifer	6
WC05a	Development of New Boreholes in West Cumbria Aquifer	10
WC06	Roughton Gill Mine Adit (Option 1)	1.4
WC06	Roughton Gill Mine Adit (Option 2)	1.4
WC07	Kirklington Borehole Development	5
WC09	Development of Boreholes in North Cumbria Aquifer	4.5
WC10	Desalination, Workington	20
WC14d	Kielder Water Transfer to West Cumbria (Cumwhinton Treated)	80
WC19	Crummock Automated Compensation Control	2.7
WC23a	Supply of Final Effluent to Non-household Customers	0.5
WC23b	Supply of Final Effluent to Non-household Customers	1
WC23c	Supply of Final Effluent to Non-household Customers	2
WC72	Raw Water Losses	0.08
<b>Demand Management Options</b>		
WC WE01	Domestic Rainwater Harvesting	0.01
WC WE02	Domestic Partnership Retrofit Install	0.026
WC WE03	Domestic Visit and Fix	0.026
WC WE04	Combi Boiler Saving Device - installation through Housing Associations	0.039
WC WE05	Combi Boiler Saving Device - installation by United Utilities	0.049
WC WE06	Retrofit Dual Flush Toilets	0.004
WC WE07	Leaky Loos	0.036
WC WE08	Subsidised Water Efficiency Products Sold via Website - vouchers	0.001
WC WE09	Showerhead Giveaways	0.214

Ref	Option	Design Capacity (MI/d)
WC WE10	Tourist Sites - promotion and retrofit	0.049
WC WE11	Waterless Car Washing Giveaways	0.026
WC WE12	Free Water Butt Distribution	0.001
WC WE13	Free Showerhead Distribution	0.007
WC WE14	Subsidised Water Efficiency Products sold via Website - shower heads	0.007
WC WE15	Enhanced Water Savers Pack Distribution	0.058
WC Met-001	Metering on Customer Contact	0.026
WC Met-002a	Enhanced Promotion 5 Year	0.38
WC Met-002b	Enhanced Promotion 10 Yea	0.14
WC Met-003	Enhanced Home Water Efficiency Visits	0.08
WC Met-004	Blanket Promotion	0.32
WC Met-005	Metering on Change of Occupier	0.75
<b>Leakage and Network Metering Options</b>		
WC-LEA01	Leakage Detection Stage 1	1.70
WC-LEA02	Leakage Detection Stage 2	2.70 (incl WC-LEA01)
WC-LEA03	Infrastructure Replacement Stage 1	0.11
WC-LEA04	Pressure Management Stage 1	0.44
WC-LEA05	Increased Verification of Existing Meters	0.06
WC-LEA06	Increased Number of Continuously Logged Meters	0.01
WC-LEA08	Widspread Metering Using AMR	0.94
WC-LEA09	Splitting DMAs	0.02
WC-LEA10	Splitting Large Upstream Tiles	0.13
WC-LEA11	Establishing Water Balance Areas	0.00

The following matrices present the findings of the assessment.

## Supply Side Options Assessment Matrices

The following supply side options have been assessed as part of the SEA of the dWRMP:

Ref	Option	Design Capacity (MI/d)
WC01	Thirlmere Transfer into West Cumbria	80
WC02	River Derwent Abstraction	4
WC04	Wastwater (negotiate part abstraction licence)	10
WC05	Development of New Boreholes in West Cumbria Aquifer	6
WC05a	Development of New Boreholes in West Cumbria Aquifer	10
WC06	Roughton Gill Mine Adit (Option 1)	1.4
WC06	Roughton Gill Mine Adit (Option 2)	1.4
WC07	Kirklington Borehole Development	5
WC09	Development of Boreholes in North Cumbria Aquifer	4.5
WC10	Desalination, Workington	20
WC14d	Kielder Water Transfer to West Cumbria (Cumwhinton Treated)	80
WC19	Crummock Automated Compensation Control	2.7
WC23a	Supply of Final Effluent to Non-household Customers	0.5
WC23b	Supply of Final Effluent to Non-household Customers	1
WC23c	Supply of Final Effluent to Non-household Customers	2
WC72	Raw Water Losses	0.08



												Commentary
<p><b>WC01</b>  <b>Thirlmere</b>  <b>Transfer</b>  <b>into West</b>  <b>Cumbria</b>    <b>(Design</b>  <b>Capacity</b>  <b>80 MI/d)</b></p>	-	-	0	-	-	--	-	+++/-	0	--	-	<p>This option would involve increasing current abstraction from Thirlmere reservoir by enhancing infrastructure capacity. The option would require a new treatment works and pumping station near Bridge End at the outlet of Thirlmere reservoir. Treated water would be pumped to a new service reservoir (SR) at Castle Rigg, from which the water would flow by gravity down a large diameter trunk main (LDTM) terminating at Stainburn SR. There would be three main take-offs from this LDTM to supply the Corn How, Ennerdale and Quarry Hill areas. The Ennerdale and Corn How connections would not require any additional pumping to deliver treated water to the existing Cornhow SR (which would be upgraded) and a proposed new replacement SR at Ennerdale. However, additional pumping would be required to transfer flows from Corn How to Buttermere SR. The Quarry Hill take-off would require booster pumping to deliver water to Bothel Moor SR. The total length of additional new pipeline required under this option would be approximately 100km. This option would also involve the abandonment of three existing WTWs in West Cumbria namely, Quarry Hill, Ennerdale, and Corn How. Several of the proposed development sites are adjacent, or in close proximity, to designated conservation sites. These include: Bridge End (adjacent to River Derwent and Bassenthwaite Lake SAC and River Derwent and Tributaries SSSI and in close proximity to Thirlmere Woods SSSI/Ancient Woodland); Ennerdale (adjacent to River Ehen SAC/SSSI to the east and in close proximity to Lake District High Fells SAC, Pillar and Ennerdale Fells SSSI and Ennerdale SSSI); Cornhow (adjacent to River Derwent and Tributaries SSSI and River Derwent and Bassenthwaite Lake SAC); and Buttermere (adjacent to Lake District High Fells SAC and Buttermere Fells SSSI). Pipeline sections would cross / run adjacent to the River Eden SAC whilst other pipeline sections would be in close proximity to other SACs (for example: the River Derwent and Bassenthwaite Lake SAC, Lake District High Fells SAC, Clints Quarry SAC, North Pennine Dales Meadows SAC). The HRA identifies that significant construction effects on the River Derwent and Bassenthwaite Lake SAC are possible due to the proximity of the works to this site whilst effects on the River Ehen are uncertain. In consequence, the option has been assessed as having a significant negative effect on biodiversity. However, the HRA states that it is likely that these effects could be managed/avoided with scheme specific mitigation. In this respect, should this option be taken forward to the preferred options stage, impacts on those features of designated sites that may be significantly affected will be considered in more detail and mitigation measures identified. Further, scheme level investigations and appropriate assessment would also be undertaken at the project stage should the option form part of the final Water Resources Management Plan. This option would involve upgrading/replacing facilities at a number of existing sites including, for example, the upgrade of Castle Rigg and Ennerdale SRs. However, a number of scheme components would also be located on greenfield land, most significantly the new WTW and pumping station near Bridge End and SR at Bothel Moor. The option has therefore been assessed as having a minor negative effect on soils/land use. It is not expected that construction of this option 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). Works at both Bridge End and Ennerdale may be affected by flooding (dependent on timing) being located within Flood Zones 2/3 whilst the pipeline would also be routed across Flood Zones 2/3. The option would require 4,500 HGV movements over a 2.25 year construction and decommissioning period which, together with emissions to air from plant, may have a minor negative effect on local air quality. The option would generate 53,692 tonnes CO<sub>2</sub>e which has been assessed as having a significant negative effect on Objective 6 (and Objective 10). Construction activity may have an adverse effect on health as a result of air quality/noise impacts, particularly larger scale works in close proximity to residential receptors (e.g. new SRs at Castle Rigg at Bothel Moor). The proposed pipeline would also pass through/be adjacent to a number of settlements including Cockermouth and Keswick and associated works may therefore affect receptors along this route. Works may affect recreational users, particularly in respect of those sites located within the Lake District National Park. Notwithstanding the above, works would be temporary and associated effects are expected to be felt in the short term only (i.e. over the 2.25 year construction period). Further, it is likely that impacts would be managed/mitigated where possible using good practice. Overall, the option has therefore been assessed as having a minor negative effect on health. The option would require a high capital investment which is likely to generate a number of jobs, supply chain benefits and increased spend in the local economy by contractors and construction workers. However, pipeline works of the proposed scale (exceeding 100 km in length) and duration (2.25 years) could result in significant disruption to roads in the area (the roads under which new pipes would be installed or existing pipes upgraded include approximately 61 km of A-road, 19 km of B-road, 19 km of C-road and 3 km of unclassified road), although the magnitude of effects in this regard are likely to be lessened by the adoption of mitigation measures at the project level. On balance, the option has been assessed as having a mixed significant positive and minor negative effect on Objective 8. The option would not have any effects on water efficiency. The option would require significant volumes of resources, increase energy demand and generate waste which has been assessed as having a significant negative effect on Objective 10. Development at several sites has the potential to affect the settings of listed buildings. The development sites include Bothel Moor where works associated with the construction of a new SR may affect the settings of listed buildings in Topenhow (and in particular Croft House Grade II Listed Building to the north). Pipeline works may also affect the settings of listed buildings and scheduled monuments along the proposed route (e.g. Castle How Hillfort and assets at Papcastle) and could disturb unknown archaeological assets (although this is currently uncertain). However, any impacts would be temporary and it is assumed that mitigation would be adopted where possible to avoid significant adverse effects (e.g. routing to avoided direct impacts on assets). In consequence, the option has been assessed as having a minor negative effect on Objective 11. The majority of development sites (with the exception of Bothel Moor and Quarry Hill) are located within the Lake District National Park and in consequence there is potential for significant landscape impacts. However, a number of new assets would be located within/adjacent to existing sites which, alongside the implementation of appropriate mitigation such as screening, is likely to reduce the magnitude of landscape impacts. Approximately 50% of the pipeline length would lie within the Lake District National Park and therefore there is potential for substantial landscape effects associated with pipeline works. However, the majority of the route would follow existing linear features (roads) and adverse effects would be over a short timescale with planting and re-seeding likely to return land to a pre-development state within a year (depending on the season in which works are undertaken). Development may also affect the visual amenity of residential receptors in close proximity to the development sites (and in particular receptors to the north of Castle Rigg and Bothel Moor) and along the pipeline route as well as recreational users. Overall, the option has been assessed as having a significant negative effect on landscape.</p>

Operation	++	0	++	-	0	--	++	++	0	-	0	-	Commentary
1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits													
2. To ensure the appropriate and efficient use of land and protect soil quality													
3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies													
4. To reduce the risk of flooding													
5. To minimise emissions of pollutant gases and particulates and enhance air quality													
6. To limit the causes and potential consequences of climate change													
7. To ensure the protection and enhancement of human health													
8. To maintain and enhance the economic and social well-being of the local community													
9. To ensure the sustainable and efficient use of water resources													
10. To promote the efficient use of resources													
11. To protect and enhance cultural and historic assets													
12. To protect and enhance landscape character													
	<p>The scheme is designed to relieve pressure on the River Ehen SAC and therefore adverse operational effects on this site would not be expected. It is assumed that compensation releases to the River Derwent would be maintained and the findings of the HRA indicate that there may be some positive benefits for the lower reaches of the Derwent (and the River Derwent and Tributaries SSSI and River Derwent and Bassenthwaite Lake SAC ) as the scheme would involve the abandonment of WTWs downstream (and a reduction in associated abstractions). Overall, the option has been assessed as having a significant positive effect on biodiversity. No ongoing impact on land use/soils is expected (initial loss of land during construction has been discounted). As noted above, the option would not affect compensation releases whilst the abandonment of the three WTWs would reduce abstraction from sources identified for amendment as part of the Review of Consents programme. On balance the option has therefore been assessed as having a significant positive effect on Objective 3. The option is not expected to cause or exacerbate flooding in the area although some components of the scheme may be at risk of flooding (Bridge End WTW and Ennerdale SR would be within Flood Zones 2/3). No operational effects on air quality are anticipated. Net operational energy usage would be 367 KWh/MI and the option would generate 8,001 tonnes CO<sub>2</sub>e/a which has been assessed as having a significant negative effect on Objectives 6 and 10. As the mean operating level of the reservoir would be similar to current operation, effects on informal recreation are expected to be negligible. Impacts on higher flows in St Johns Beck may affect angling and in-stream recreation such as canoeing. However, given that the option is only likely to affect higher flows, effects are not expected to be significant. Further, reductions in abstraction associated with the closure of the three WTWs may generate potential benefits to river users such as canoeists and also anglers. The option would deliver a large increase capacity of 80 MI/d, serving to address deficit within the West Cumbrian WRZ. On balance, the option has been assessed as having a significant positive effect on health. The increased capacity may also support economic and population growth in the West Cumbria area, generating a significant positive effect on Objective 8. No impact on leakage / water efficiency is expected. As noted above, new development may affect the settings of listed buildings in close proximity to Bothel Moor although no discernible effect on the setting of this asset is anticipated once works are complete given the nature of the development at this site (i.e. a buried service reservoir). The new service reservoirs would be buried and it is expected that planting and re-seeding would minimise any landscape effects associated with these assets in the longer term (i.e. within a year, depending on the season in which works are undertaken). New above ground infrastructure would (with the exception of Bothel Moor and Quarry Hill) be located within the Lake District National Park and in consequence there is potential for significant landscape impacts. New assets may also affect the visual amenity of residential receptors in close proximity to the development sites (and in particular receptors to the north of Castle Rigg and Bothel Moor) as well as recreational users. However, a number of new assets would be located within/adjacent to existing sites which, alongside the implementation of appropriate mitigation such as sympathetic design and use of local materials, is likely to reduce the magnitude of landscape impacts. Further, appropriate screening and landscaping would be likely to lessen the immediate landscape/visual impact over time (as vegetation matures). Overall, the option has therefore been assessed as having a minor negative effect on Objective 12.</p>												

	1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	2. To ensure the appropriate and efficient use of land and protect soil quality	3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies	4. To reduce the risk of flooding	5. To minimise emissions of pollutant gases and particulates and enhance air quality	6. To limit the causes and potential consequences of climate change	7. To ensure the protection and enhancement of human health	8. To maintain and enhance the economic and social well-being of the local community	9. To ensure the sustainable and efficient use of water resources	10. To promote the efficient use of resources	11. To protect and enhance cultural and historic assets	12. To protect and enhance landscape character	Commentary
<b>WC02</b> <b>River Derwent Abstraction (Design Capacity 4 MI/d)</b> <b>Construction / Implementation</b>	--	+	0	-	-	--	-	++	0	--	-	-	<p>This option would involve the construction of a new three stage water treatment works on the existing Barepot site and a 4 MI/d capacity pumping station. A new treated water pumping main (1.5 km in length) would also be required in addition to a further 16km of new pipeline from Stainburn to Summergrove service reservoirs. The Barepot site is not within any designated nature conservation areas although the River Derwent and Bassenthwaite Lake SAC (and River Derwent SSSI) is situated immediately to the south. The pipeline would also cross this water course. The HRA identifies that there is a risk of effects on the SAC and in consequence the option has been assessed as having a significant negative effect on biodiversity. However, the HRA states that it is likely that the works could be suitably managed to avoid significant or adverse effects (e.g. timing of works to avoid migration periods; routing pipeline to make use of existing road crossings). In this respect, should this option be taken forward to the preferred options stage, impacts on those features of the SAC that maybe significantly affected will be considered in more detail and mitigation measures identified. Further, scheme level investigations and appropriate assessment would also be undertaken at the project stage should the option form part of the final Water Resources Management Plan. It has been assumed that this option would utilise the existing Barepot site which is considered to have a minor positive effect on soils/land use (it is also assumed that any soil displaced during pipeline works would be returned following completion of construction). It is not expected that construction of this option 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). The Barepot site is located within Flood Zone 2 and therefore works may be liable to flooding (depending on the timing of installation). However, the option would be unlikely to increase flood risk elsewhere. Construction is expected to generate 2,650 HGV movements, the emissions from which, in conjunction with emissions to air from plant, may have a negative effect on local air quality. The option would generate 7,632 tonnes CO<sub>2</sub>e, which has been assessed as having a significant negative effect on Objective 6 (and Objective 10). There is potential for short term and temporary adverse effects on health through noise disturbance and air quality impacts, in particular on residential properties in the immediate vicinity of the Barepot site. Pipeline works between Stainburn and Summergrove may also generate noise/air quality impacts on receptors along the proposed route, particularly as this would be within/adjacent to the larger settlements of Workington and Whitehaven. The option would involve a large capital expenditure over 1.2 years which is likely to generate employment opportunities and supply chain benefits together with spend by construction workers in the local economy. Whilst there may be some congestion/traffic disruption during the works, on balance the option has been assessed as having a significant positive effect on Objective 8. The option would have no effect on water efficiency. The option would require additional resources, increase energy demand and generate waste which has been assessed as having a significant negative effect on Objective 10. The Barepot site does not contain any designated heritage assets. A Roman fort (Scheduled Monument) is some 1.5km from the site although its setting is not expected to be impacted by construction activities. Pipeline works between Stainburn and Summergrove may affect the settings of listed buildings along the proposed route as well as a number of Scheduled Monuments including, for example, Parton Roman Fort. At Stainburn, works would also be within close proximity of Workington Hall Registered Park and Garden. Overall, the option has been assessed as having a minor negative effect on Objective 11. Development of the WTW and pumping station would be within an existing site however, there is potential for short term adverse impacts on the visual amenity of residential receptors in the immediate vicinity of the site whilst works associated with the installation of the pipeline may have temporary landscape and visual impacts. Overall, the option has been assessed as having a minor negative effect on landscape.</p>
<b>Operation</b>	--	0	-	-	0	-	0	+	0	-	0	-	<p>The HRA identifies that the operation of this option is has the potential to significantly affect River Derwent and Bassenthwaite Lake SAC (although the increase in abstraction is relatively modest). The current Q75 and Q98 flows of the River Derwent at the gauging station at Camerton (around 2 km upstream of the abstraction point at Barepot) are approximately 8 and 3 m<sup>3</sup>s<sup>-1</sup>. This equates to flows of around 691 MI/d and 259 MI/d respectively. An increase in abstraction of 4 MI/d would represent around 1.2% of Q98 flows and 0.4% of Q75 flows which the HRA concludes is considered a significant effect. Should this option be taken forward to the preferred options stage, impacts on those features of the SAC that maybe significantly affected would therefore need to be considered in more detail and mitigation measures identified, if possible. Further, scheme level investigations and appropriate assessment would also be required at the project stage should the option form part of the final Water Resources Management Plan. At this stage, however, the option has been assessed as having a significant negative effect on biodiversity. Once operational, no further impacts on land use/soils are expected. Decreases in river flow may impact on water quality which has been assessed as having a minor negative effect on Objective 3. The option is not expected to cause or exacerbate flooding although new infrastructure may be at risk of flooding being located in Flood Zone 2. No operational effects on air quality are anticipated. This option would have an operational energy requirement of 975 kWh/MI and would generate 714 tonnes of CO<sub>2</sub>e/a which has been assessed as having a minor negative effect on Objectives 6 and 10. The option may affect recreational activities such as angling due to changes in river flow and in this respect the River Derwent is an important salmonid fishery. However, the option would help secure drinking water supply. On balance, the option has been assessed as having a neutral effect on Objective 7. The additional capacity (4MI/d) may also support economic/population growth, generating a minor positive effect on Objective 8. The option would not affect water efficiency. The operation of this option is not expected have any adverse effect on cultural heritage assets including the Roman fort (1.5km from the Barepot site). New above ground infrastructure would be within an existing site although there is potential for the development to affect the amenity of a small number of residential receptors to the south/east. Further, reduced flows in the River Derwent may have a visual impact on recreational users. Overall, the option has been assessed as having a minor negative effect on landscape.</p>

	1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	2. To ensure the appropriate and efficient use of land and protect soil quality	3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies	4. To reduce the risk of flooding	5. To minimise emissions of pollutant gases and particulates and enhance air quality	6. To limit the causes and potential consequences of climate change	7. To ensure the protection and enhancement of human health	8. To maintain and enhance the economic and social well-being of the local community	9. To ensure the sustainable and efficient use of water resources	10. To promote the efficient use of resources	11. To protect and enhance cultural and historic assets	12. To protect and enhance landscape character	Commentary
<b>WC 04 Wastwater (negotiate part abstraction licence (Design Capacity 10 MI/d))</b> <b>Construction / Implementation</b>	--	+	0	-	-	--	0	++	0	-	0	-	<p>This option involves an agreement with third party licence holders for water transfer from Brow Top Service Reservoir to Ennerdale WTW. It would require the construction of a new 10MI/d pumping station at Brow Top, 13.5km pipeline and a new mixing tank at Ennerdale. The development sites are not affected by any biodiversity designations and it is assumed that new (above ground) infrastructure would be located at existing sites. A number of SSSI are located in the area. Pillar and Ennerdale Fells SSSI is located 2 km east of the suggested pipeline route on the southern bank of Ennerdale Water. Haile Great Wood SSSI is at 1.5km to the east of the pipeline route. Florence Mine SSSI is located underground near the town of Egremont at a distance of 4 km. As these SSSI are located away from the road which the route of the pipeline follows, they are unlikely to be affected by the pipeline works. The HRA identifies that construction of the scheme could potentially affect the River Ehen SAC as it is likely that this would be crossed by the transfer pipeline. In consequence, the option has been assessed as having a significant negative effect on biodiversity. However, the HRA states that potential effects on the SAC could be avoided / mitigated by using existing road crossings and by (for example) appropriate timing of works / mitigation. In this respect, should this option be taken forward to the preferred options stage, impacts on those features of the SAC that may be significantly affected will be considered in more detail and mitigation measures identified. Further, scheme level investigations and appropriate assessment would also be undertaken at the project stage should the option form part of the final Water Resources Management Plan. The new pumping station and mixing tank would be located on existing sites which has been assessed as having a minor positive effect on soils/land use. It is not expected that construction of this option would have effects on water quality or water resources, provided good practices are adhered to and mitigation implemented (such as dust suppression, soil containment and emergency response procedures). Pipeline works would cross Flood Zones 2/3 toward Ennerdale and the new mixing tank at Ennerdale would be within Flood Zone 2. As a result, construction activity may be affected by flooding (subject to timing). The option would require 1,400 HGV vehicle movements over the 1.8 year construction period which, together with emissions to air from plant, may have a minor negative effect on local air quality. The option would generate 2,626 tonnes CO<sub>2</sub>e, which has been assessed as having a significant negative effect on Objective 6 (and Objective 10). No effects on health are expected during construction given the remoteness of the development sites. The pipeline that would be required would cross a number of public footpaths, however any impact is likely to be of short duration at any one location and suitable diversions are assumed to be put in place. The option would involve a large capital expenditure which is likely to generate some local employment opportunities and supply chain benefits together with spend by contractors and construction workers in the local economy. Whilst there may be some minor congestion/traffic disruption along C roads that comprise the pipeline route during the works, on balance the option has been assessed as having a significant positive effect on Objective 8. The option is not expected to affect water efficiency. The option would require new materials and energy consumption, and generate waste. There are earthworks and buried remains of prehistoric stone hut circle settlements (Tongue How and Town Bank Scheduled Monuments) and prehistoric cairn cemeteries (Monks Graves and Stockdale Moor Scheduled Monuments) located east of the suggested pipeline route. The remains of Egremont Castle are located 4 km west of the pipeline route in Egremont. As these scheduled monuments are all located away from the affected roads and the Ennerdale site, no impacts are expected on them and therefore the option has been assessed as having a neutral effect on Objective 10. Development of the new pumping station and mixing tank would be within existing sites and whilst Ennerdale WTW is within the Lake District National Park, the scale of works at this site would be small. The pipeline route coincides with the boundary of the Lake District National Park for most of its course and runs inside the National Park for its northern section to Ennerdale WTW. Therefore there is potential for substantial landscape effects associated with pipeline works. However, the majority of the route would follow existing linear features (roads) and adverse effects would be over a short timescale with planting and re-seeding likely to return land to a pre-development state within a year (depending on the season in which works are undertaken). Overall, whilst landscape effects associated with construction activity would be temporary, the location of works within the Lake District National Park has been assessed as having a minor negative effect on landscape.</p>
<b>Operation</b>	?	0	-	-	0	0	+	+	0	0	0	0	<p>Once operational, water would be taken from Wastwater, which is designated as a SSSI and SAC and is located within the Lake District National Park. A 3km stretch of the River Irt downstream of Wastwater has the potential for reduced flows. Further, whilst the option would be under an existing license, additional abstraction would result in reservoir levels being lower than the current average which may impact on Wastwater SAC/SSSI, although this is currently uncertain. No impact on soils or land use is expected during operation of the option. The reduced flows in the River Irt have been assessed as having a minor negative effect on Objective 3. The option is not expected to cause or exacerbate flooding although new infrastructure (mixing tank) may be at risk of flooding. Ongoing operational energy requirements (39 kWh/MI) would generate 87 tonnes CO<sub>2</sub>e/a which has been assessed as having a neutral effect on Objectives 6 and 10. The option would secure 10MI/d of safe water supply although there is potential for adverse effects on health associated with impacts on informal recreation and angling due to reduced river flows. As this is only expected to be noticeable at times of low flow (i.e. drought years, which occur approximately 1 in 20 years), on balance the option has been assessed as having a minor positive effect on health. The additional capacity may also support economic/population growth in the West Cumbria area which has been assessed as having a minor positive effect on Objective 8. The option would not affect water efficiency. No impacts are expected on the nearby Scheduled Monuments during operation as they are located away from the affected water bodies. The new pumping station is outside the Lake District National Park, and is located on an existing site. The new mixing tank would be small additional infrastructure on an existing site and would benefit from existing screening. Overall, the option has been assessed as having a neutral effect on Objective 12.</p>



		1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	2. To ensure the appropriate and efficient use of land and protect soil quality	3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies	4. To reduce the risk of flooding	5. To minimise emissions of pollutant gases and particulates and enhance air quality	6. To limit the causes and potential consequences of climate change	7. To ensure the protection and enhancement of human health	8. To maintain and enhance the economic and social well-being of the local community	9. To ensure the sustainable and efficient use of water resources	10. To promote the efficient use of resources	11. To protect and enhance cultural and historic assets	12. To protect and enhance landscape character	Commentary
WC05 Development of New Boreholes in West Cumbria Aquifer (Design Capacity 6 MI/d)	Construction / Implementation	--	-	0	-	-	--	-	++	0	--	-	-	<p>This option would involve the construction of three new boreholes at Sandwith, Rottington and Moor Platts in addition to utilising an existing borehole at Catgill. The option would require drilling of a borehole at each site, a new fixed speed borehole pump and a new headworks GRP kiosk. The Catgill site would also require a new break tank, aeration tower and RWPS. A total of 1.5km of pipeline would be required from Sandwith to Rottington, 4km from Rottington to Moor Platts and 2.5km from Moor Platts to Catgill. Finally, a 13km pipeline would transfer all raw water to Ennerdale WTW. A new 1km washout main would also be needed at Catgill to the nearest Egremont sewer. The borehole sites are not affected by any biodiversity designations but development would occur on greenfield land and in consequence, there may be disturbance/habitat loss associated with, for example, the drilling of boreholes and other construction activity. The HRA identifies that the construction of the scheme could potentially affect the River Ehen SAC as it is likely that this would be crossed by the transfer pipeline. In consequence, the option has been assessed as having a significant negative effect on biodiversity. However, the HRA states that potential effects on the SAC could be avoided / mitigated by using existing road crossings and by (for example) appropriate timing of works / mitigation. In this respect, should this option be taken forward to the preferred options stage, impacts on those features of the SAC that may be significantly affected will be considered in more detail and mitigation measures identified. Further, scheme level investigations and appropriate assessment would also be undertaken at the project stage should the option form part of the final Water Resources Management Plan. As development would be undertaken on greenfield land to accommodate the new boreholes and associated infrastructure, the option has been assessed as having a minor negative effect on soils/land use. Additionally, temporary loss of land would occur during the pipeline works, although it is assumed that any soil displaced during excavations would be returned following completion of construction. It is not expected that construction of this option 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). Sections of the proposed pipelines cross Flood Zones 2 and 3 and therefore construction activity may be at risk of flooding (subject to timing). The option would require approximately 1,250 HGV movements during the 2 year construction period which, together with emissions to air from plant, may have a minor negative effect on local air quality. The option would generate 3,459 tonnes of CO<sub>2</sub>e which has been assessed as having a significant negative effect on Objective 6 (and Objective 10). Construction could affect human health through noise disturbance and air quality impacts, particularly as the pipeline would be routed through Egremont as well as other settlements such as St Bees. Further, there may be temporary impacts during construction to the public footpath next to the Sandwith site, however, these are considered to be short in duration and suitable diversions could be put in place. Overall, the option has been assessed as having a minor negative effect on health. The option would involve a large capital expenditure which may provide additional local jobs, generate supply chain benefits and boost spending in the local economy (by construction workers). However, local congestion may occur during construction works along roads. On balance, the option has been assessed as having a significant positive effect on Objective 8. The option would not affect water efficiency. The option would require additional resources, increase energy demand and generate waste which has been assessed as having a significant negative effect on Objective 10. The borehole sites do not contain, and are not within close proximity to, any designated cultural heritage assets with the exception of Moor Platts which would be adjacent to a Grade II Listed Building (Moorleys Farmhouse), the setting of which may be affected by construction activity. The pipeline is expected to pass through Egremont, close to the Scheduled Monument Egremont Castle although works are unlikely to affect its setting. There are also a number of listed buildings along the route of the proposed pipelines, the settings of which may be temporarily affected by the works. Overall, the option has been assessed as having a minor negative effect on Objective 11. The borehole sites are in a rural setting and with the exception of the Catgill, would be located on greenfield land such that construction activity may have adverse landscape/visual impacts. The option also requires 21km of new transfer piping to be laid which would cross the Lake District National Park for approximately 6km. In consequence, there is potential for substantial landscape effects associated with pipeline works. However, the majority of the route (including the 6km pipeline across the Lake District National Park) would follow existing linear features (roads) and adverse effects would be over a short timescale with planting and re-seeding likely to return land to a pre-development state within a year (depending on the season in which works are undertaken). Overall, whilst landscape effects associated with construction activity would be temporary, the location of pipeline works within the Lake District National Park has been assessed as having a minor negative effect on landscape.</p> <p>Whilst the new boreholes are outside the surface water catchment of the River Ehen and therefore any localised drawdown would not affect tributaries of the river, it is possible that abstraction under this option may affect groundwater supplies to the Ehen. The HRA states that it is not clear what contribution to flow these are likely to make and that any effects are likely to be felt outside of the SAC, but the option may affect mobile species (Atlantic salmon) migrating through the lower reaches. Overall, the option has been assessed as having an uncertain effect on biodiversity at this stage and should this option be taken forward, further investigation in respect of potential effects on the River Ehen SAC is likely to be required. During operation, no effects on land use or soils are expected (discounting the loss of land during construction). This option would result in increased abstraction of groundwater (which may result in reductions in river flows, although this is currently uncertain). The option has therefore been assessed as having a minor negative effect on Objective 3. The option is not expected to cause or exacerbate flooding. No effects on air quality are anticipated. The ongoing energy requirement would be 2,401 kWh/MI and the option would generate 3,106 tonnes of CO<sub>2</sub>e/a. This has been assessed as having a significant negative effect on Objectives 6 and 10. The option would result in an increased supply of safe, secure drinking water of 6MI/d which would benefit human health and support economic/population growth in West Cumbria (the reduction in river flows is not expected to be perceptible to recreational users or anglers). Overall, the option has been assessed as having a minor positive effect on Objectives 7 and 8. The option would have no impact on water efficiency. As noted above, the Moor Platts site is adjacent to a Grade II Listed Building (Moorleys Farmhouse), the setting of which may be affected by new above ground infrastructure (although any adverse effects could be mitigated by adequate screening). The borehole sites are in a rural setting and with the exception of Catgill would be located on greenfield land. In consequence, there is potential for minor landscape and visual impacts from new above ground infrastructure.</p>
	Operation	?	0	-	0	0	--	+	+	0	--	-	-	

	1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	2. To ensure the appropriate and efficient use of land and protect soil quality	3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies	4. To reduce the risk of flooding	5. To minimise emissions of pollutant gases and particulates and enhance air quality	6. To limit the causes and potential consequences of climate change	7. To ensure the protection and enhancement of human health	8. To maintain and enhance the economic and social well-being of the local community	9. To ensure the sustainable and efficient use of water resources	10. To promote the efficient use of resources	11. To protect and enhance cultural and historic assets	12. To protect and enhance landscape character	Commentary
<b>WC05a</b> <b>Develop</b> <b>ment of</b> <b>New</b> <b>Borehol</b> <b>es in</b> <b>West</b> <b>Cumbri</b> <b>a</b> <b>Aquifer</b> <b>(Design</b> <b>Capacit</b> <b>y 10</b> <b>MI/d)</b>  <b>Construction / Implementation</b>	--	-	0	-	-	--	-	++	0	--	-	-	<p>This option would involve the construction of seven new boreholes at Sandwith, Rottington and Moor Platts in addition to utilising an existing borehole at Catgill (eight boreholes in total). The option would require drilling of a borehole at each site, a new fixed speed borehole pump and a new headworks GRP kiosk. The Catgill site would also require a new break tank, aeration tower and RWPS. A total of 1.5km of pipeline would be required from Sandwith to Rottington, 4km from Rottington to Moor Platts and 2.5km from Moor Platts to Catgill. Finally, a 13km pipeline would transfer all raw water to Ennerdale WTW. A new 1km washout main would also be needed at Catgill to the nearest Egremont sewer. The borehole sites are not affected by any biodiversity designations but development would occur on greenfield land and in consequence, there may be disturbance/habitat loss associated with, for example, the drilling of boreholes and other construction activity. The HRA identifies that the construction of the scheme could potentially affect the River Ehen SAC as it is likely that this would be crossed by the transfer pipeline. In consequence, the option has been assessed as having a significant negative effect on biodiversity. However, the HRA states that potential effects on the SAC could be avoided / mitigated by using existing road crossings and by (for example) appropriate timing of works / mitigation. In this respect, should this option be taken forward to the preferred options stage, impacts on those features of the SAC that may be significantly affected will be considered in more detail and mitigation measures identified. Further, scheme level investigations and appropriate assessment would also be undertaken at the project stage should the option form part of the final Water Resources Management Plan. As development would be undertaken on greenfield land to accommodate the new boreholes and associated infrastructure, the option has been assessed as having a minor negative effect on soils/land use. Additionally, temporary loss of land would occur during the pipeline works, although it is assumed that any soil displaced during excavations would be returned following completion of construction. It is not expected that construction of this option 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). Sections of the proposed pipelines cross Flood Zones 2 and 3 and therefore construction activity may be at risk of flooding (subject to timing). The option would require approximately 1,250 HGV movements during the 1.5 year construction period which, together with emissions to air from plant, may have a minor negative effect on local air quality. The option would generate 4,650 tonnes of CO<sub>2</sub>e which has been assessed as having a significant negative effect on Objective 6 (and Objective 10). Construction could affect human health through noise disturbance and air quality impacts, particularly as the pipeline would be routed through Egremont as well as other settlements such as St Bees. Further, there may be temporary impacts during construction to the public footpath next to the Sandwith site, however, these are considered to be short in duration and suitable diversions could be put in place. Overall, the option has been assessed as having a minor negative effect on health. The option would involve a large capital expenditure which may provide additional local jobs, generate supply chain benefits and boost spending in the local economy (by construction workers). However, local congestion may occur during construction works along roads. On balance, the option has been assessed as having a significant positive effect on Objective 8. The option would not affect water efficiency. The option would require additional resources, increase energy demand and generate waste which has been assessed as having a significant negative effect on Objective 10. The borehole sites do not contain, and are not within close proximity to, any designated cultural heritage assets with the exception of Moor Platts which would be adjacent to a Grade II Listed Building (Moorleys Farmhouse), the setting of which may be affected by construction activity. The pipeline is expected to pass through Egremont, close to the Scheduled Monument Egremont Castle although works are unlikely to affect its setting. There are also a number of listed buildings along the route of the proposed pipelines, the settings of which may be temporarily affected by the works. Overall, the option has been assessed as having a minor negative effect on Objective 11. The borehole sites are in a rural setting and with the exception of the Catgill, would be located on greenfield land such that construction activity may have adverse landscape/visual impacts. The option also requires 21km of new transfer piping to be laid which would cross the Lake District National Park for approximately 6km. In consequence, there is potential for substantial landscape effects associated with pipeline works. However, the majority of the route (including the 6km pipeline across the Lake District National Park) would follow existing linear features (roads) and adverse effects would be over a short timescale with planting and re-seeding likely to return land to a pre-development state within a year (depending on the season in which works are undertaken). Overall, whilst landscape effects associated with construction activity would be temporary, the location of pipeline works within the Lake District National Park has been assessed as having a minor negative effect on landscape.</p>

		1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	2. To ensure the appropriate and efficient use of land and protect soil quality	3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies	4. To reduce the risk of flooding	5. To minimise emissions of pollutant gases and particulates and enhance air quality	6. To limit the causes and potential consequences of climate change	7. To ensure the protection and enhancement of human health	8. To maintain and enhance the economic and social well-being of the local community	9. To ensure the sustainable and efficient use of water resources	10. To promote the efficient use of resources	11. To protect and enhance cultural and historic assets	12. To protect and enhance landscape character	Commentary
Operation	?	0	-	0	0	0	--	+	+	0	--	-	-	<p>Whilst the new boreholes are outside the surface water catchment of the River Ehen and therefore any localised drawdown would not affect tributaries of the river, it is possible that abstraction under this option may affect groundwater supplies to the Ehen. The HRA states that it is not clear what contribution to flow these are likely to make and that any effects are likely to be felt outside of the SAC, but the option may affect mobile species (Atlantic salmon) migrating through the lower reaches. Overall, the option has been assessed as having an uncertain effect on biodiversity at this stage and should this option be taken forward, further investigation in respect of potential effects on the River Ehen SAC is likely to be required. During operation, no effects on land use or soils are expected (discounting the loss of land during construction). This option would result in increased abstraction of groundwater (which may result in reductions in river flows, although this is currently uncertain). The option has therefore been assessed as having a minor negative effect on Objective 3. The other boreholes are deemed sufficiently far from protected areas to not affect biodiversity once operational. During operation, no effects on land use or soils are expected (discounting the loss of land during construction). A minor reduction in river flows and groundwater levels would be expected due to the abstractions, which has been assessed as having a minor negative effect on Objective 3. The option is not expected to cause or exacerbate flooding. No effects on air quality are anticipated. The ongoing energy requirement would be 1,861 kWh/Ml and the option would generate 4,012 tonnes of CO<sub>2</sub>e/a. This has been assessed as having a significant negative effect on Objectives 6 and 10. The option would result in an increased supply of safe, secure drinking water of 10Ml/d which would benefit human health and support economic/population growth in West Cumbria (the reduction in river flows is not expected to be perceptible to recreational users or anglers). Overall, the option has been assessed as having a minor positive effect on Objectives 7 and 8. The option would have no impact on water efficiency. As noted above, the Moor Platts site is adjacent to a Grade II Listed Building (Moorleys Farmhouse), the setting of which may be affected by new above ground infrastructure (although any adverse effects could be mitigated by adequate screening). The borehole sites are in a rural setting and with the exception of Catgill would be located on greenfield land. In consequence, there is potential for minor landscape and visual impacts from new above ground infrastructure.</p>

	1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	2. To ensure the appropriate and efficient use of land and protect soil quality	3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies	4. To reduce the risk of flooding	5. To minimise emissions of pollutant gases and particulates and enhance air quality	6. To limit the causes and potential consequences of climate change	7. To ensure the protection and enhancement of human health	8. To maintain and enhance the economic and social well-being of the local community	9. To ensure the sustainable and efficient use of water resources	10. To promote the efficient use of resources	11. To protect and enhance cultural and historic assets	12. To protect and enhance landscape character	Commentary
<b>WC06</b> <b>Roughton Gill Mine Adit (Option 1)</b> <b>(Design Capacity 1.4 MI/d)</b>  <b>Construction / Implementation</b>	--	-	0	-	-	--	-	++/-	0	--	-	--	<p>This option involves refurbishment of the existing Roughton Gill mine adit abstraction main. A new collection tank and raw water pumping station would also be required at Fellside together with 5km of associated pipework to transfer water between Fellside and Chapel House reservoir and 40km of pipeline from Quarry Hill WTW to Summergrove reservoir via Stainburn. The Fellside site is adjacent to the Lake District High Fells SAC and Skiddaw Group SSSI. The HRA states that construction of the new collection tank and pumping station at this location would risk impinging on the SAC, as well as the River Eden SAC (due to risks of construction run-off etc). The new pipeline between the Fellside site and Chapel House reservoir would also be routed along the edge of/partly within the SAC/ SSSI following a road and then miner's track to Chapel House reservoir. The HRA identifies that by keeping to the track, effects on the SAC/SSSI are likely to be minimised although there is still a likelihood of significant effects if this route is used. The pipeline from the mine to Fellside (i.e. through the SAC) would be slip-lined, which will minimise potential effects on the SAC, but some excavation is still possible. The pipeline from Quarry Hill to Summergrove would run adjacent to the River Derwent and Bassenthwaite Lake SAC/SSSI for part of its route and would cross the SAC/SSSI at Cockermouth, although the pipeline would be routed along existing roads and with appropriate mitigation adverse effects are likely to be minimised. Overall, the option is considered likely to have significant negative effects on biodiversity. It has been assumed that the pumping station would be located on greenfield land which has been assessed as having a minor negative effect on soils/land use. It is not expected that construction of this option 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). The option is not expected to cause or exacerbate flooding although sections of the new pipelines would cross Flood Zone 3 and in consequence construction activity may be at risk of flooding (subject to timing). Approximately 2,500 HGV movements during the 1 year construction period, together with emissions to air from plant, may have a negative effect on local air quality. The option would generate 1,970 tonnes CO<sub>2</sub>e which has been assessed as having a significant negative effect on Objective 6 (and Objective 10). Construction activity in the vicinity of the Fellside site is unlikely to generate significant air quality/noise impacts as the number of receptors likely to be affected is minimal, reflecting the rural location of the option. However, the area is popular with walkers and there are published walks along the route of the transfer pipeline from Roughton Gill to Fellside. A National Cycle Route and footpath also follow the transfer pipeline from Fell Side to Chapel House Reservoir. Pipeline works between Quarry Hill and Summergrove may also generate noise/air quality impacts on receptors along the proposed route, particularly as this would be within/adjacent to the larger settlements of Workington, Whitehaven and Cockermouth where the number of receptors likely to be affected would be greater. In consequence, the option has been assessed as having a minor negative effect on health. The option would involve a high capital expenditure which is likely to generate a number of jobs, supply chain benefits and increased spend in the local economy by construction workers. However, the pipeline between Quarry Hill and Summergrove would follow the A66, A596 and A595 as well as B and C roads for its circa 40km length and associated works would be likely to cause traffic disruption and congestion along these routes. On balance, the option has been assessed as having a mixed significant positive and minor negative effect on Objective 8. The option would not affect water efficiency. Construction would increase resource use, energy demand and generate waste which has been assessed as having a significant negative effect on Objective 10. Three Romano-British settlements and a bowl barrow, the closest Scheduled Monuments to works in the vicinity of the Fellside site, are located approximately 1.5 km from the pipeline route and are not expected to be affected by construction activity. The settings of listed buildings along the route of the new pipeline may be temporarily affected, but are not expected to be directly impacted. Pipeline works between Quarry Hill and Summergrove may also affect the settings of listed buildings along the proposed route as well as a number of Scheduled Monuments including, for example, the Roman Forts at Papcastle and Parton Roman Fort. At Stainburn, works would also be within close proximity of Workington Hall Registered Park and Garden. Overall, the option has been assessed as having a minor negative effect on Objective 11. The pipeline between Fellside and Chapel House, existing mains works and new pumping station would be within the Lake District National Park. Pipeline works between Quarry Hill and Stainburn would also be within/alongside the boundary of the Lake District National Park (for approximately 5km). In consequence, there is potential for substantial landscape effects associated with construction activity. Whilst the new pipelines would follow linear features (roads and miner's track) and associated adverse effects would be over a short timescale (with planting and re-seeding likely to return land to a pre-development state within a year, subject to the season in which works are undertaken), works on the existing main and new pumping station are considered likely to have a significant negative effect on landscape. Construction activity may also affect the visual amenity of both residential receptors along the pipeline route and recreational users such as walkers. Overall, the option has been assessed as having a significant negative effect on landscape.</p>



		Commentary
<b>Operation</b>	0	1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits
	0	2. To ensure the appropriate and efficient use of land and protect soil quality
	-	3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies
	0	4. To reduce the risk of flooding
	0	5. To minimise emissions of pollutant gases and particulates and enhance air quality
	-	6. To limit the causes and potential consequences of climate change
	0	7. To ensure the protection and enhancement of human health
	+	8. To maintain and enhance the economic and social well-being of the local community
	0	9. To ensure the sustainable and efficient use of water resources
	-	10. To promote the efficient use of resources
	0	11. To protect and enhance cultural and historic assets
	-	12. To protect and enhance landscape character
		<p>Operation of the scheme would be within the terms of the existing licence, which was reviewed under the review of consents with respect to flows to the River Eden, with the scheme simply improving the collection from the adit. Since it is effectively a 'passive' collection, the HRA concludes that there is little risk of increased drawdown in the Lake District High Fells SAC that would affect any features. In consequence, the option has been assessed as having a neutral effect on biodiversity. No effects on land use/soils are anticipated (initial land take assessed at the construction stage). Resumption of abstraction at Roughton Gill has been assessed as having a minor negative effect on Objective 3. The option is not expected to cause or exacerbate flooding. No operational effects on local air quality are anticipated. The ongoing operational energy requirement would be 370 kWh/MI and the option would generate 623 tonnes CO<sub>2</sub>e/a which has been assessed as having a minor negative effect on Objectives 6 and 10. The option would result in an increased capacity of 1.4 MI/d which is considered unlikely to have a discernible effect on health. However, the increased capacity may support economic/population growth in the West Cumbria area and the option has therefore been assessed as having a minor positive effect on Objective 8. No water efficiency effects are expected. Operation of the option is not expected to affect designated cultural heritage assets. A permanent landscape impact is anticipated within the Lake District National Park from the presence of the new raw water pumping station. However, as the structure would be in the context of surrounding farm structures and is expected to be in-keeping with the existing infrastructure, this impact has been assessed as having a minor negative effect on landscape. Impacts on flows may affect the visual amenity of recreational users such as walkers in the area, although any adverse effects are not expected to be significant.</p>

	1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	2. To ensure the appropriate and efficient use of land and protect soil quality	3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies	4. To reduce the risk of flooding	5. To minimise emissions of pollutant gases and particulates and enhance air quality	6. To limit the causes and potential consequences of climate change	7. To ensure the protection and enhancement of human health	8. To maintain and enhance the economic and social well-being of the local community	9. To ensure the sustainable and efficient use of water resources	10. To promote the efficient use of resources	11. To protect and enhance cultural and historic assets	12. To protect and enhance landscape character	Commentary
<b>WC06 Roughton Gill Mine Adit (Option 2) (Design Capacity 1.4 MI/d)</b>													
<b>Construction / Implementation</b>	--	0	0	-	-	--	-	++/-	0	--	-	--	<p>This option involves refurbishment of the existing Roughton Gill mine adit abstraction main. It would require the replacement of the existing main between Roughton Gill and Fellside together with a new 8.7km pipeline to Chapel House reservoir and a further 40km of pipeline from Quarry Hill WTW to Summergrove reservoir via Stainburn. The replacement/new pipelines would be routed through the Lake District High Fells SAC/SSSI and in consequence there is potential for adverse effects on this site. The pipeline from Quarry Hill to Summergrove would run adjacent to the River Derwent and Bassenthwaite Lake SAC/SSSI for part of its route and would cross the SAC/SSSI at Cockermouth, although the pipeline would be routed along existing roads and with appropriate mitigation adverse effects are likely to be minimised. Overall, the option is considered likely to have significant negative effects on biodiversity. It is assumed that any soil displaced during pipeline works would be replaced following completion of construction and therefore effects on Objective 2 have been assessed as neutral. It is not expected that construction of this option 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). The option is not expected to cause or exacerbate flooding although sections of the pipeline route would cross Flood Zone 3 and in consequence construction activity may be at risk of flooding (subject to timing). Approximately 2,500 HGV movements during the 1 year construction period, together with emissions to air from plant, may have a negative effect on local air quality. The option would generate 1,613 tonnes CO<sub>2</sub>e which has been assessed as having a significant negative effect on Objective 6 (and Objective 10). Pipeline works between Quarry Hill and Summergrove may generate noise/air quality impacts on receptors along the proposed route, particularly as this would be within/adjacent to the larger settlements of Workington, Whitehaven and Cockermouth where the number of receptors likely to be affected would be greater. In consequence, the option has been assessed as having a minor negative effect on health. The option would involve a high capital expenditure which is likely to generate a number of jobs, supply chain benefits and increased spend in the local economy by construction workers. However, the pipeline between Quarry Hill and Summergrove would follow the A66, A596 and A595 as well as B and C roads for its circa 40km length and associated works would be likely to cause traffic disruption and congestion along these routes. On balance, the option has been assessed as having a mixed significant positive and minor negative effect on Objective 8. The option would not affect water efficiency. Three Romano-British settlements and a bowl barrow, the closest Scheduled Monuments to works in the vicinity of Chapel House reservoir, are located approximately 1.5 km from the pipeline route and are not expected to be affected by construction activity. The settings of listed buildings along the route of the new pipeline may be temporarily affected, but are not expected to be directly impacted. Pipeline works between Quarry Hill and Summergrove may also affect the settings of listed buildings along the proposed route as well as a number of Scheduled Monuments including, for example, the Roman Forts at Papcastle and Parton Roman Fort. At Stainburn, works would also be within close proximity of Workington Hall Registered Park and Garden. Overall, the option has been assessed as having a minor negative effect on Objective 11. Pipeline works in the vicinity of Roughton Gill would be within the Lake District National Park and would be across open land whilst the pipeline between Quarry Hill and Stainburn would also be within/alongside the boundary of the National Park (for approximately 5km, although this would follow the A595). In consequence, there is potential for substantial landscape effects associated with construction activity. Whilst associated adverse effects would be over a short timescale (with planting and re-seeding likely to return land to a pre-development state within a year, subject to the season in which works are undertaken), they are nonetheless expected to be significant. Construction activity may also affect the visual amenity of both residential receptors along the pipeline route and recreational users such as walkers. Overall, the option has been assessed as having a significant negative effect on landscape.</p>
<b>Operation</b>	0	0	-	0	0	-	0	+	0	-	0	0	

	1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	2. To ensure the appropriate and efficient use of land and protect soil quality	3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies	4. To reduce the risk of flooding	5. To minimise emissions of pollutant gases and particulates and enhance air quality	6. To limit the causes and potential consequences of climate change	7. To ensure the protection and enhancement of human health	8. To maintain and enhance the economic and social well-being of the local community	9. To ensure the sustainable and efficient use of water resources	10. To promote the efficient use of resources	11. To protect and enhance cultural and historic assets	12. To protect and enhance landscape character	Commentary
<p><b>WC07</b>  <b>Kirklington Borehole Development</b>  <b>(Design Capacity 5 MI/d)</b></p> <p style="text-align: center;">Construction / Implementation</p>	--	-	0	-	-	--	-	++/-	0	--	--	-	<p>This option comprises the development of 3 new boreholes at Scaleby and 2 new boreholes at Longtown supplying 5MI/d of water to a new treatment works located at Skitby. This treated water would be delivered to Waygill Hill service reservoir (SR), to feed the Carlisle WRZ. The option would also require a new booster pumping station (PS), located at the High Brow Nelson SR site, pumping 5MI/d of water to Quarry Hill WTW SR to feed the West Cumbria WRZ. A further 40km of pipeline from Quarry Hill WTW to Summergrove reservoir via Stainburn would also be required. The borehole and treatment works sites are not affected by any biodiversity designations but development would occur on greenfield land and in consequence, there may be disturbance/habitat loss associated with, for example, the drilling of boreholes and other construction activity. It is assumed that the PS at High Brow Nelson SR would be within the existing site and therefore effects on biodiversity are likely to be negligible. It is expected that the route of the new pipeline would be generally along/adjacent to existing roads although it would cross the River Eden SAC and the North Pennine Moors SAC/SPA (where construction will be required within 500m at Waygill Hill SR). The pipeline from Quarry Hill to Summergrove would also run adjacent to the River Derwent and Bassenthwaite Lake SAC/SSSI for part of its route and would cross the SAC/SSSI at Cockermouth. The HRA identifies that the construction of the scheme could potentially affect the River Ehen SAC as it is likely that this would be crossed by the transfer pipeline, the North Pennine Moors SAC / SPA (where construction will be required within 500m at Waygill Hill SR) and the River Derwent and Bassenthwaite SAC. In consequence, the option has been assessed as having a significant negative effect on biodiversity. However, the HRA states that potential effects could be avoided / mitigated by using existing road crossings and by (for example) appropriate timing of works / mitigation. In this respect, should this option be taken forward to the preferred options stage, impacts on those features of the designated sites that may be significantly affected will be considered in more detail and mitigation measures identified. Further, scheme level investigations and appropriate assessment would also be undertaken at the project stage should the option form part of the final Water Resources Management Plan. Whilst this option would utilise an existing site (High Brow Nelson SR), development associated with the new boreholes and water treatment works would be on greenfield land which has been assessed as having a minor negative effect on soils/land use. It is not expected that construction of this option 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). Sections of pipeline would pass through Flood Zones 2 and 3 and therefore works may be affected by flooding (dependent on timing). The option would require an estimated 2,600 HGV movements over the 1.2 year construction phase which, together with emissions to air from plant, is likely to have a minor negative effect on local air quality. The option would generate 2,970 tonnes of CO<sub>2</sub>e which has been assessed as having a significant negative effect on Objective 6 (and Objective 10). Construction activity may have air quality/noise impacts on the (albeit limited) receptors in close proximity to the development sites as well as along the route of the pipelines, which would pass through the larger settlements of Brampton, Workington, Whitehaven and Cockermouth. Overall, the option has been assessed as having a minor negative effect on health. The option would involve a high capital expenditure which may provide additional local jobs, generate supply chain benefits and boost spending in the local economy by construction workers. However, the option would require several road crossings whilst the pipeline between Quarry Hill and Summergrove would follow the A66, A596 and A595 as well as B and C roads for its circa 40km length and associated works would be likely to cause traffic disruption and congestion along these routes. On balance, the option has been assessed as having a mixed significant positive and minor negative effect on Objective 8. The option would not affect water efficiency. Construction would increase resource use, energy demand and generate waste which has been assessed as having a significant negative effect on Objective 10. The Longtown site is located within/in close proximity to the Battle of Solway Moss Registered Battlefield. Pipeline may also cross this site and associated works could affect the setting of listed buildings along its route. At Newtown, current proposals indicate that the pipeline would cross Hadrian's Wall (Scheduled Monument and World Heritage Site). Further, new pipeline between High Brow Nelson and Quarry Hill WTW would also pass through the Old Carlisle Scheduled Monument. Pipeline works between Quarry Hill and Summergrove may also affect the settings of listed buildings along the proposed route as well as a number of Scheduled Monuments including, for example, the Roman Forts at Papcastle and Parton Roman Fort. At Stainburn, works would also be within close proximity of Workington Hall Registered Park and Garden. Overall, the option has been assessed as having a significant negative effect on cultural heritage. The new boreholes at Scaleby and Longtown, and the new WTW, may have landscape impacts. The visual amenity of properties and public footpaths within the vicinity of these sites may also be affected although the rural setting and sparsely located properties mean that the minor intrusion would only be to very few people. Works associated with the installation of pipelines may also affect visual amenity and landscape character, albeit temporarily. In particular, pipeline works between Quarry Hill and Stainburn would be within/alongside the boundary of the Lake District National Park (for approximately 5km) whilst the pipeline at Waygill Hill service reservoir would cross the North Pennines AONB. However, the majority of the route would follow existing linear features (roads) and adverse effects would be over a short timescale with planting and re-seeding likely to return land to a pre-development state within a year (depending on the season in which works are undertaken). Both the Quarry Hill and High Brow Nelson service reservoir sites already exist, and as the new pumping station at High Brow Nelson is assumed to be located within the existing site boundaries, no additional intrusion to the local landscape is expected. Overall, the option has been assessed as having a minor negative effect on landscape.</p>

	1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	2. To ensure the appropriate and efficient use of land and protect soil quality	3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies	4. To reduce the risk of flooding	5. To minimise emissions of pollutant gases and particulates and enhance air quality	6. To limit the causes and potential consequences of climate change	7. To ensure the protection and enhancement of human health	8. To maintain and enhance the economic and social well-being of the local community	9. To ensure the sustainable and efficient use of water resources	10. To promote the efficient use of resources	11. To protect and enhance cultural and historic assets	12. To protect and enhance landscape character	Commentary
Operation	--	0	-	0	0	--	+	+	0	--	0	-	<p>Operation of the new boreholes has the potential to have a significant negative effect on biodiversity, due to the close proximity of the three boreholes at Scaleby to Scaleby Moss, a SSSI site that is sensitive to groundwater levels. Further, the HRA highlights that abstraction from the aquifer could affect the River Eden SAC directly (the Scaleby boreholes are only 4km from the Eden at its closest point, near Low Crosby) or (more likely) indirectly by affecting flows within tributaries of this watercourse (e.g. the Brunstoke Beck). Similarly, abstraction from the Longtown boreholes could affect the Esk and hence the interest features of the Solway Firth suite of estuarine sites. This would require some additional modelling to quantify, although the CAMS indicates that there is water available for use in the Lower Eden catchment, and the EA has indicated that the under-utilised Kirklington aquifer has substantial water available for use. At this stage the option has been assessed as having a significant negative effect on biodiversity. No effects on soils or land use are expected during operation (the initial loss of greenfield land has been assessed during construction). The option would increase groundwater abstraction which has been assessed as having a minor negative effect on Objective 3. The option is not expected to cause or exacerbate flooding. No effects on local air quality are anticipated. The option would require ongoing energy use (2,531 KWh/MI) with associated greenhouse gas emissions of 2,565 tonnes CO<sub>2</sub>e/a which has been assessed as having a significant negative effect on Objectives 6 and 10. There are no expected impacts on informal recreation or angling in the River Ehen, and the option would ensure safe, secure supply of 5MI/d of water for the local population and economy of West Cumbria and Carlisle. This has been assessed as having a minor positive effect on Objectives 7 and 8. No impact on water efficiency or leakage is expected. Operation of the option is not expected to affect cultural heritage assets. Above ground infrastructure at the new boreholes at Scaleby and Longtown, and the new WTW, may have landscape impacts. The visual amenity of properties and public footpaths within the vicinity of these sites may also be affected although the rural setting and sparsely located properties mean that the minor intrusion would only be to very few people. As the new pumping station at High Brow Nelson is assumed to be within the existing site boundaries, no additional intrusion to the landscape is expected. Overall, the option has been assessed as having a minor negative effect on landscape.</p>

	1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	2. To ensure the appropriate and efficient use of land and protect soil quality	3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies	4. To reduce the risk of flooding	5. To minimise emissions of pollutant gases and particulates and enhance air quality	6. To limit the causes and potential consequences of climate change	7. To ensure the protection and enhancement of human health	8. To maintain and enhance the economic and social well-being of the local community	9. To ensure the sustainable and efficient use of water resources	10. To promote the efficient use of resources	11. To protect and enhance cultural and historic assets	12. To protect and enhance landscape character	Commentary
<p><b>WC09</b>  <b>Development of Boreholes in North Cumbria Aquifer (Design Capacity 4.5 Ml/d)</b></p> <p style="text-align: center;"><b>Construction / Implementation</b></p>	--	-	0	-	-	--	-	++/-	0	--	-	<p>This option comprises the construction of two new boreholes at Waverton and Thursby for abstraction and transfer to Quarry Hill WTW. The option would also require a new 8km raw water transfer pipe from Waverton to the WTW and a 15km transfer pipe from Thursby to the WTW. A further 25km of pipeline from Quarry Hill WTW to Summergrove reservoir via Stainburn would also be required. The WTW is assumed to be able to accommodate this extra capacity at this stage. Construction activity would be located over 10km upstream of the Solway Firth, which is a designated SAC, SPA and Ramsar site, and the Broad Dales SSSI, however these sites are not expected to be affected by the works. The Wedholme Flow SSSI 6km downstream of the Waverton site is also not expected to be affected by construction activity. However, development at the borehole sites would occur on greenfield land and in consequence, there may be disturbance/habitat loss associated with, for example, the drilling of the boreholes and other construction activity. The pipeline from Quarry Hill to Summergrove would run adjacent to the River Derwent and Bassenthwaite Lake SAC/SSSI for part of its route and would cross the SAC/SSSI at Cockermouth. The HRA identifies that the construction of the scheme could potentially affect the SAC and in consequence, the option has been assessed as having a significant negative effect on biodiversity. However, the HRA states that potential effects could be avoided / mitigated by using existing road crossings. In this respect, should this option be taken forward to the preferred options stage, impacts on those features of the SAC that may be significantly affected will be considered in more detail and mitigation measures identified. Further, scheme level investigations and appropriate assessment would also be undertaken at the project stage should the option form part of the final Water Resources Management Plan. As development would result in the loss of some greenfield land, the option has been assessed as having a minor negative effect on soils/land use. It is not expected that construction of this option would have an effect on water quality or water resources, provided good practices are adhered to and mitigation implemented (such as dust suppression, soil containment and emergency response procedures). The pipelines would pass through Flood Zones 2 and 3 at several points and therefore works may be affected by flooding (dependent on timing). Construction works may have a minor negative effect on local air quality associated with emissions to air from HGV movements (approximately 2,500 over 1.25 years) and plant, which has been assessed as having a minor negative effect on Objective 5. The option would generate 2,602 tonnes CO<sub>2</sub>e which has been assessed as having a significant negative effect on Objective 6 (and Objective 10). Construction activity may have temporary air quality/noise impacts on the (albeit limited) receptors in close proximity to the development sites as well as along the route of the pipelines. In particular, the Thursby site is adjacent to the settlement boundary of Thursby with residential receptors to the east whilst several farms may be affected by development at Waverton. Pipeline works between Quarry Hill and Summergrove may also generate noise/air quality impacts on receptors along the proposed route, particularly as this would be within/adjacent to the larger settlements of Workington, Whitehaven and Cockermouth where the number of receptors likely to be affected would be greater. Overall, the option has been assessed as having a minor negative effect on health. The option would require a large capital investment which may provide additional local jobs, generate supply chain benefits and boost spending in the local economy by construction workers. However, the option would require several (albeit minor) road crossings whilst the pipeline between Quarry Hill and Summergrove would follow the A66, A596 and A595 as well as B and C roads for its circa 40km length and associated works would be likely to cause traffic disruption and congestion along these routes. On balance, the option has been assessed as having a mixed significant positive and minor negative effect on Objective 8. The option is not expected to affect water efficiency. Construction activities would require the use of new resources and energy, and generate waste which has been assessed as having a significant negative effect on Objective 10. Development at the borehole sites is unlikely to affect the settings of listed buildings in the settlements of Thursby and Waverton. However, the pipeline as proposed would cross through Old Carlisle Scheduled Monument and works may affect the settings of other scheduled monuments and listed buildings along the proposed routes as well as Workington Hall Registered Park and Garden. Taking into account the potential for mitigation to avoid direct impacts on designated heritage assets arising from pipeline works (such as routing), the option has been assessed as having a minor negative effect on cultural heritage. The visual amenity of properties and public footpaths within the vicinity of the borehole sites may be affected by construction activity although the rural setting and sparsely located properties mean that the minor intrusion would only be to very few people. Pipeline works between Quarry Hill and Stainburn would also be within/alongside the boundary of the Lake District National Park (for approximately 5km). In consequence, there is potential for substantial landscape effects associated with construction activity. However, the majority of the route would follow existing linear features (roads) and adverse effects would be over a short timescale with planting and re-seeding likely to return land to a pre-development state within a year (depending on the season in which works are undertaken). Overall, the option has been assessed as having a minor negative effect on landscape.</p>	



		1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	2. To ensure the appropriate and efficient use of land and protect soil quality	3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies	4. To reduce the risk of flooding	5. To minimise emissions of pollutant gases and particulates and enhance air quality	6. To limit the causes and potential consequences of climate change	7. To ensure the protection and enhancement of human health	8. To maintain and enhance the economic and social well-being of the local community	9. To ensure the sustainable and efficient use of water resources	10. To promote the efficient use of resources	11. To protect and enhance cultural and historic assets	12. To protect and enhance landscape character	Commentary
Operation	?	0	-	0	0	0	-	0	+	0	-	0	-	New borehole abstractions at Waverton and Thursby have the potential to impact on the nearby River Waverly and River Wampool, which discharges into the Solway Firth. The Waverton site is located approximately 12km upstream of Solway Firth, whilst Thursby is around 17 km upstream of the same site (SAC, SPA and Ramsar Site). It has been assumed a 1.5km reach downstream of the abstraction could be impacted, however, and therefore the HRA concludes that significant effects on this site would not be expected. All other European designated sites are almost certainly too distant for the abstraction to have a significant direct effect, including the River Eden SAC and the South Solway Mosses SAC which are both over 5km from the nearest borehole. However, the option may affect water dependent SSSIs downstream of the borehole sites although no readily available flow data could be found for the River Waverley or Wampool to contextualise the abstraction volumes and current flow. Overall, the option has therefore been assessed as having an uncertain effect on biodiversity at this stage. No effects on land use or soils are expected during operation (initial landtake discounted at the construction stage). A minor reduction in groundwater levels is expected from operation of the boreholes. This has been assessed as having a minor negative effect on Objective 3. The option is not expected to cause or exacerbate flooding in the area. No effect on local air quality is expected during operation. The option would require ongoing energy use (2,029 KWh/MI) with associated greenhouse gas emissions of 2,055 tonnes CO <sub>2</sub> e/a. This has been assessed as having a significant negative effect on Objectives 6 and 10. There are no expected impacts on informal recreation and access, with no noticeable effects on river levels by users. The option has a design capacity of 4.5MI/d although this is unlikely to have a discernible effect on health. However, the additional supply may support economic/population growth, generating a minor positive effect on Objective 8. No operational effects on cultural heritage are anticipated. New above ground infrastructure at the Waverton and Thursby boreholes such as rising mains and pumps may affect local landscape character and, potentially, the visual amenity of residential and recreational receptors. This has been assessed as having a minor negative effect on Objective 12.

	1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	2. To ensure the appropriate and efficient use of land and protect soil quality	3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies	4. To reduce the risk of flooding	5. To minimise emissions of pollutant gases and particulates and enhance air quality	6. To limit the causes and potential consequences of climate change	7. To ensure the protection and enhancement of human health	8. To maintain and enhance the economic and social well-being of the local community	9. To ensure the sustainable and efficient use of water resources	10. To promote the efficient use of resources	11. To protect and enhance cultural and historic assets	12. To protect and enhance landscape character	Commentary
<b>WC10 Desalination, Workington (Design Capacity 20 Ml/d)</b>	--	0	0	-	-	--	-	++/-	0	--	-	--	<p>This option comprises a new 20 Ml/d desalination plant located in Workington and would require 63km of associated pipelines, new pumping station and service reservoir at Brigham as well as a new pumping station at Corn How. It has been assumed that development of the desalination plant would predominantly take place on brownfield land in Workington however, the scale of works and coastal location of the site may mean that there is some potential for impacts on coastal/marine ecology. In this respect, the HRA identifies that the works would be likely to affect the Derwent estuary and therefore the option has a high risk of significant effects on the mobile interest features of the River Derwent and Bassenthwaite Lake SAC. Whilst mitigation may be possible, the HRA concludes that avoidance would be difficult and so significant effects would be anticipated. The Brigham site is not affected by any biodiversity designations although development of a new service reservoir on greenfield land may cause habitat loss/disturbance. Works at Corn How would be relatively small scale although the site is adjacent to the River Derwent and Bassenthwaite Lake SAC and River Derwent and Tributaries SSSI (as well as ancient woodland). The pipelines would cross the River Derwent although the route is currently road-based and so effects could probably be managed with normal good-practice and some scheme-specific measures. Overall, the option has been assessed as having a significant negative effect on biodiversity. As noted above, this option would result in the loss of greenfield land to accommodate the new service reservoir and pumping station at Brigham, although it is assumed that the new pumping station at Corn How and desalination plant at Workington would be located on previously developed land. On balance, the option has been assessed as having a neutral negative effect on soils/land use. It is not expected that construction of this option would have an effect on water quality or water resources, provided good practices are adhered to and mitigation implemented (such as dust suppression, soil containment and emergency response procedures). The desalination plant and sections of the pipeline would be located in Flood Zone 3 and therefore construction activity may be affected by flooding (dependent on timing). The option would require 1,667 HGV movements during construction which, together with emissions to air from plant, may have a minor negative effect on local air quality. The option would generate a substantial volume of CO<sub>2</sub>e which has been assessed as having a significant negative effect on Objective 6 (or Objective 10). The desalination plant would be located within a semi-industrial area whilst the new pumping station at Corn How would be within an existing site and therefore construction related impacts from the development of these facilities on health are expected to be negligible. Works at Brigham may have noise/air quality impacts on residential receptors to the west and south of the site and school to the south whilst pipeline works may affect receptors along the proposed route. Overall, the option has been assessed as having a minor negative effect on health. This option would involve a high capital expenditure which has the potential to generate jobs, supply chain benefits and income in the local area associated with construction worker spend. However, HGV movements and works along the pipeline route (which follows existing roads for the majority of its route) may cause traffic disruption and congestion. On balance, the option has been assessed as having a mixed significant positive effect and minor negative effect on Objective 8. No effect on water efficiency is anticipated. The scale of the works would require significant resource and energy use, as well as generating waste, which has been assessed as having a significant negative effect on Objective 10. Development of the desalination plant, pumping stations and service reservoir is unlikely to affect designated cultural heritage assets. However, pipeline works may affect listed buildings and scheduled monuments along the proposed route including, for example, Papcastle Roman forts and Workington Medieval Fortified House. Pipeline works may also disturb unknown archaeological assets, although this is currently uncertain. Notwithstanding, any impacts would be temporary and have therefore been assessed as having a minor negative effect on Objective 11. The desalination plant would be located in a semi-industrial coastal area with minimal landscape impacts anticipated from construction activity. There are also no residential properties overlooking the site. The new pumping station at Corn How would be within an existing site although this site is within the Lake District National Park. Development of the new service reservoir and pumping station at Brigham may affect the rural landscape character of the area (although the site is not affected by any landscape designations) as well as the visual amenity of residential receptors in close proximity to this site. The pipeline between Brigham, Corn How and Summergrove would pass through the Lake District National Park whilst the pipeline north towards Low Aketon would run adjacent to the Park for approximately 5km. In consequence, there is potential for substantial landscape effects associated with pipeline works. Overall, the option has been assessed as having a significant negative effect on landscape.</p>
<b>Construction / Implementation</b>	--	0	-	-	0	--	++	++	0	--	0	-	
<b>Operation</b>	--	0	-	-	0	--	++	++	0	--	0	-	



		1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	2. To ensure the appropriate and efficient use of land and protect soil quality	3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies	4. To reduce the risk of flooding	5. To minimise emissions of pollutant gases and particulates and enhance air quality	6. To limit the causes and potential consequences of climate change	7. To ensure the protection and enhancement of human health	8. To maintain and enhance the economic and social well-being of the local community	9. To ensure the sustainable and efficient use of water resources	10. To promote the efficient use of resources	11. To protect and enhance cultural and historic assets	12. To protect and enhance landscape character	Commentary
<b>WC14d Kielder Water Transfer to West Cumbria (Cumwhinton Treated)  (Design Capacity 80 Ml/d)</b>	<b>Construction / Implementation</b>	--	-	0	-	-	--	-	++	0	--	-	-	<p>This option comprises the transfer of water from Kielder Water in the Northumbrian Water supply region to the West Cumbria WRZ. The option would require: a new intake structure, pumping station and screening equipment at Kielder Water with a 80Ml/d capacity; new 40km raw water transfer main from Kielder to Carlisle; new booster pumping station located at Catgallow service reservoir; new WTW facility adjacent to Cumwhinton WTW; 23km raw water transfer main to Quarry Hill WTW; new bulk supply point (BSP) located close to Quarry Hill WTW; new branch main feed into Quarry Hill service reservoir; new continuation of previous LDTM between the new Quarry Hill BSP and a further BSP located close to Corn How service reservoir; new main between Corn How BSP and Corn How service reservoir and fluoridation at the reservoir; and new continuation of previous LDTM between Corn How pumping station and Summergrove service reservoir (with fluoridation at the reservoir). The option would also involve the abandonment of three existing WTWs in West Cumbria namely, Quarry Hill, Ennerdale, and Corn How. The development sites do not contain any statutory or non-statutory designations. Two SSSIs, Kielder Mires and Kielderhead Moors, lie around 0.5km to the south and north of Kielder Reservoir. The River Eden SAC/SSSI is 1km to the east of Cumwhinton and Cotehill Pastures and Ponds SSSI is 1km to the south. The Corn How site is adjacent to the River Derwent and Bassenthwaite Lake SAC and River Derwent and Tributaries SSSI (as well as ancient woodland). The HRA identifies that effects on European designated sites would depend heavily on the pipeline routes. Under current proposals, the primary pipeline from Kielder to UU is assumed to be a straight line across Kielder Forest (and hence across the Border Mires, Kielder – Butterburn SAC, River Eden SAC in addition to Caudbeck Flow, River Eden and Tributaries and Kielder Mires SSSIs). The pipeline from Cumwhinton to Quarry Hill would also cross the River Eden SAC as well as ancient woodland whilst the pipeline from Quarry Hill to Summergrove would run adjacent to the River Derwent and Bassenthwaite Lake SAC/SSSI for part of its route and would cross the SAC/SSSI. Under current proposals, the HRA concludes that it is likely that the scheme would have significant construction effects on the Border Mires, Kielder – Butterburn SAC and (probably) the River Eden SAC and River Derwent and Bassenthwaite Lake SAC (since several tributaries are crossed, not at existing crossing points). It is also possible that some of the breeding birds interest features of the North Pennine Moors SPA could be disturbed by construction. In consequence, the option has been assessed as having a significant negative effect on biodiversity. However, the HRA states that it is likely that these effects could be managed/avoided with scheme specific mitigation (e.g. routing). In this respect, should this option be taken forward to the preferred options stage, impacts on those features of designated sites that may be significantly affected will be considered in more detail and mitigation measures identified. Further, scheme level investigations and appropriate assessment would also be undertaken at the project stage should the option form part of the final Water Resources Management Plan. The WTWs proposed for decommissioning include Ennerdale (adjacent to River Ehen SAC/SSSI to the east and in close proximity to Lake District High Fells SAC, Pillar and Ennerdale Fells SSSI and Ennerdale SSSI) and Corn How (adjacent to River Derwent and Tributaries SSSI and River Derwent and Bassenthwaite Lake SAC. There is therefore potential for construction effects on these sites if the works are not managed appropriately. It has been assumed that the new intake structure, pumping stations and WTW would be built on undeveloped land (it has been assumed that BSPs at Corn How and Quarry Hill as well as works at Summergrove would be within existing site boundaries) and in consequence the option has been assessed as having a minor negative effect on Objective 2. Construction of this option would not have effects on water quality or water resources, provided good practices are adhered to and mitigation implemented (such as dust suppression, soil containment and emergency response procedures). The site of the new intake would be within Flood Zone 3 whilst the proposed pipeline routes would cross Flood Zones 2/3 at several points. As a result, construction activity may be affected by flooding (depending on timing) although the option would not cause or significantly exacerbate flooding in the area. Construction is expected to generate a negative effect on air quality as a result of emissions from plant and associated HGV movements (there would be an estimated 5,750 HGV movements during the construction period). This has been assessed as having a minor negative effect on Objective 5. Construction of the scheme would generate 67,204 tonnes CO<sub>2</sub>e which has been assessed as having a significant negative effect on Objective 6 (and Objective 10). Construction of the option could lead to short term effects on human health through noise and air quality impacts, although the developments sites are not located in close proximity to significant numbers of residential receptors and the scale of works at each site would be generally small. Notwithstanding, construction of the new WTW at Cumwhinton would constitute a more substantial development that may affect residential receptors to the north of the site and an animal refuge to the south. Further, pipeline works may have adverse effects on receptors along the proposed route. Kielder Reservoir is also a regionally/nationally important recreation site and therefore the amenity of visitors may be affected during construction. However, any negative effects on these receptors would be temporary and are likely to be minimised through the adoption of good practice construction techniques and have therefore been assessed as minor. Construction of the option would involve a high capital expenditure which is likely to generate employment opportunities and supply chain benefits together with increased spend by construction workers in the local economy. However, pipeline works are likely to result in traffic disruption and congestion. Although current proposals indicate that the pipelines would largely cross fields, it is expected that the final route would follow roads where appropriate. On balance, and under current proposals, the option has been assessed as having a mixed significant positive and minor negative effect on Objective 8. This option is unlikely to have an effect on the efficiency of water consumption. Construction would increase resource use, energy demand and generate waste which has been assessed as having a significant negative effect on Objective 10. There are several heritage and archaeological sites around the shoreline of Kielder Water (Haw Hill Camp, a Romano-British settlement located on the south shoreline) which would be unaffected by the option. There are no designated cultural heritage assets at, or within close proximity to, the other development sites with the exception of Cumwhinton which is approximately 700m from Corby Castle Registered Park and Garden, although no effects on the setting of this asset are expected due to distance from the site (approximately 700m) and the presence of physical barriers (e.g. woodland). However, there are a number of heritage features on the transfer pipeline routes, such as Maiden Way Roman Road, Beacon Pasture early post-medieval dispersed settlement and Hadrians Wall World Heritage Site/Scheduled Monument, although it is assumed that these features would be avoided when the transfer pipeline route would be scoped in more detail, for example by routing the pipeline along roads etc. Notwithstanding, the settings of some assets such as listed buildings along roads may be temporarily affected during the works. There is also the potential for unknown archaeology to be encountered on the route due to the number</p>

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Operation	++	0	++	0	0	-	++	++	0	-	0	-	<p>of ancient monuments present in the area and the length of the pipeline route. Overall, the option has been assessed as having a minor negative effect on Objective 11. There may be some impact on landscape due to the construction of the new bankside intake structure and pumping station at Kielder whilst the Corn How site and sections of the pipeline route are located within the Lake District National Park. Whilst construction of the new WTW at Cumwhinton would have landscape impacts, works would be adjacent to the existing WTW and the number of residential receptors to the north of the site is relatively low. Works at the other development sites may also have temporary landscape/visual impacts although it is noted that new facilities would be located adjacent to existing sites whilst the number of visual receptors likely to be affected would be small.</p> <p>The HRA identifies that the operation of this option is unlikely to have any adverse effects on European sites. Use of water from Kielder would not affect any WRD interest features at sites within its catchment and the only real mechanism for impacts would be indirect, through increases in discharges after usage (in theory, 80MI/d could be entering the West Cumbria WRZ). Although the option constitutes an interbasin transfer of raw water, it would be treated immediately on arrival and risks associated with this (e.g. invasive species transfer) would not be expected. Further, the abandonment of the three WTWs would reduce abstraction from sources identified for amendment as part of the Review of Consents programme which may benefit the River Ehen SAC and River Derwent and Bassenthwaite Lake SAC in particular. Taking into account the findings of the HRA, this option has been assessed as having a significant positive effect on biodiversity. No operational effects on land use/soils are anticipated (initial loss of land assessed at the construction stage). The abstraction of up to 80 MI/d would impact upon water levels in Kielder reservoir compared to current operation. However, as noted above the abandonment of the three WTWs would reduce abstraction from sources identified for amendment as part of the Review of Consents programme. On balance the option has therefore been assessed as having a significant positive effect on Objective 3. The option is not expected to cause or exacerbate flooding. Operation of this option would not have effects on air quality. Net operational energy usage would be 1,153 KWh/MI and the option would generate 21,539 tonnes CO<sub>2</sub>e /a which has been assessed as having a significant negative effect on Objectives 6 and 10. The option would have significant positive effects on human health by ensuring a continuity of supply of safe drinking water across the West Cumbria area as well as a significant positive effect on the local economy as increased supply may support population and economic growth. However, there is the potential for impacts on recreational use of Kielder reservoir due to changes in water levels as a result of abstraction. The option is not a leakage reduction or water efficiency option and therefore effects on Objective 9 are expected to be neutral. No operational effects on cultural heritage assets during operation are anticipated. The new bankside intake structure and pumping station at Kielder, together with the additional draw on the reservoir, may have adverse effects on landscape character and the visual amenity of recreational users. The new WTW at Cumwhinton may affect local landscape character and the visual amenity of residential receptors to the north, although adverse effects may be lessened by the adoption of appropriate mitigation such as screening. New above ground infrastructure at the other development sites would have negligible landscape/visual impacts as they would be of relatively small scale and adjacent to existing sites whilst the number of visual receptors likely to be affected would be small. Overall, the option has been assessed as having a minor negative effect on landscape.</p>

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WC19 Crummock Automated Compensation Control (Design Capacity 2.7 MI/d)	Construction / Implementation	--	+	0	-	-	-	-	++	0	-	-	-	<p>This option would involve the replacement of Crummock weir's penstock with automated compensation control. This would allow for an automated control of the compensation flow to the River Derwent. The option would also require 16km of new pipeline from Stainburn to Summergrove service reservoirs. Crummock Water is within the River Derwent and Bassenthwaite Lake SAC/SSSI which may be affected by the option. In consequence, the option has been assessed as having a significant negative effect on biodiversity. However, the HRA states that, as construction works required to deliver this option would be relatively minor and effects could be controlled / managed with normal good practice and scheme-specific measures (e.g. avoiding key migration periods, etc), no adverse effects would be anticipated. In this respect, should this option be taken forward to the preferred options stage, impacts on those features of the SAC that may be significantly affected will be considered in more detail and mitigation measures identified. Further, scheme level investigations and appropriate assessment would also be undertaken at the project stage should the option form part of the final Water Resources Management Plan. The option would involve the replacement of existing facilities and would not require additional land take (it has been assumed that any soils displaced during the works would be returned following completion of construction). This has been assessed as having a minor positive effect on soils/land use. No discernible effect on river flow is anticipated during the construction work. Construction work would be located within Flood Zones 2 and 3, due to the location on Crummock weir, and may therefore be affected by flooding (dependent on timing). A total of 1,350 HGV movements would be required over the 1 year construction period which may have a minor adverse effect on local air quality. The option would generate 795 tonnes of CO<sub>2</sub>e which has been assessed as having a minor negative effect on Objective 6 (and Objective 10). No effects on health or recreation associated with the replacement of the penstock are expected. Pipeline works between Stainburn and Summergrove may generate noise/air quality impacts on receptors along the proposed route, particularly as this would be within/adjacent to the larger settlements of Workington and Whitehaven. In consequence, the option has been assessed as having a minor negative effect on health. The option would involve a high capital expenditure which is likely to generate a number of jobs, supply chain benefits and increased spend in the local economy by construction workers. However, the pipeline between Stainburn and Summergrove would follow the A595 as well as B and C roads and associated works would be likely to cause traffic disruption and congestion along these routes. On balance, the option has been assessed as having a significant positive effect on Objective 8. The option would not affect water efficiency. The option would require additional resources, increase energy demand and generate waste which has been assessed as having a significant negative effect on Objective 10. The closest Scheduled Monument to the development site is the moated site of Loweswater Pele. This is not expected to be affected by construction activities (it is located approximately 500m from the Crummock weir). Pipeline works between Stainburn and Summergrove may affect the settings of listed buildings along the proposed route as well as a number of Scheduled Monuments including, for example, Parton Roman Fort. At Stainburn, works would also be within close proximity of Workington Hall Registered Park and Garden. Overall, the option has been assessed as having a minor negative effect on Objective 11. Temporary landscape impacts are expected due to the location of Crummock weir within the Lake District National Park although given the scale of works, these are not expected to be significant. Construction activity may also affect the visual amenity residential receptors along the pipeline route (although this would not be affected by any landscape designations). Overall, the option has been assessed as having a minor negative effect on landscape.</p> <p>Operation of the scheme would be within the terms of the existing licence. However, compensation flows into the River Cocker would be reduced relative to the current volumes as the releases currently 'over-compensate' for the inaccuracies in gauging and in this respect the HRA identifies that effects on the River Derwent and Bassenthwaite Lake SAC are uncertain. In consequence, the option has been assessed as having an uncertain effect on biodiversity at this stage. The option is not expected to have any effects on water quantity/quality. No effect on soil or land use is expected during operation. Operation of the option is not expected to cause or exacerbate flooding in the area. No effects on local air quality are anticipated. The option would require ongoing energy use (617 KWh/MI) with associated greenhouse gas emissions of 402 tonnes CO<sub>2</sub>e/a which has been assessed as having a minor negative effect on Objectives 6 and 10. As there would be no noticeable reductions in water flow, no effects on recreational users including anglers are expected during operation. The option would secure 2.7MI/d additional capacity although this would be unlikely to have a discernible effect on health. The additional capacity may however support economic and population growth within the West Cumbria area which has been assessed as having a minor positive effect on Objective 8. The option would have no effect on water efficiency. No operational effects on cultural heritage are anticipated. No permanent landscape impacts are expected once the penstock is operational as it would replace an existing unit, resulting in a neutral effect on Objective 12.</p>
	Operation	?	0	0	0	0	0	-	0	+	0	-	0	

		1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	2. To ensure the appropriate and efficient use of land and protect soil quality	3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies	4. To reduce the risk of flooding	5. To minimise emissions of pollutant gases and particulates and enhance air quality	6. To limit the causes and potential consequences of climate change	7. To ensure the protection and enhancement of human health	8. To maintain and enhance the economic and social well-being of the local community	9. To ensure the sustainable and efficient use of water resources	10. To promote the efficient use of resources	11. To protect and enhance cultural and historic assets	12. To protect and enhance landscape character	Commentary
WC23a Supply of Final Effluent to Non-household Customers  (Design Capacity 0.5 MI/d)	Construction / Implementation	?	0	0	?	-	-	-	0	0	-	0	0	<p>This option would involve the supply of final effluent to non-household customers as non-potable supply. There are a number of possible customers that could accept final effluent from various facilities in the West Cumbria WRZ and no specific wastewater treatment works have been identified for the implementation of this option (as implementation would be dependent on the location of customers that can accept final effluent as a non-potable supply). A 'generic' assessment has therefore been made and it is assumed that the option would comprise: a new break tank and pumping station at an existing water treatment works; new transfer pipeline of 2km length to transfer flows of 0.5 MI/d; and new receiving storage tanks at the end of the 2km transfer pipeline. It is expected that the break tank and pumping station would be located at an existing water treatments works (it is assumed that storage tanks would be located either at the water treatment works or at the receiving site) and therefore associated effects on biodiversity arising from the construction of this infrastructure (e.g. habitat loss or disturbance) are unlikely to be significant. It is possible that the installation of new transfer pipeline may cause short term, temporary disturbance as a result of excavation activities. The transfer pipeline may also cross locations important for biodiversity (including designated sites) which may affect priority habitats and protected species, although it would be expected that adverse effects would be mitigated where possible using good practice construction techniques. Notwithstanding, as the location of works is unknown, effects on Objective 1 have been assessed as uncertain. As new development associated with this option would be predominantly located at the site of an existing water treatment works, with any soil displaced through excavation returned following the completion of the works, effects on soil/land use are expected to be negligible. It is not expected that construction of this option 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). As the location of the option is currently unknown, construction related impacts on flood risk are uncertain. Emissions to air from HGV movements (construction would generate an estimated 1,250 HGV movements) and plant and machinery may have a negative effect on local air quality during the construction phase, the severity of which would be to a large extent dependent on the proximity of sensitive receptors and existing air quality. Notwithstanding, any impacts would be short term and temporary and may be mitigated to an extent through good practice and therefore effects on Objective 5 have been assessed as negative. Construction would generate an estimated 155 tonnes CO<sub>2</sub>e which has been assessed as having a minor negative effect on Objective 6 (and Objective 10). Construction could affect human health through noise disturbance and air quality impacts (subject to the proximity of sensitive receptors) and temporarily affect recreational receptors. However, it is expected that the majority of works would be undertaken at the site of an existing water treatment works and any impacts would be temporary and are likely to be managed such that effects on Objective 7 have been assessed as negative. Construction would involve a relatively low capital expenditure which is unlikely to generate substantial or sustained economic effects. Further, the laying of transfer pipeline may result in short term and temporary adverse impacts on the road network (e.g. as a result of increased vehicle movements, road closures/diversions etc) although such impacts would be temporary. Overall, the option has been assessed as having a neutral effect on Objective 8. The option would not affect water efficiency. Construction would increase resource use, energy demand and generate waste which has been assessed as having a minor negative effective on Objective 10. As construction activity would be largely undertaken within an existing water treatment works, effects on heritage assets and landscape are expected to be negligible. Mains replacement may involve carrying out works in the curtilage or grounds of heritage assets but this would be temporary and managed and in consequence effects would not be significant.</p>
	Operation	?	0	+	?	0	0	0	0	+	0	0	0	



		1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	2. To ensure the appropriate and efficient use of land and protect soil quality	3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies	4. To reduce the risk of flooding	5. To minimise emissions of pollutant gases and particulates and enhance air quality	6. To limit the causes and potential consequences of climate change	7. To ensure the protection and enhancement of human health	8. To maintain and enhance the economic and social well-being of the local community	9. To ensure the sustainable and efficient use of water resources	10. To promote the efficient use of resources	11. To protect and enhance cultural and historic assets	12. To protect and enhance landscape character	Commentary
WC23b Supply of Final Effluent to Non-household Customers  (Design Capacity 1.0 MI/d)	Construction / Implementation	?	0	0	?	-	-	-	0	0	-	0	0	<p>This option would involve the supply of final effluent to non-household customers as non-potable supply. There are a number of possible customers that could accept final effluent from various facilities in the West Cumbria WRZ and no specific wastewater treatment works have been identified for the implementation of this option (as implementation would be dependent on the location of customers that can accept final effluent as a non-potable supply). A 'generic' assessment has therefore been made and it is assumed that the option would comprise: a new break tank and pumping station at an existing water treatment works; new transfer pipeline of 2km length to transfer flows of 1 MI/d; and new receiving storage tanks at the end of the 2km transfer pipeline. It is expected that the break tank and pumping station would be located at an existing water treatments works (it is assumed that storage tanks would be located either at the water treatment works or at the receiving site) and therefore associated effects on biodiversity arising from the construction of this infrastructure (e.g. habitat loss or disturbance) are unlikely to be significant. It is possible that the installation of new transfer pipeline may cause short term, temporary disturbance as a result of excavation activities. The transfer pipeline may also cross locations important for biodiversity (including designated sites) which may affect priority habitats and protected species, although it would be expected that adverse effects would be mitigated where possible using good practice construction techniques. Notwithstanding, as the location of works is unknown, effects on Objective 1 have been assessed as uncertain. As new development associated with this option would be predominantly located at the site of an existing water treatment works, with any soil displaced through excavation returned following the completion of the works, effects on soil/land use are expected to be negligible. It is not expected that construction of this option 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). As the location of the option is currently unknown, construction related impacts on flood risk are uncertain. Emissions to air from HGV movements (construction would generate an estimated 1,250 HGV movements) and plant and machinery may have a negative effect on local air quality during the construction phase, the severity of which would be to a large extent dependent on the proximity of sensitive receptors and existing air quality. Notwithstanding, any impacts would be short term and temporary and may be mitigated to an extent through good practice and therefore effects on Objective 5 have been assessed as negative. Construction would generate an estimated 164 tonnes CO<sub>2</sub>e which has been assessed as having a minor negative effect on Objective 6 (and Objective 10). Construction could affect human health through noise disturbance and air quality impacts (subject to the proximity of sensitive receptors) and temporarily affect recreational receptors. However, it is expected that the majority of works would be undertaken at the site of an existing water treatment works and any impacts would be temporary and are likely to be managed such that effects on Objective 7 have been assessed as negative. Construction would involve a relatively low capital expenditure which is unlikely to generate substantial economic effects. Further, the laying of transfer pipeline may result in short term and temporary adverse impacts on the road network (e.g. as a result of increased vehicle movements, road closures/diversions etc) although such impacts would be temporary. Overall, the option has been assessed as having a neutral effect on Objective 8. The option would not affect water efficiency. Construction would increase resource use, energy demand and generate waste which has been assessed as having a minor negative effective on Objective 10. As construction activity would be largely undertaken within an existing water treatment works, effects on heritage assets and landscape are expected to be negligible. Mains replacement may involve carrying out works in the curtilage or grounds of heritage assets but this would be temporary and managed and in consequence effects would not be significant.</p>
	Operation	?	0	+	?	0	0	0	+	+	0	0	0	

		1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	2. To ensure the appropriate and efficient use of land and protect soil quality	3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies	4. To reduce the risk of flooding	5. To minimise emissions of pollutant gases and particulates and enhance air quality	6. To limit the causes and potential consequences of climate change	7. To ensure the protection and enhancement of human health	8. To maintain and enhance the economic and social well-being of the local community	9. To ensure the sustainable and efficient use of water resources	10. To promote the efficient use of resources	11. To protect and enhance cultural and historic assets	12. To protect and enhance landscape character	Commentary
WC23c Supply of Final Effluent to Non-household Customers  (Design Capacity 2.0 MI/d)	Construction / Implementation	?	0	0	?	-	-	-	0	0	-	0	0	<p>This option would involve the supply of final effluent to non-household customers as non-potable supply. There are a number of possible customers that could accept final effluent from various facilities in the West Cumbria WRZ and no specific wastewater treatment works have been identified for the implementation of this option (as implementation would be dependent on the location of customers that can accept final effluent as a non-potable supply). A 'generic' assessment has therefore been made and it is assumed that the option would comprise: a new break tank and pumping station at an existing water treatment works; new transfer pipeline of 2km length to transfer flows of 2 MI/d; and new receiving storage tanks at the end of the 2km transfer pipeline. It is expected that the break tank and pumping station would be located at an existing water treatments works (it is assumed that storage tanks would be located either at the water treatment works or at the receiving site) and therefore associated effects on biodiversity arising from the construction of this infrastructure (e.g. habitat loss or disturbance) are unlikely to be significant. It is possible that the installation of new transfer pipeline may cause short term, temporary disturbance as a result of excavation activities. The transfer pipeline may also cross locations important for biodiversity (including designated sites) which may affect priority habitats and protected species, although it would be expected that adverse effects would be mitigated where possible using good practice construction techniques. Notwithstanding, as the location of works is unknown, effects on Objective 1 have been assessed as uncertain. As new development associated with this option would be predominantly located at the site of an existing water treatment works, with any soil displaced through excavation returned following the completion of the works, effects on soil/land use are expected to be negligible. It is not expected that construction of this option 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). As the location of the option is currently unknown, construction related impacts on flood risk are uncertain. Emissions to air from HGV movements (construction would generate an estimated 1,250 HGV movements) and plant and machinery may have a negative effect on local air quality during the construction phase, the severity of which would be to a large extent dependent on the proximity of sensitive receptors and existing air quality. Notwithstanding, any impacts would be short term and temporary and may be mitigated to an extent through good practice and therefore effects on Objective 5 have been assessed as negative. Construction would generate an estimated 179 tonnes CO<sub>2</sub>e which has been assessed as having a minor negative effect on Objective 6 (and Objective 10). Construction could affect human health through noise disturbance and air quality impacts (subject to the proximity of sensitive receptors) and temporarily affect recreational receptors. However, it is expected that the majority of works would be undertaken at the site of an existing water treatment works and any impacts would be temporary and are likely to be managed such that effects on Objective 7 have been assessed as negative. Construction would involve a relatively low capital expenditure which is unlikely to generate discernible economic effects. Further, the laying of transfer pipeline may result in short term and temporary adverse impacts on the road network (e.g. as a result of increased vehicle movements, road closures/diversions etc) although such impacts would be temporary. Overall, the option has been assessed as having a neutral effect on Objective 8. The option would not affect water efficiency. Construction would increase resource use, energy demand and generate waste which has been assessed as having a minor negative effective on Objective 10. As construction activity would be largely undertaken within an existing water treatment works, effects on heritage assets and landscape are expected to be negligible. Mains replacement may involve carrying out works in the curtilage or grounds of heritage assets but this would be temporary and managed and in consequence effects would not be significant.</p>
	Operation	?	0	+	?	0	0	0	+	+	0	0	0	

		1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	2. To ensure the appropriate and efficient use of land and protect soil quality	3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies	4. To reduce the risk of flooding	5. To minimise emissions of pollutant gases and particulates and enhance air quality	6. To limit the causes and potential consequences of climate change	7. To ensure the protection and enhancement of human health	8. To maintain and enhance the economic and social well-being of the local community	9. To ensure the sustainable and efficient use of water resources	10. To promote the efficient use of resources	11. To protect and enhance cultural and historic assets	12. To protect and enhance landscape character	Commentary
WC72 Raw Water Losses (Design Capacity 0.08 MI/d)	Construction / Implementation	?	0	0	0	0	0	0	0	0	0	0	<p>This option would involve reducing raw water losses from the system. This would include identification of leaks on raw water transfers and repairing pipes to reduce leakage. Construction activity associated with the repair of leaks is generally not expected to affect 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, as the location of pipes to be repaired is unknown, effects on Objective 1 have been assessed as uncertain. Further, it would be expected that adverse effects would be mitigated where possible using good practice construction techniques. There would be no new land take associated with this option and therefore effects on soils/land use are expected to be negligible with any soil displaced through excavation returned following the completion of works. Water resources and efficiency are unlikely to be affected by the process of leakage repair and in consequence there would be no adverse effects on Objectives 3 or 9. The option is not expected to address or exacerbate flood risk during implementation. Vehicle movements and the operation of plant associated with leak detection and repair may affect local air quality and generate noise/vibration disturbance. However, such impacts would be temporary and are likely to be managed such that effects on Objectives 5 and 7 have been assessed as neutral. The implementation of this option would result in an increase in greenhouse gas emissions as a result of associated vehicle movements and embedded carbon in replacement pipes (although emissions would be negligible). The option would involve a large capital expenditure which is expected to help sustain current employment levels and may create a number of jobs. Further, the option is expected to deliver some supply chain benefits. However, the repair of infrastructure may result in short term and temporary adverse impacts on the road network (e.g. as a result of increased vehicle movements, road closures/diversions etc) although such impacts would be temporary. Overall, the option has been assessed as having a significant positive effect on Objective 8. During construction there would be a minor increase in resource use and construction waste along with fuel usage for vehicles and plant. The repair of pipes may involve carrying out works in the curtilage or grounds of heritage assets but this would be temporary and managed and in consequence effects would not be significant. Given the small scale and short term nature of works under this option and focus on underground infrastructure, together with the assumption that appropriate mitigation would be adopted during construction, it is expected that effects on landscape would be neutral.</p> <p>Once a leak has been repaired there is unlikely to be any effects across the majority of objectives. By reducing raw water losses, the operation of the option is likely to increase/ensure continuity of water supply without the need for additional abstraction which has been assessed as having a minor positive effect in respect of water resources (Objectives 3 and 9). This may in-turn reduce greenhouse gas emissions and energy use associated with reduced treatment and pumping of water. However, potential savings are unlikely to be substantial and therefore effects on Objectives 6 and 10 have been assessed as neutral.</p>	
	Operation	0	0	+	0	0	0	0	0	+	0	0		0



## Demand Management Options Assessment Matrices

The following demand management options have been assessed as part of the SEA of the dWRMP:

Ref	Option	Design Capacity (MI/d)
WC WE01	Domestic Rainwater Harvesting	0.01
WC WE02	Domestic Partnership Retrofit Install	0.026
WC WE03	Domestic Visit and Fix	0.026
WC WE04	Combi Boiler Saving Device - installation through Housing Associations	0.039
WC WE05	Combi Boiler Saving Device - installation by United Utilities	0.049
WC WE06	Retrofit Dual Flush Toilets	0.004
WC WE07	Leaky Loos	0.036
WC WE08	Subsidised Water Efficiency Products Sold via Website - vouchers	0.001
WC WE09	Showerhead Giveaways	0.214
WC WE10	Tourist Sites - promotion and retrofit	0.049
WC WE11	Waterless Car Washing Giveaways	0.026
WC WE12	Free Water Butt Distribution	0.001
WC WE13	Free Showerhead Distribution	0.007
WC WE14	Subsidised Water Efficiency Products Sold via Website - shower heads	0.007
WC WE15	Enhanced Water Savers Pack Distribution	0.058
WC Met-001	Metering on Customer Contact	0.026
WC Met-002a	Enhanced Promotion 5 Year	0.38
WC Met-002b	Enhanced Promotion 10 Year	0.14
WC Met-003	Enhanced Home Water Efficiency Visits	0.08
WC Met-004	Blanket Promotion	0.32
WC Met-005	Metering on Change of Occupier	0.75

		1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	2. To ensure the appropriate and efficient use of land and protect soil quality	3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies	4. To reduce the risk of flooding	5. To minimise emissions of pollutant gases and particulates and enhance air quality	6. To limit the causes and potential consequences of climate change	7. To ensure the protection and enhancement of human health	8. To maintain and enhance the economic and social well-being of the local community	9. To ensure the sustainable and efficient use of water resources	10. To promote the efficient use of resources	11. To protect and enhance cultural and historic assets	12. To protect and enhance landscape character	Commentary
<b>WE01 Domestic Rainwater Harvesting (Design Capacity 0.01 Ml/d)</b>	<b>Construction / Implementation</b>	0	0	0	0	0	0	0	0	0	0	0	0	<p>This option comprises the installation of 1 rainwater harvesting system a year to existing properties over a 5 year period. Activity associated with the implementation of this option would be within the curtilage of residential properties and therefore no effects are predicted on biodiversity, soils/land use, water environment/resources, flooding, historic assets or landscape. The implementation of this option would result in a small increase in vehicle movements although effects on air quality are expected to be negligible. Carbon emissions associated with the installation of the systems (vehicular movements and materials) are estimated to be 5.8 tonnes CO<sub>2</sub>e which has been assessed as having a neutral effect on Objective 6 (and Objective 10). Implementation of the option is not expected to affect human health. It is expected that the installation of devices would be undertaken by existing contractors and therefore any employment opportunities generated by the option would be limited. There may be associated supply-chain benefits related to the manufacture and distribution of the systems although this is not expected to be at a scale that would generate a positive effect on the local/regional economy, particularly given uncertainties in respect of where the devices would be manufactured. The option would necessitate the use of new materials/resources in the manufacture/installation of harvesting systems, although given the number of systems to be installed effects on this aspect of Objective 10 are likely to be neutral.</p> <p>Operation of the option is not expected to have effects on biodiversity, soil/land use, flooding, air quality, health, heritage assets or landscape. The option would reduce demand for water and in consequence, this option has been assessed as having a neutral effect on Objectives 3 and 9. Reducing demand is also expected to, in-turn, reduce greenhouse gas emissions and energy use associated with reduced treatment and pumping of water. However, savings would be negligible due to the relatively low capacity associated with this option and therefore effects on Objectives 6 and 10 have been assessed as neutral. Further, the operation of harvesting systems requires pumping which will increase energy usage. By reducing demand, this option may reduce water bills for metered customers which has the potential to benefit vulnerable customers and increase disposable income although as this option would not be specifically targeted at such customers effects on Objective 8 have been assessed as neutral.</p>
	<b>Operation</b>	0	0	+	0	0	0	0	0	+	0	0	0	

	1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	2. To ensure the appropriate and efficient use of land and protect soil quality	3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies	4. To reduce the risk of flooding	5. To minimise emissions of pollutant gases and particulates and enhance air quality	6. To limit the causes and potential consequences of climate change	7. To ensure the protection and enhancement of human health	8. To maintain and enhance the economic and social well-being of the local community	9. To ensure the sustainable and efficient use of water resources	10. To promote the efficient use of resources	11. To protect and enhance cultural and historic assets	12. To protect and enhance landscape character	Commentary
<b>WE02 Domestic Partnership Retrofit Install (Design Capacity 0.026 Ml/d)</b>													
<b>Construction / Implementation</b>	0	0	0	0	0	0	0	0	0	-	0	0	<p>This option consists of 125 customers a year (over 5 years) receiving a water audit and retrofit (including, for example, shower heads, shower timer and save-a-flush). Activity associated with the implementation of this option would be within residential properties and therefore no effects are predicted on biodiversity, soils/land use, water environment/resources, flooding, historic assets or landscape. This option is not expected to result in an increase in vehicle movements (as installation would be undertaken by plumbers already visiting the customer and therefore no additional vehicle movements are anticipated) and therefore effects on air quality are expected to be negligible. Negligible emissions of carbon are anticipated under this option and in consequence effects on Objective 6 have been assessed as neutral. Implementation of the option is not expected to affect human health. It is expected that the installation of devices would be undertaken by plumbers already undertaking annual surveys/repairs and therefore any employment opportunities generated by the option would be limited. Notwithstanding, implementation of the option would directly benefit these businesses and there may be associated supply-chain benefits related to the manufacture and distribution of water efficiency devices although this is not expected to be at a scale that would generate a significant positive effect on the local/regional economy, particularly given uncertainties in respect of where the devices would be manufactured. The option would necessitate the use of new materials/resources in the manufacture/installation of devices and will generate waste (any replaced facilities or devices).</p> <p>Operation of the option is not expected to have effects on biodiversity, soil/land use, flooding, air quality, health, heritage assets or landscape. The option would reduce demand for water (by 0.026 Ml/d) through both the retrofit of water efficiency devices and audit (which is expected to increase customer awareness of, and action towards, water conservation). This would therefore help to protect surface and groundwater resources from which United Utilities abstracts which has been assessed as having a minor positive effect on Objectives 3 and 9. Reducing demand is also expected to, in-turn, reduce greenhouse gas emissions and energy use associated with reduced treatment, pumping of water and energy consumption within properties. However, savings would be negligible due to the relatively low capacity associated with this option and therefore effects on Objectives 6 and 10 have been assessed as neutral. By reducing demand, this option may reduce water bills for metered customers which has the potential to benefit vulnerable customers and increase disposable income although as this option would not be specifically targeted at such customers effects on Objective 8 have been assessed as neutral.</p>
<b>Operation</b>	0	0	+	0	0	0	0	0	+	0	0	0	

		1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	2. To ensure the appropriate and efficient use of land and protect soil quality	3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies	4. To reduce the risk of flooding	5. To minimise emissions of pollutant gases and particulates and enhance air quality	6. To limit the causes and potential consequences of climate change	7. To ensure the protection and enhancement of human health	8. To maintain and enhance the economic and social well-being of the local community	9. To ensure the sustainable and efficient use of water resources	10. To promote the efficient use of resources	11. To protect and enhance cultural and historic assets	12. To protect and enhance landscape character	Commentary
WE03 Domestic Visit and Fix (Design Capacity 0.026 MI/d)	Construction / Implementation	0	0	0	0	0	0	0	0	0	-	0	0	<p>Under this option, 125 customers a year would receive a water audit and retrofit (including, for example, shower heads, shower timer and save-a-flush) by a United Utilities representative over a 5 year period. Activity associated with the implementation of this option would be within residential properties and therefore no effects are predicted on biodiversity, soils/land use, water environment/resources, flooding, historic assets or landscape. The implementation of this option would result in a small increase in vehicle movements although effects on air quality are expected to be negligible. Carbon emissions associated with the audit/retrofit (vehicular movements and materials) are estimated to be 22 tonnes CO<sub>2</sub>e which has been assessed as having a neutral effect on Objective 6. Implementation of the option is not expected to affect human health. It is expected that the installation of devices would be undertaken by United Utilities staff and therefore only some (limited) employment opportunities may be generated by the option. There may also be associated supply-chain benefits related to the manufacture and distribution of water efficiency devices although this is not expected to be at a scale that would generate a significant positive effect on the local/regional economy, particularly given uncertainties in respect of where the devices would be manufactured. The option would necessitate the use of new materials/resources in the manufacture/installation of devices and will generate waste (any replaced facilities or devices).</p> <p>Operation of the option is not expected to have effects on biodiversity, soil/land use, flooding, air quality, health, heritage assets or landscape. The option would reduce demand for water (by 0.026 MI/d) through both the retrofit of water efficiency devices and audit (which is expected to increase customer awareness of, and action towards, water conservation). This would therefore help to protect surface and groundwater resources from which United Utilities abstracts which has been assessed as having a minor positive effect on Objectives 3 and 9. Reducing demand is also expected to, in-turn, reduce greenhouse gas emissions and energy use associated with reduced treatment, pumping of water and energy consumption within properties. However, savings would be negligible due to the relatively low capacity associated with this option and therefore effects on Objectives 6 and 10 have been assessed as neutral. By reducing demand, this option may reduce water bills for metered customers which has the potential to benefit vulnerable customers and increase disposable income although as this option would not be specifically targeted at such customers effects on Objective 8 have been assessed as neutral.</p>
	Operation	0	0	+	0	0	0	0	0	+	0	0	0	

	1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	2. To ensure the appropriate and efficient use of land and protect soil quality	3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies	4. To reduce the risk of flooding	5. To minimise emissions of pollutant gases and particulates and enhance air quality	6. To limit the causes and potential consequences of climate change	7. To ensure the protection and enhancement of human health	8. To maintain and enhance the economic and social well-being of the local community	9. To ensure the sustainable and efficient use of water resources	10. To promote the efficient use of resources	11. To protect and enhance cultural and historic assets	12. To protect and enhance landscape character	Commentary
<b>WE04 Combi Boiler Saving Device - installation through Housing Associations (Design Capacity 0.039 MI/d)</b>													
<b>Construction / Implementation</b>	0	0	0	0	0	0	0	0	0	-	0	0	<p>This option comprises the provision of a Combi Boiler device to 105 households per year over a 5 year period. Installation would be undertaken by housing associations during their routine visits. Activity associated with the implementation of this option would be within residential properties and therefore no effects are predicted on biodiversity, soils/land use, water environment/resources, flooding, historic assets or landscape. This option is not expected to result in an increase in vehicle movements (as installation would be undertaken by plumbers already visiting the customer and therefore no additional vehicle movements are anticipated) and therefore effects on air quality are expected to be negligible. Carbon emissions associated with the audit/retrofit, which comprises embedded carbon in new devices would be negligible and in consequence effects on Objective 6 have been assessed as neutral. Implementation of the option is not expected to affect human health. It is expected that the installation of devices would be undertaken by existing housing association staff and therefore any employment opportunities generated by the option would be limited. There may be associated supply-chain benefits related to the manufacture and distribution of boiler devices although this is not expected to be at a scale that would generate a positive effect on the local/regional economy, particularly given uncertainties in respect of where the devices would be manufactured. The option would necessitate the use of new materials/resources in the manufacture/installation of devices.</p> <p>Operation of the option is not expected to have effects on biodiversity, soil/land use, flooding, air quality, health, heritage assets or landscape. The option would reduce demand for water (by 0.039 MI/d) and would therefore help to protect surface and groundwater resources from which United Utilities abstracts. This has been assessed as having a minor positive effect on Objectives 3 and 9. Reducing demand is also expected to, in-turn, reduce greenhouse gas emissions and energy use associated with reduced treatment, pumping of water and energy consumption within properties. However, savings would be negligible due to the relatively low capacity associated with this option and therefore effects on Objectives 6 and 10 have been assessed as neutral. By reducing demand, this option may reduce water bills for metered customers which has the potential to benefit vulnerable customers, particularly given that it is delivered through housing associations which is more likely to benefit low income households or those who need support. This has been assessed as having a positive effect on Objective 8.</p>
<b>Operation</b>	0	0	+	0	0	0	0	+	+	0	0	0	

		1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	2. To ensure the appropriate and efficient use of land and protect soil quality	3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies	4. To reduce the risk of flooding	5. To minimise emissions of pollutant gases and particulates and enhance air quality	6. To limit the causes and potential consequences of climate change	7. To ensure the protection and enhancement of human health	8. To maintain and enhance the economic and social well-being of the local community	9. To ensure the sustainable and efficient use of water resources	10. To promote the efficient use of resources	11. To protect and enhance cultural and historic assets	12. To protect and enhance landscape character	Commentary
WE05 Combi Boiler Saving Device - installation by UU  (Design Capacity 0.049 MI/d)	Construction / Implementation	0	0	0	0	0	0	0	0	0	-	0	0	<p>This option comprises the provision of a Combi Boiler device to 131 households per year over a 5 year period. Installation would be carried out by United Utilities. Activity associated with the implementation of this option would be within residential properties and therefore no effects are predicted on biodiversity, soils/land use, water environment/resources, flooding, historic assets or landscape. This option would result in a small increase in vehicle movements although effects on air quality are expected to be negligible. Carbon emissions associated with the audit/retrofit (vehicular movements and materials) are estimated to be 22 tonnes CO<sub>2</sub>e which has been assessed as having a neutral effect on Objective 6. Implementation of the option is not expected to affect human health. It is expected that the installation of devices would be undertaken by existing United Utilities staff/contractors and therefore only limited employment opportunities may be generated under this option. There may be associated supply-chain benefits related to the manufacture and distribution of boiler devices although this is not expected to be at a scale that would generate a significant positive effect on the local/regional economy, particularly given uncertainties in respect of where the devices would be manufactured. The option would necessitate the use of new materials/resources in the manufacture/installation of devices.</p> <p>Operation of the option is not expected to have effects on biodiversity, soil/land use, flooding, air quality, health, heritage assets or landscape. The option would reduce demand for water (by 0.049 MI/d) and would therefore help to protect surface and groundwater resources from which United Utilities abstracts. This has been assessed as having a minor positive effect on Objectives 3 and 9. Reducing demand is also expected to, in-turn, reduce greenhouse gas emissions and energy use associated with reduced treatment, pumping of water and energy consumption within properties. Under this option there would be a maximum saving of 120 tonnes CO<sub>2</sub>e per annum which has been assessed as having a positive effect on Objectives 6 and 10. By reducing demand, this option may reduce water bills for metered customers which has the potential to benefit vulnerable customers and increase disposable income although as this option would not be specifically targeted at such customers effects on Objective 8 have been assessed as neutral.</p>
	Operation	0	0	+	0	0	+	0	0	+	+	0	0	

	1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	2. To ensure the appropriate and efficient use of land and protect soil quality	3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies	4. To reduce the risk of flooding	5. To minimise emissions of pollutant gases and particulates and enhance air quality	6. To limit the causes and potential consequences of climate change	7. To ensure the protection and enhancement of human health	8. To maintain and enhance the economic and social well-being of the local community	9. To ensure the sustainable and efficient use of water resources	10. To promote the efficient use of resources	11. To protect and enhance cultural and historic assets	12. To protect and enhance landscape character	Commentary
<b>WE06 Retrofit Dual Flush Toilets (Design Capacity 0.004 MI/d)</b>													
<b>Construction / Implementation</b>	0	0	0	0	0	0	0	0	0	-	0	0	<p>This option consists of 64 households receiving a water audit and fitting of a dual flush retrofit per year which would be undertaken by United Utilities over a 5 year period. Activity associated with the implementation of this option would be within residential properties and therefore no effects are predicted on biodiversity, soils/land use, water environment/resources, flooding, historic assets or landscape. The implementation of this option would result in a small increase in vehicle movements although effects on air quality are expected to be negligible. Carbon emissions associated with the audit/retrofit (vehicular movements and materials) are estimated to be 11 tonnes CO<sub>2</sub>e and in consequence effects on Objective 6 have been assessed as neutral. Implementation of the option is not expected to affect human health. It is expected that the installation of the dual flush devices would be undertaken by existing United Utilities staff/contractors and therefore any employment opportunities generated by the option would be very limited, particularly given the number of households expected to receive the retrofit. There may be associated supply-chain benefits related to the manufacture and distribution of dual flush devices although this is not expected to be at a scale that would generate a positive effect on the local/regional economy, particularly given uncertainties in respect of where the devices would be manufactured. The option would necessitate the use of new materials/resources in the manufacture/installation of devices and will generate waste (replaced flush mechanisms).</p> <p>Operation of the option is not expected to have effects on biodiversity, soil/land use, flooding, air quality, health, heritage assets or landscape. The option would reduce demand for water (by 0.004 MI/d) through both the retrofit of dual flush devices and audit (which is expected to increase customer awareness of, and action towards, water conservation). This would therefore help to protect surface and groundwater resources from which United Utilities abstracts which has been assessed as having a minor positive effect on Objectives 3 and 9. Reducing demand is also expected to, in-turn, reduce greenhouse gas emissions and energy use associated with reduced treatment and pumping of water. However, savings would be negligible due to the relatively low capacity associated with this option and therefore effects on Objectives 5, 6 and 10 have been assessed as neutral. By reducing demand, this option may reduce water bills for metered customers which has the potential to benefit vulnerable customers and increase disposable income although as this option would not be specifically targeted at such customers effects on Objective 8 have been assessed as neutral.</p>
<b>Operation</b>	0	0	+	0	0	0	0	0	+	0	0	0	



	1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	2. To ensure the appropriate and efficient use of land and protect soil quality	3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies	4. To reduce the risk of flooding	5. To minimise emissions of pollutant gases and particulates and enhance air quality	6. To limit the causes and potential consequences of climate change	7. To ensure the protection and enhancement of human health	8. To maintain and enhance the economic and social well-being of the local community	9. To ensure the sustainable and efficient use of water resources	10. To promote the efficient use of resources	11. To protect and enhance cultural and historic assets	12. To protect and enhance landscape character	Commentary
<b>WE07 Leaky Loos (Design Capacity 0.036 MI/d)</b>													
<b>Construction / Implementation</b>	0	0	0	0	0	0	0	0	0	-	0	0	<p>This option consists of 31 customers receiving a water audit and toilet retrofit per year over a 5 year period. Activity associated with the implementation of this option would be within residential properties and therefore no effects are predicted on biodiversity, soils/land use, water environment/resources, flooding, historic assets or landscape. The implementation of this option would result in a small increase in vehicle movements although effects on air quality are expected to be negligible. Carbon emissions associated with the audit/retrofit (vehicular movements and materials) would be negligible and in consequence effects on Objective 6 have been assessed as neutral. Implementation of the option is not expected to affect human health. It is expected that the installation would be undertaken by existing United Utilities staff/contractors and therefore any employment opportunities generated by the option would be limited. Notwithstanding, there may be associated supply-chain benefits related to the manufacture and distribution of toilet parts although this is not expected to be at a scale that would generate a positive effect on the local/regional economy, particularly given uncertainties in respect of where the parts would be manufactured. The option would necessitate the use of new materials/resources in the manufacture/installation of toilet parts and would generate a small volume of waste.</p> <p>Operation of the option is not expected to have effects on biodiversity, soil/land use, flooding, air quality, health, heritage assets or landscape. The option would reduce demand for water (by 0.036 MI/d) through both the toilet re-fit and audit (which is expected to increase customer awareness of, and action towards, water conservation). This would therefore help to protect surface and groundwater resources from which United Utilities abstracts which has been assessed as having a minor positive effect on Objectives 3 and 9. Reducing demand is also expected to, in-turn, reduce greenhouse gas emissions and energy use associated with reduced treatment, pumping of water and energy consumption within properties. However, savings would be negligible due to the relatively low capacity associated with this option and therefore effects on Objectives 6 and 10 have been assessed as neutral. By reducing demand, this option may reduce water bills for metered customers which has the potential to benefit vulnerable customers and increase disposable income although as this option would not be specifically targeted at such customers effects on Objective 8 have been assessed as neutral.</p>
<b>Operation</b>	0	0	+	0	0	0	0	0	+	0	0	0	

		1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	2. To ensure the appropriate and efficient use of land and protect soil quality	3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies	4. To reduce the risk of flooding	5. To minimise emissions of pollutant gases and particulates and enhance air quality	6. To limit the causes and potential consequences of climate change	7. To ensure the protection and enhancement of human health	8. To maintain and enhance the economic and social well-being of the local community	9. To ensure the sustainable and efficient use of water resources	10. To promote the efficient use of resources	11. To protect and enhance cultural and historic assets	12. To protect and enhance landscape character	Commentary
<b>WE08 Subsidised Water Efficiency Products Sold via Website - vouchers (Design Capacity 0.001 MI/d)</b>	<b>Construction / Implementation</b>	0	0	0	0	0	0	0	0	0	0	0	0	<p>This option consists of customers receiving a water saving voucher to purchase water efficiency products sold via United Utilities' website. It is estimated that 120 vouchers would be provided each year over a 5 year period. The implementation of this option would not involve any new development and therefore it is not expected to generate any effects on biodiversity, soils/land use, water environment/resources, flooding, air quality, historic assets or landscape. No emissions of carbon are anticipated under this option and in consequence effects on Objective 6 have been assessed as neutral. Carbon emissions associated with this option would be negligible and in consequence effects on Objective 6 have been assessed as neutral. Implementation of the option is not expected to affect human health. This option is not expected to generate any direct economic benefits. The provision of vouchers may encourage the purchase of water efficiency products which in-turn could have supply-chain benefits related to their manufacture and distribution although this is not expected to be at a scale that would generate any discernable effect as demand for, and manufacturing output of, products is not expected to increase as a result of the option (there may be potential for United Utilities to promote locally manufactured products through the scheme where cost and quality are acceptable). Indirectly, the option may increase the use of new materials/resources in the manufacture/installation of water efficiency products and waste (replaced devices/facilities) although again, any effects would be negligible.</p> <p>Operation of the option is not expected to have effects on biodiversity, soil/land use, flooding, air quality, health, heritage assets or landscape. The option would reduce demand for water and in consequence, this option has been assessed as having a minor positive effect on Objectives 3 and 9. Reducing demand is also expected to, in-turn, reduce greenhouse gas emissions and energy use associated with reduced treatment, pumping of water and energy consumption within properties. However, savings would be negligible due to the relatively low capacity associated with this option and therefore effects on Objectives 6 and 10 have been assessed as neutral. By reducing demand, this option may reduce water bills for those customers who purchase products and are metered which has the potential to benefit vulnerable customers and increase disposable income although as this option would not be specifically targeted at such customers effects on Objective 8 have been assessed as neutral.</p>
	<b>Operation</b>	0	0	+	0	0	0	0	0	+	0	0	0	

		1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	2. To ensure the appropriate and efficient use of land and protect soil quality	3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies	4. To reduce the risk of flooding	5. To minimise emissions of pollutant gases and particulates and enhance air quality	6. To limit the causes and potential consequences of climate change	7. To ensure the protection and enhancement of human health	8. To maintain and enhance the economic and social well-being of the local community	9. To ensure the sustainable and efficient use of water resources	10. To promote the efficient use of resources	11. To protect and enhance cultural and historic assets	12. To protect and enhance landscape character	Commentary
<b>WE09 Showerhead Giveaways (Design Capacity 0.214 Ml/d)</b>	<b>Construction / Implementation</b>	0	0	0	0	0	0	0	0	-	0	0	<p>This option consists of 2,000 customers per year receiving a water saving showerhead over a 5 year period. The implementation of this option would not involve any new development and therefore it is not expected to generate any effects on biodiversity, soils/land use, water environment/resources, flooding, air quality, historic assets or landscape. Carbon emissions associated with the option are estimated to be 33 tonnes CO<sub>2</sub>e and in consequence effects on Objective 6 have been assessed as neutral. Implementation of the option is not expected to affect human health. Showerheads are expected to be self installed and therefore there would not be any direct effects on Objective 8. Notwithstanding, there may be associated supply-chain benefits related to the manufacture and distribution of showerheads although this is not expected to be at a scale that would generate a positive effect on the local/regional economy, particularly given uncertainties in respect of where the products would be manufactured. The option would necessitate the use of new materials/resources in the manufacture of showerheads and waste (replaced showerheads).</p> <p>Operation of the option is not expected to have effects on biodiversity, soil/land use, flooding, air quality, health, heritage assets or landscape. The option would reduce demand for water (by 0.214 Ml/d). This would therefore help to protect surface and groundwater resources from which United Utilities abstracts which has been assessed as having a minor positive effect on Objectives 3 and 9. Reducing demand is also expected to, in-turn, reduce greenhouse gas emissions and energy use associated with reduced treatment, pumping of water and energy consumption within properties. Under this option there would be a maximum saving of 351 tonnes CO<sub>2</sub>e per annum which has been assessed as having a positive effect on Objectives 6 and 10. By reducing demand, this option may reduce water bills for metered customers which has the potential to benefit vulnerable customers and increase disposable income although as this option would not be specifically targeted at such customers effects on Objective 8 have been assessed as neutral.</p>	
	<b>Operation</b>	0	0	+	0	0	+	0	0	+	+	0		0

		1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	2. To ensure the appropriate and efficient use of land and protect soil quality	3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies	4. To reduce the risk of flooding	5. To minimise emissions of pollutant gases and particulates and enhance air quality	6. To limit the causes and potential consequences of climate change	7. To ensure the protection and enhancement of human health	8. To maintain and enhance the economic and social well-being of the local community	9. To ensure the sustainable and efficient use of water resources	10. To promote the efficient use of resources	11. To protect and enhance cultural and historic assets	12. To protect and enhance landscape character	Commentary
WE10 Tourist Sites - promotion and retrofit (Design Capacity 0.049 MI/d)	Construction / Implementation	0	0	0	0	0	0	0	0	0	0	0	0	<p>This option involves the promotion of water efficiency and retrofit of toilet facilities at 5 tourist sites per year over a 5 year period. No discernable effects have been identified against any of the objectives as a result of the implementation of this option. This reflects the fact that the option does not involve any new development, the minimal number of new products (and associated resources) likely to be required as well as the low volume of waste (old toilet facilities) likely to be generated. Carbon emissions associated with the option are estimated to be 5 tonnes CO<sub>2</sub>e and in consequence effects on Objective 6 have been assessed as neutral. Implementation of the option is not expected to affect human health. It is expected that the installation of devices would be undertaken by existing contractors and therefore any employment opportunities generated by the option would be limited. There may be associated supply-chain benefits related to the manufacture and distribution of facilities although this is not expected to be at a scale that would generate a positive effect on the local/regional economy, particularly given uncertainties in respect of where the devices would be manufactured.</p> <p>Operation of the option is not expected to have effects on biodiversity, soil/land use, flooding, air quality, health, heritage assets or landscape. The option would reduce demand for water (by 0.049 MI/d). This would therefore help to protect surface and groundwater resources from which United Utilities abstracts which has been assessed as having a minor positive effect on Objectives 3 and 9. Reducing demand is also expected to, in-turn, reduce greenhouse gas emissions and energy use associated with reduced treatment, pumping of water and energy consumption at tourist sites. However, savings would be negligible due to the relatively low capacity associated with this option and therefore effects on Objectives 6 and 10 have been assessed as neutral. By reducing demand, this option may reduce water bills for tourist sites and may help cater for increased water demand during peak tourist seasons. However, given the number of sites that are expected to receive retrofits (25 over a 5 year period) effects on Objective 8 are considered to be neutral, although this is to a large extent dependent on the scale of sites selected/their existing level of water demand which is currently unknown.</p>
	Operation	0	0	+	0	0	0	0	0	+	0	0	0	

		1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	2. To ensure the appropriate and efficient use of land and protect soil quality	3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies	4. To reduce the risk of flooding	5. To minimise emissions of pollutant gases and particulates and enhance air quality	6. To limit the causes and potential consequences of climate change	7. To ensure the protection and enhancement of human health	8. To maintain and enhance the economic and social well-being of the local community	9. To ensure the sustainable and efficient use of water resources	10. To promote the efficient use of resources	11. To protect and enhance cultural and historic assets	12. To protect and enhance landscape character	Commentary
<b>WE11 Waterless Car Washing Giveaways (Design Capacity 0.026 Ml/d)</b>	<b>Construction / Implementation</b>	0	0	0	0	0	0	0	0	0	0	0	0	<p>This option consists of 2,000 customers receiving a sample bottle of waterless car wash and voucher to purchase additional bottles over a 5 year period. No discernable effects have been identified against any of the objectives as a result of the implementation of this option. This reflects the fact that the option does not involve any new development and that the number of samples to be provided to customers is low (thereby not generating noticeable effects in respect of resource use and waste and employment) and will only offset the purchase of other car wash products. Carbon emissions associated with the option are estimated to be 0.8 tonnes CO<sub>2</sub>e and in consequence effects on Objective 6 have been assessed as neutral. Implementation of the option is not expected to affect human health.</p> <p>Operation of the option is not expected to have effects on biodiversity, soil/land use, flooding, health, heritage assets or landscape. The option would reduce demand for water (by 0.026 Ml/d). This would therefore help to protect surface and groundwater resources from which United Utilities abstracts which has been assessed as having a minor positive effect on Objectives 3 and 9. Reducing demand is also expected to, in-turn, reduce greenhouse gas emissions and energy use associated with reduced treatment and pumping of water. However, savings would be negligible due to the relatively low capacity associated with this option and therefore effects on Objectives 6 and 10 have been assessed as neutral. By reducing demand, this option may reduce water bills for metered customers which has the potential to generate a positive effect in relation to Objective 8 although any such effects are considered to be negligible.</p>
	<b>Operation</b>	0	0	+	0	0	0	0	0	+	0	0	0	

		1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	2. To ensure the appropriate and efficient use of land and protect soil quality	3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies	4. To reduce the risk of flooding	5. To minimise emissions of pollutant gases and particulates and enhance air quality	6. To limit the causes and potential consequences of climate change	7. To ensure the protection and enhancement of human health	8. To maintain and enhance the economic and social well-being of the local community	9. To ensure the sustainable and efficient use of water resources	10. To promote the efficient use of resources	11. To protect and enhance cultural and historic assets	12. To protect and enhance landscape character	Commentary
<b>WE12 Free Water Butt Distribution (Design Capacity 0.001 Ml/d)</b>	<b>Construction / Implementation</b>	0	0	0	0	0	0	0	0	0	-	0	0	<p>This option consists of the distribution of water butts to 120 customers per year over a 5 year period. The implementation of this option would not involve any new development and therefore it is not expected to generate any effects on biodiversity, soils/land use, water environment/resources, flooding, air quality, historic assets or landscape. Carbon emissions associated with the option are estimated to be 24 tonnes CO<sub>2</sub>e and in consequence effects on Objective 6 have been assessed as neutral. Implementation of the option is not expected to affect human health. Water butts are expected to be self installed and therefore there would not be any direct effects on Objective 8. Notwithstanding, there may be associated supply-chain benefits related to the manufacture and distribution of water butts although this is not expected to be at a scale that would generate a positive effect on the local/regional economy, particularly given uncertainties in respect of where the products would be manufactured. The option would necessitate the use of new materials/resources in the manufacture of waterbutts.</p> <p>Operation of the option is not expected to have effects on biodiversity, soil/land use, flooding, air quality, health, heritage assets or landscape. The option would reduce demand for water and in consequence, this option has been assessed as having a minor positive effect on Objectives 3 and 9. Reducing demand is also expected to, in-turn, reduce greenhouse gas emissions and energy use associated with reduced treatment and pumping of water. However, savings would be negligible due to the relatively low capacity associated with this option and therefore effects on Objectives 6 and 10 have been assessed as neutral. By reducing demand, this option may reduce water bills for those customers who receive the water butts and are metered which has the potential to benefit vulnerable customers and increase disposable income although as this option would not be specifically targeted at such customers effects on Objective 8 have been assessed as neutral.</p>
	<b>Operation</b>	0	0	+	0	0	0	0	0	+	0	0	0	

		1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	2. To ensure the appropriate and efficient use of land and protect soil quality	3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies	4. To reduce the risk of flooding	5. To minimise emissions of pollutant gases and particulates and enhance air quality	6. To limit the causes and potential consequences of climate change	7. To ensure the protection and enhancement of human health	8. To maintain and enhance the economic and social well-being of the local community	9. To ensure the sustainable and efficient use of water resources	10. To promote the efficient use of resources	11. To protect and enhance cultural and historic assets	12. To protect and enhance landscape character	Commentary
<b>WE13 Free Showerhead Distribution (Design Capacity 0.007 MI/d)</b>	<b>Construction / Implementation</b>	0	0	0	0	0	0	0	0	-	0	0	<p>This option consists of the distribution of showerheads to 125 customers per year over a 5 year period. The implementation of this option would not involve any new development and therefore it is not expected to generate any effects on biodiversity, soils/land use, water environment/resources, flooding, air quality, historic assets or landscape. Carbon emissions associated with the option are estimated to be 2 tonnes CO<sub>2</sub>e and in consequence effects on Objective 6 have been assessed as neutral. Implementation of the option is not expected to affect human health. Showerheads are expected to be self installed and therefore there would not be any direct effects on Objective 8. Notwithstanding, there may be associated supply-chain benefits related to the manufacture and distribution of showerheads although this is not expected to be at a scale that would generate a positive effect on the local/regional economy, particularly given uncertainties in respect of where the products would be manufactured. The option would necessitate the use of new materials/resources in the manufacture of showerheads and generate waste (replaced showerheads).</p> <p>Operation of the option is not expected to have effects on biodiversity, soil/land use, flooding, air quality, health, heritage assets or landscape. The option would reduce demand for water (by 0.007 MI/d). This would therefore help to protect surface and groundwater resources from which United Utilities abstracts which has been assessed as having a minor positive effect on Objectives 3 and 9. Reducing demand is also expected to, in-turn, reduce greenhouse gas emissions and energy use associated with reduced treatment and pumping of water. However, savings would be negligible due to the relatively low capacity associated with this option and therefore effects on Objectives 6 and 10 have been assessed as neutral. By reducing demand, this option may reduce water bills for metered customers which has the potential to benefit vulnerable customers and increase disposable income although as this option would not be specifically targeted at such customers effects on Objective 8 have been assessed as neutral.</p>	
	<b>Operation</b>	0	0	+	0	0	0	0	+	0	0	0		



		1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	2. To ensure the appropriate and efficient use of land and protect soil quality	3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies	4. To reduce the risk of flooding	5. To minimise emissions of pollutant gases and particulates and enhance air quality	6. To limit the causes and potential consequences of climate change	7. To ensure the protection and enhancement of human health	8. To maintain and enhance the economic and social well-being of the local community	9. To ensure the sustainable and efficient use of water resources	10. To promote the efficient use of resources	11. To protect and enhance cultural and historic assets	12. To protect and enhance landscape character	Commentary
<b>WE14 Subsidised Water Efficiency Products Sold via Website - showerheads (Design Capacity 0.007 Ml/d)</b>	<b>Construction / Implementation</b>	0	0	0	0	0	0	0	0	0	-	0	0	<p>This option consists of subsidised showerheads being sold via United Utilities' website. It is estimated that 120 showerheads would be sold each year over a 5 year period. The implementation of this option would not involve any new development and therefore it is not expected to generate any effects on biodiversity, soils/land use, water environment/resources, flooding, air quality, historic assets or landscape. Carbon emissions associated with the option would be negligible and therefore effects on Objective 6 have been assessed as neutral. Implementation of the option is not expected to affect human health. This option is not expected to generate any direct economic benefits. The sale of subsidised showerheads may encourage take-up which in-turn could have supply-chain benefits related to their manufacture and distribution although this is not expected to be at a scale that would generate a positive effect on the local/regional economy, particularly given uncertainties in respect of where the products would be manufactured. Indirectly, the option would necessitate the use of new materials/resources in the manufacture of showerheads and generate waste (replaced showerheads).</p> <p>Operation of the option is not expected to have effects on biodiversity, soil/land use, flooding, air quality, health, heritage assets or landscape. The option would reduce demand for water (by 0.007 Ml/d). This would therefore help to protect surface and groundwater resources from which United Utilities abstracts which has been assessed as having a minor positive effect on Objectives 3 and 9. Reducing demand is also expected to, in-turn, reduce greenhouse gas emissions and energy use associated with reduced treatment, pumping of water and energy consumption within properties. However, savings would be negligible due to the relatively low capacity associated with this option and therefore effects on Objectives 6 and 10 have been assessed as neutral. By reducing demand, this option may reduce water bills for metered customers which has the potential to benefit vulnerable customers and increase disposable income although as this option would not be specifically targeted at such customers effects on Objective 8 have been assessed as neutral.</p>
	<b>Operation</b>	0	0	+	0	0	0	0	0	+	0	0	0	

		1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	2. To ensure the appropriate and efficient use of land and protect soil quality	3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies	4. To reduce the risk of flooding	5. To minimise emissions of pollutant gases and particulates and enhance air quality	6. To limit the causes and potential consequences of climate change	7. To ensure the protection and enhancement of human health	8. To maintain and enhance the economic and social well-being of the local community	9. To ensure the sustainable and efficient use of water resources	10. To promote the efficient use of resources	11. To protect and enhance cultural and historic assets	12. To protect and enhance landscape character	Commentary
WE15 Enhanced Water Savers Pack Distribution (Design Capacity 0.058 Ml/d)	Construction / Implementation	0	0	0	0	0	0	0	0	0	-	0	0	<p>This option comprises the distribution of 313 enhanced water savers packs to United Utilities' customers per year over a 5 year period. The implementation of this option would not involve any new development and therefore it is not expected to generate any effects on biodiversity, soils/land use, water environment/resources, flooding, air quality, historic assets or landscape. Carbon emissions associated with the option would be negligible and therefore effects on Objective 6 have been assessed as neutral. Implementation of the option is not expected to affect human health. Water efficiency products contained within the packs are expected to be self installed and therefore there would not be any direct effects on Objective 8. Notwithstanding, there may be associated supply-chain benefits related to the manufacture and distribution of these products although this is not expected to be at a scale that would generate a positive effect on the local/regional economy, particularly given uncertainties in respect of where the products would be manufactured. The option would necessitate the use of new materials/resources in the manufacture of water efficiency products and may generate waste (e.g. replaced showerheads).</p> <p>Operation of the option is not expected to have effects on biodiversity, soil/land use, flooding, air quality, health, heritage assets or landscape. The option would reduce demand for water (by 0.058 Ml/d). This would therefore help to protect surface and groundwater resources from which United Utilities abstracts which has been assessed as having a minor positive effect on Objectives 3 and 9. Reducing demand is also expected to, in-turn, reduce greenhouse gas emissions and energy use associated with reduced treatment, pumping of water and energy consumption within properties. However, savings would be negligible due to the relatively low capacity associated with this option and therefore effects on Objectives 6 and 10 have been assessed as neutral. By reducing demand, this option may reduce water bills for metered customers which has the potential to benefit vulnerable customers and increase disposable income although as this option would not be specifically targeted at such customers effects on Objective 8 have been assessed as neutral.</p>
	Operation	0	0	+	0	0	0	0	0	+	0	0	0	

		Commentary												
		1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	2. To ensure the appropriate and efficient use of land and protect soil quality	3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies	4. To reduce the risk of flooding	5. To minimise emissions of pollutant gases and particulates and enhance air quality	6. To limit the causes and potential consequences of climate change	7. To ensure the protection and enhancement of human health	8. To maintain and enhance the economic and social well-being of the local community	9. To ensure the sustainable and efficient use of water resources	10. To promote the efficient use of resources	11. To protect and enhance cultural and historic assets	12. To protect and enhance landscape character	
WC-Met-001 Metering on Customer Contact  (Design Capacity 0.26Ml/d)	Construction / Implementation	0	0	0	0	0	-	0	0	0	-	0	0	<p>Under this option free metering would be offered to unmeasured customers on contact with United Utilities. An average of 357 meters would be installed per annum at customer properties (between AMP6 and AMP10). Works associated with the installation of meters would not be expected to affect biodiversity, land use/soil, the water environment/resources, flooding, cultural heritage or landscape as construction activity would be small scale and undertaken within properties wherever possible. The option would generate an average of 703 vehicle movements per annum during implementation which is not considered to be of a scale likely to generate substantial adverse effects on Objectives 5 and 7, particularly as these movements would be dispersed across the West Cumbria area. Carbon emissions associated with the option are estimated to be 630 tonnes CO<sub>2</sub>e (over a 25 year period) which has been assessed as having a minor negative effect on Objective 6 (and Objective 10). Implementation of the option is not expected to affect human health. This option has a low capital spend which is unlikely to generate substantial or sustained economic effects. During implementation there would be an increase in fuel usage for vehicles and additional resources associated with the manufacture of meters which has been assessed as having a minor negative effect on Objective 10.</p> <p>Once meters are installed, there is unlikely to be any effects across the majority of objectives. Ongoing maintenance and metering (via drive-by) is expected to generate vehicle movements (a total of 19,127 per annum) although air quality impacts are not expected to be significant. The option would have a design capacity of 0.26 Ml/d and would therefore help to protect surface and groundwater resources from which United Utilities abstracts. This has been assessed as having a minor positive effect on Objectives 3 and 9. This may in-turn reduce greenhouse gas emissions and energy use associated with reduced treatment and pumping of water. However, net savings associated with this option would be negligible and therefore effects on Objectives 6 and 10 have been assessed as neutral. Ongoing maintenance/meter reading activities may help to sustain current employment levels and generate a limited number of jobs, although economic benefits are not expected to be substantial.</p>
	Operation	0	0	+	0	0	0	0	0	+	0	0	0	

		Commentary												
		1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	2. To ensure the appropriate and efficient use of land and protect soil quality	3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies	4. To reduce the risk of flooding	5. To minimise emissions of pollutant gases and particulates and enhance air quality	6. To limit the causes and potential consequences of climate change	7. To ensure the protection and enhancement of human health	8. To maintain and enhance the economic and social well-being of the local community	9. To ensure the sustainable and efficient use of water resources	10. To promote the efficient use of resources	11. To protect and enhance cultural and historic assets	12. To protect and enhance landscape character	
WC-Met-002a Enhanced Promotion  (Design Capacity 0.38M/d)	Construction / Implementation	0	0	0	0	0	-	0	0	0	-	0	0	<p>This option would comprise targeted promotion at those customers who are likely to benefit financially from metering. It is anticipated that an average of 2,606 meters would be installed per annum under this option (during AMP6). Works associated with the installation of meters would not be expected to affect biodiversity, land use/soil, the water environment/resources, flooding, cultural heritage or landscape as construction activity would be small scale and undertaken within properties wherever possible. The option would generate an average of 5,211 vehicle movements per annum during implementation which is not considered to be of a scale likely to generate substantial adverse effects on Objectives 5 and 7, particularly as these movements would be dispersed across the West Cumbria area. Carbon emissions associated with the option are estimated to be 919 tonnes CO<sub>2</sub>e which has been assessed as having a minor negative effect on Objective 6 (and Objective 10). Implementation of the option is not expected to affect human health. This option has a low capital spend which is unlikely to generate substantial or sustained economic effects. During implementation there would be an increase in fuel usage for vehicles and additional resources associated with the manufacture of meters which has been assessed as having a minor negative effect on Objective 10.</p> <p>Once meters are installed, there is unlikely to be any effects across the majority of objectives. Ongoing maintenance and metering (via drive-by) is expected to generate vehicle movements (an average of 47,944 per annum) although air quality impacts are not expected to be significant. The option would have a design capacity of 0.38 Ml/d and would therefore help to protect surface and groundwater resources from which United Utilities abstracts. This has been assessed as having a minor positive effect on Objectives 3 and 9. This may in-turn reduce greenhouse gas emissions and energy use associated with reduced treatment and pumping of water and in this context it is estimated that this option would save up to 127 tonnes CO<sub>2</sub>e/a which has been assessed as having a minor positive effect on Objectives 6 and 10. Ongoing maintenance/meter reading activities may help to sustain current employment levels and generate a limited number of jobs. In specifically targeting households that are likely to benefit financially from metering, this option may reduce water bills for newly metered customers which has the potential to benefit vulnerable customers and increase disposable income, generating a positive effect in relation to Objective 8. Effects in this regard could be enhanced should the option be targeted at vulnerable customers.</p>
	Operation	0	0	+	0	0	+	0	0	+	+	0	0	

		1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits												2. To ensure the appropriate and efficient use of land and protect soil quality												3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies												4. To reduce the risk of flooding												5. To minimise emissions of pollutant gases and particulates and enhance air quality												6. To limit the causes and potential consequences of climate change												7. To ensure the protection and enhancement of human health												8. To maintain and enhance the economic and social well-being of the local community												9. To ensure the sustainable and efficient use of water resources												10. To promote the efficient use of resources												11. To protect and enhance cultural and historic assets												12. To protect and enhance landscape character												Commentary
WC-Met-002b Enhanced Promotion  (Design Capacity 0.14Ml/d)	Construction / Implementation	0												0												0												0												0												-												0												0												0												-												0												0												<p>This option would comprise targeted promotion at those customers who are likely to benefit financially from metering. It is anticipated that an average of 490 meters would be installed per annum under this option (during AMP6 and AMP7). Works associated with the installation of meters would not be expected to affect biodiversity, land use/soil, the water environment/resources, flooding, cultural heritage or landscape as construction activity would be small scale and undertaken within properties wherever possible. The option would generate an average of 980 vehicle movements per annum during construction which may have minor air quality impacts. However, such impacts would be temporary such that effects on Objectives 5 and 7 have been assessed as neutral. Carbon emissions associated with the option are estimated to be 346 tonnes CO<sub>2</sub>e which has been assessed as having a minor negative effect on Objective 6 (and Objective 10). Implementation of the option is not expected to affect human health. This option has a low capital spend which is unlikely to generate substantial or sustained economic effects. During implementation there would be an increase in fuel usage for vehicles and additional resources associated with the manufacture of meters which has been assessed as having a minor negative effect on Objective 10.</p> <p>Once meters are installed, there is unlikely to be any effects across the majority of objectives. Ongoing maintenance and metering (via drive-by) is expected to generate vehicle movements (an average of 14,331 per annum) although air quality impacts are not expected to be significant. The option would have a design capacity of 0.14 Ml/d and would therefore help to protect surface and groundwater resources from which United Utilities abstracts. This has been assessed as having a minor positive effect on Objectives 3 and 9. This may in-turn reduce greenhouse gas emissions and energy use associated with reduced treatment and pumping of water. However, net savings associated with this option would be negligible and therefore effects on Objectives 6 and 10 have been assessed as neutral. Ongoing maintenance/meter reading activities may help to sustain current employment levels and generate a limited number of jobs. In specifically targeting households that are likely to benefit financially from metering, this option may reduce water bills for newly metered customers which has the potential to benefit vulnerable customers and increase disposable income, generating a positive effect in relation to Objective 8. Effects in this regard could be enhanced should the option be targeted at vulnerable customers.</p>
	Operation	0												0												+												0												0												0												0												0												+												0												0												0												

		1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	2. To ensure the appropriate and efficient use of land and protect soil quality	3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies	4. To reduce the risk of flooding	5. To minimise emissions of pollutant gases and particulates and enhance air quality	6. To limit the causes and potential consequences of climate change	7. To ensure the protection and enhancement of human health	8. To maintain and enhance the economic and social well-being of the local community	9. To ensure the sustainable and efficient use of water resources	10. To promote the efficient use of resources	11. To protect and enhance cultural and historic assets	12. To protect and enhance landscape character	Commentary
<b>WC-Met-003 Enhanced Home Water Efficiency Visits</b>	<b>Construction / Implementation</b>	0	0	0	0	0	-	0	0	0	-	0	0	<p>Under this option free metering would be offered to customers as part of home water efficiency visits. It is anticipated that an average of 110 meters would be installed per annum at customer properties (between AMP6 and AMP10). Works associated with the installation of meters would not be expected to affect biodiversity, land use/soil, the water environment/resources, flooding, cultural heritage or landscape as construction activity would be small scale and undertaken within properties wherever possible. The option would generate an average of 221 vehicle movements per annum during construction which may have a minor impact on air quality. However, such impacts would be temporary such that effects on Objectives 5 and 7 have been assessed as neutral. Carbon emissions associated with the option are estimated to be 195 tonnes CO<sub>2</sub>e which has been assessed as having a minor negative effect on Objective 6 (and Objective 10). Implementation of the option is not expected to affect human health. This option has a low capital spend which is unlikely to generate substantial or sustained economic effects. During implementation there would be an increase in fuel usage for vehicles and additional resources associated with the manufacture of meters which has been assessed as having a minor negative effect on Objective 10.</p> <p>Once meters are installed, there is unlikely to be any effects across the majority of objectives. Ongoing maintenance and metering (via drive-by) is expected to generate vehicle movements (an average of 5,579 per annum) although air quality impacts are not expected to be significant. The option would reduce demand for water which has been assessed as having a minor positive effect on Objectives 3 and 9. A reduction in demand may in-turn reduce greenhouse gas emissions and energy use associated with reduced treatment and pumping of water. However, net savings associated with this option would be negligible and therefore effects on Objectives 6 and 10 have been assessed as neutral. Ongoing maintenance/meter reading activities may help to sustain current employment levels and generate a limited number of jobs, although economic benefits are not expected to be substantial.</p>
<b>(Design Capacity 0.08MI/d)</b>	<b>Operation</b>	0	0	+	0	0	0	0	+	0	0	0		

		Commentary												
		1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	2. To ensure the appropriate and efficient use of land and protect soil quality	3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies	4. To reduce the risk of flooding	5. To minimise emissions of pollutant gases and particulates and enhance air quality	6. To limit the causes and potential consequences of climate change	7. To ensure the protection and enhancement of human health	8. To maintain and enhance the economic and social well-being of the local community	9. To ensure the sustainable and efficient use of water resources	10. To promote the efficient use of resources	11. To protect and enhance cultural and historic assets	12. To protect and enhance landscape character	
<b>WC-Met-004 Blanket Promotion  (Design Capacity 0.32 MI/d)</b>	<b>Construction / Implementation</b>	0	0	0	0	0	-	0	0	0	-	0	0	<p>This option would comprise blanket promotion of free metering to all customers. It is anticipated that an average of 442 meters would be installed per annum at customer properties (between AMP6 and AMP10). Works associated with the installation of meters would not be expected to affect biodiversity, land use/soil, the water environment/resources, flooding, cultural heritage or landscape as construction activity would be small scale and undertaken within properties wherever possible. The option would generate an average of 884 vehicle movements per annum during construction which may have minor air quality impacts. However, such impacts would be temporary such that effects on Objectives 5 and 7 have been assessed as neutral. Carbon emissions associated with the option are estimated to be 780 tonnes CO<sub>2</sub>e which has been assessed as having a minor negative effect on Objective 6 (and Objective 10). Implementation of the option is not expected to affect human health. This option has a low capital spend which is unlikely to generate substantial or sustained economic effects. During implementation there would be an increase in fuel usage for vehicles and additional resources associated with the manufacture of meters which has been assessed as having a minor negative effect on Objective 10.</p> <p>Once meters are installed, there is unlikely to be any effects across the majority of objectives. Ongoing maintenance and metering (via drive-by) is expected to generate vehicle movements (an average of 22,304 per annum) although air quality impacts are not expected to be significant. The option would have a design capacity of 0.32 MI/d and would therefore help to protect surface and groundwater resources from which United Utilities abstracts. This has been assessed as having a minor positive effect on Objectives 3 and 9. This may in-turn reduce greenhouse gas emissions and energy use associated with reduced treatment and pumping of water and in this context it is estimated that this option would save up to 108 tonnes CO<sub>2</sub>e/a which has been assessed as having a minor positive effect on Objectives 6 and 10. Ongoing maintenance/meter reading activities may help to sustain current employment levels and generate a limited number of jobs, although economic benefits are not expected to be substantial.</p>
	<b>Operation</b>	0	0	+	0	0	0	+	0	0	+	+	0	



		1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	2. To ensure the appropriate and efficient use of land and protect soil quality	3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies	4. To reduce the risk of flooding	5. To minimise emissions of pollutant gases and particulates and enhance air quality	6. To limit the causes and potential consequences of climate change	7. To ensure the protection and enhancement of human health	8. To maintain and enhance the economic and social well-being of the local community	9. To ensure the sustainable and efficient use of water resources	10. To promote the efficient use of resources	11. To protect and enhance cultural and historic assets	12. To protect and enhance landscape character	Commentary
<b>WC-Met-005 Metering on Change of Occupancy</b>	<b>Construction / Implementation</b>	0	0	0	0	0	-	0	0	0	-	0	0	<p>Under this option meters would be installed at customer properties when the property changes ownership. It is anticipated that an average of 1,038 meters would be installed per annum at customer properties (between AMP6 and AMP10). Works associated with the installation of meters would not be expected to affect biodiversity, land use/soil, the water environment/resources, flooding, cultural heritage or landscape as construction activity would be small scale and undertaken within properties wherever possible. The option would generate an average of 2,075 vehicle movements per annum during construction which may have a minor impact on air quality. However, such impacts would be temporary such that effects on Objectives 5 and 7 have been assessed as neutral. Carbon emissions associated with the option are estimated to be 1,830 tonnes CO<sub>2</sub>e which has been assessed as having a significant negative effect on Objectives 6 and 10. Implementation of the option is not expected to affect human health. This option has a low capital spend which is unlikely to generate substantial or sustained economic effects.</p> <p>Once meters are installed, there is unlikely to be any effects across the majority of objectives. Ongoing maintenance and metering (via drive-by) is expected to generate vehicle movements (an average of 66,432 per annum) although air quality impacts are not expected to be significant. The option would have a design capacity of 0.75 Ml/d and would therefore help to protect surface and groundwater resources from which United Utilities abstracts. This has been assessed as having a minor positive effect on Objectives 3 and 9. This may in-turn reduce greenhouse gas emissions and energy use associated with reduced treatment and pumping of water and in this context it is estimated that this option would save up to 252 tonnes CO<sub>2</sub>e/a which has been assessed as having a minor positive effect on Objectives 6 and 10. Ongoing maintenance/meter reading activities may help to sustain current employment levels and generate a limited number of jobs, although economic benefits are not expected to be substantial.</p>
<b>(Design Capacity 0.75 Ml/d)</b>	<b>Operation</b>	0	0	+	0	0	+	0	0	+	+	0	0	

## Leakage and Network Metering Options Assessment Matrices

The following leakage and network metering options have been assessed as part of the SEA of the dWRMP:

Ref	Option	Design Capacity (MI/d)
WC-LEA01	Leakage Detection Stage 1	1.70
WC-LEA02	Leakage Detection Stage 2	1.00
WC-LEA03	Infrastructure Replacement Stage 1	0.11
WC-LEA04	Pressure Management Stage 1	0.44
WC-LEA05	Increased Verification of Existing Meters	0.06
WC-LEA06	Increased Number of Continuously Logged Meters	0.01
WC-LEA08	Widespread Metering Using AMR	0.94
WC-LEA09	Splitting DMAs	0.02
WC-LEA10	Splitting Large Upstream Tiles	0.13
WC-LEA11	Establishing Water Balance Areas	0.00

		1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	2. To ensure the appropriate and efficient use of land and protect soil quality	3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies	4. To reduce the risk of flooding	5. To minimise emissions of pollutant gases and particulates and enhance air quality	6. To limit the causes and potential consequences of climate change	7. To ensure the protection and enhancement of human health	8. To maintain and enhance the economic and social well-being of the local community	9. To ensure the sustainable and efficient use of water resources	10. To promote the efficient use of resources	11. To protect and enhance cultural and historic assets	12. To protect and enhance landscape character	Commentary
WC-LEA01 Leakage Detection Stage 1 (Design Capacity 1.70 MI/d)	Construction / Implementation	?	0	0	0	0	-	0	0	0	-	0	0	<p>This option would involve an increase in leakage detection and repair activity (such as fractured pipe repair or replacement) within the West Cumbria WRZ (an additional 175 surveys and 269 repairs would be undertaken per annum). Construction activity associated with the repair of leaks is generally not expected to affect 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, localised temporary disturbance caused by excavation) in these instances. However, as the location of pipes to be repaired is unknown, effects on Objective 1 have been assessed as uncertain although in most cases would be expected to be minor. Further, it would be expected that adverse effects would be mitigated where possible using best practice construction techniques. There would be no new land take associated with this option and therefore effects on soils/land use are expected to be negligible with any soil displaced through excavation returned following the completion of works. Water resources and efficiency are unlikely to be affected by the process of leakage repair and in consequence there would be no adverse effects on Objectives 3 or 9. The option is not expected to address or exacerbate flood risk during implementation. Vehicle movements (444 per annum) and the operation of plant associated with leak detection and repair may affect localised air quality and generate noise/vibration disturbance. There may also be disruption to water supply. However, such impacts would be minor and temporary and are likely to be managed such that effects on Objectives 5 and 7 have been assessed as neutral. The implementation of this option would result in a minor increase in greenhouse gas emissions (108 tonnes CO<sub>2</sub>e) which has been assessed as having a minor negative effect on Objective 6 (and Objective 10). This option has a low capital spend which is unlikely to generate substantial or sustained economic effects. The repair of infrastructure may result in short term and temporary adverse impacts on the road network (e.g. as a result of increased vehicle movements, road closures/diversions etc) although such impacts would be temporary. Overall, the option has been assessed as having a neutral effect on Objective 8 (economic and social well being). During construction there would be a minor increase in resource use and waste arisings along with fuel usage for vehicles and plant. The repair of pipes may involve carrying out works in the curtilage or grounds of heritage assets but this would be temporary and managed and in consequence effects would not be neutral. Given the small scale and short term nature of works under this option and focus on underground infrastructure, together with the assumption that appropriate mitigation would be adopted during construction, it is expected that effects on landscape would be neutral.</p> <p>Once a leak has been repaired there is unlikely to be any effects across the majority of objectives. Operation of the option is likely to increase/ensure continuity of water supply (the option has a design capacity of 1.70 MI/d), generating a minor positive effect in respect of water resources (Objectives 3 and 9). This may in-turn reduce greenhouse gas emissions and energy use associated with reduced treatment and pumping of water and in this context it is estimated that this option would save up to 133 tonnes CO<sub>2</sub>e/a which has been assessed as having a minor positive effect on Objectives 6 and 10. This option has a design capacity of 1.70 MI/d which may support economic/population growth. This has been assessed as having a minor positive effect on Objective 8.</p>
	Operation	0	0	+	0	0	0	+	0	+	+	+	0	

		1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	2. To ensure the appropriate and efficient use of land and protect soil quality	3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies	4. To reduce the risk of flooding	5. To minimise emissions of pollutant gases and particulates and enhance air quality	6. To limit the causes and potential consequences of climate change	7. To ensure the protection and enhancement of human health	8. To maintain and enhance the economic and social well-being of the local community	9. To ensure the sustainable and efficient use of water resources	10. To promote the efficient use of resources	11. To protect and enhance cultural and historic assets	12. To protect and enhance landscape character	Commentary
WC-LEA02 Leakage Detection Stage 2 (Design Capacity 2.70 MI/d - including WC- LEA01)	Construction / Implementation	?	0	0	0	0	-	0	+	0	-	0	0	<p>Under this option there would be a total of 1,555 leakage repairs and 1,015 surveys per annum. The range and type of effects associated with the implementation of this option are expected to be similar to those identified in respect of leakage detection Stage 1 (Option WC-LEA01). As under Option WC-LEA01, the location of pipes to be repaired is unknown and therefore effects on Objective 1 have been assessed as uncertain. There would be no new land take associated with this option and therefore effects on soils/land use are expected to be negligible with any soil displaced through excavation returned following the completion of works. Water resources and efficiency are unlikely to be affected by the process of leakage repair and in consequence there would be no adverse effects on Objectives 3 or 9. The option is not expected to address or exacerbate flood risk during implementation. Vehicle movements (2,571 per annum) and the operation of plant associated with leak detection and repair may affect localised air quality and generate noise/vibration disturbance. There may also be disruption to water supply. However, such impacts would be temporary and are likely to be managed such that effects on Objectives 5 and 7 have been assessed as neutral. The implementation of this option would result in an increase in greenhouse gas emissions (626 tonnes CO<sub>2</sub>e per annum) as a result of associated vehicle movements and embedded carbon in materials. This has been assessed as having a minor negative effect on Objective 6 (and Objective 10). Initial capital expenditure and ongoing operational expenditure associated with repairs (considered here under construction) would be of a scale likely to generate a minor positive effect on Objective 8. The repair of infrastructure may result in short term and temporary adverse impacts on the road network (e.g. as a result of increased vehicle movements, road closures/diversions etc) although such impacts would be temporary. Overall, the option has been assessed as having a minor positive effect on Objective 8 (economic and social well being). During construction there would be a minor increase in resource use and waste arisings along with fuel usage for vehicles and plant. The repair of pipes may involve carrying out works in the curtilage or grounds of heritage assets but this would be temporary and managed and in consequence effects would be neutral. Given the small scale and short term nature of works under this option and focus on underground infrastructure, together with the assumption that appropriate mitigation would be adopted during construction, it is expected that effects on landscape would be neutral.</p> <p>As with construction/implementation, the range and type of effects associated with the operation of this option are expected to be similar to those identified in respect of leakage detection Stage 1 (Option WC-LEA01). However, this option would have a design capacity of 2.70 MI/d which is likely to further enhance positive effects on Objectives 3 and 9 (although not to the extent that the effects would be deemed to be significant). This may in-turn further reduce greenhouse gas emissions and energy use associated with reduced treatment and pumping of water and in this context it is estimated that this option would save up to 212 tonnes CO<sub>2</sub>e/a which has been assessed as having a minor positive effect on Objectives 6 and 10. This option has a design capacity of 2.70 MI/d which may support economic/population growth. This has been assessed as having a minor positive effect on Objective 8.</p>
	Operation	0	0	+	0	0	0	+	0	+	+	+	0	

		1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	2. To ensure the appropriate and efficient use of land and protect soil quality	3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies	4. To reduce the risk of flooding	5. To minimise emissions of pollutant gases and particulates and enhance air quality	6. To limit the causes and potential consequences of climate change	7. To ensure the protection and enhancement of human health	8. To maintain and enhance the economic and social well-being of the local community	9. To ensure the sustainable and efficient use of water resources	10. To promote the efficient use of resources	11. To protect and enhance cultural and historic assets	12. To protect and enhance landscape character	Commentary
WC-LEA03 Infrastructure Replacement Stage 1 (Design Capacity 0.11 MI/d)	Construction / Implementation	?	0	0	0	0	--	0	0	0	--	0	0	<p>This option would involve the refurbishment/replacement of 41.3km of existing mains within the West Cumbria WRZ. No specific locations on the water supply network have been provided for this option and it is assumed that the option would be targeted at the worst performing mains within the network. Construction activity associated with the replacement of mains is generally not expected to affect 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, as the location of works is unknown, effects on Objective 1 have been assessed as uncertain. Further, it would be expected that adverse effects would be mitigated where possible using best practice construction techniques. There would be no new land take associated with this option and therefore effects on soils/land use are expected to be negligible with any soil displaced through excavation returned following the completion of works. Water resources are unlikely to be affected by the process of mains replacement and in consequence there would be no adverse effects on Objectives 3 or 9. The option will neither increase nor exacerbate flood risk during implementation. Vehicle movements (3,142 per annum) and the operation of plant associated with mains replacement may affect local air quality and generate noise/vibration disturbance and there may also be water supply disruption. However, any impacts would be temporary and are likely to be managed such that effects on Objectives 5 and 7 have been assessed as neutral. The implementation of this option would result in an increase in greenhouse gas emissions (up to 2,722 CO<sub>2</sub>e per annum) as a result of associated vehicle movements and embedded carbon in replacement pipes. This has been assessed as having a significant negative effect on Objective 6 (and Objective 10). This option has a low capital spend which is unlikely to generate substantial or sustained economic effects. The replacement of infrastructure may result in short term and temporary adverse impacts on the road network (e.g. as a result of increased vehicle movements, road closures/diversions etc) although such impacts would be temporary. Overall, the option has been assessed as having a neutral effect on Objective 8 (economic and social well being). During construction there would be an increase in resource use and waste arisings along with fuel usage for vehicles and plant which has been assessed as having a significant negative effect on Objective 10. Mains replacement may involve carrying out works in the curtilage or grounds of heritage assets but this would be temporary and managed and in consequence effects would be neutral. Given the short term nature of the works under this option and focus on underground infrastructure, together with the assumption that appropriate mitigation would be adopted during construction, it is expected that effects on landscape would be neutral.</p> <p>Once mains have been replaced there is unlikely to be any effects across the majority of objectives. Operation of the option is likely to increase/ensure continuity of water supply by reducing leakage (the option has a design capacity of 0.11 MI/d), generating a positive effect in respect of water resources (Objectives 3 and 9). This may in-turn reduce greenhouse gas emissions and energy use associated with reduced treatment and pumping of water. However, savings would be negligible and therefore effects on Objectives 6 and 10 have been assessed as neutral.</p>
	Operation	0	0	+	0	0	0	0	0	+	0	0	0	

		1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	2. To ensure the appropriate and efficient use of land and protect soil quality	3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies	4. To reduce the risk of flooding	5. To minimise emissions of pollutant gases and particulates and enhance air quality	6. To limit the causes and potential consequences of climate change	7. To ensure the protection and enhancement of human health	8. To maintain and enhance the economic and social well-being of the local community	9. To ensure the sustainable and efficient use of water resources	10. To promote the efficient use of resources	11. To protect and enhance cultural and historic assets	12. To protect and enhance landscape character	Commentary
WC-LEA04 Pressure Management Stage 1 (Design Capacity 0.44 MI/d)	Construction / Implementation	?	0	0	0	0	-	0	0	0	-	0	0	<p>This option seeks to manage and reduce pressure within the distribution network in order to reduce leakage. It comprises the construction of chambers and installation of pressure management valves (PMVs) on the existing distribution network (a total of 9.5km of mains would be replaced and 19 new or modified PMVs would be installed under this option). The installation of PMVs is generally not expected to affect biodiversity with works expected to be undertaken beneath road surfaces in most instances. Notwithstanding, 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, as the location of works is unknown, effects on Objective 1 have been assessed as uncertain. Further, it would be expected that adverse effects would be mitigated where possible using best practice construction techniques. There would be no new land take associated with this option and therefore effects on soils/land use are expected to be negligible with any soil displaced through excavation returned following the completion of works. Water resources and efficiency are unlikely to be affected by the installation of PMVs and in consequence there would be no adverse effects on Objectives 3 or 9. The option is not expected to address or exacerbate flood risk during implementation. Vehicle movements (780 per annum) and the operation of plant associated with construction activity may affect local air quality and generate noise/vibration disturbance. There may also be disruption to water supply. However, such impacts would be temporary and are likely to be managed such that effects on Objectives 5 and 7 have been assessed as neutral. The implementation of this option would result in an increase in greenhouse gas emissions (626 CO<sub>2</sub>e per annum) which has been assessed as having a minor negative effect on Objective 6 (and Objective 10). This option has a low capital spend which is unlikely to generate substantial or sustained economic effects. However, the installation of PMVs may result in short term and temporary adverse impacts on the road network (e.g. as a result of increased vehicle movements, road closures/diversions etc) although such impacts would be temporary. Overall, the option has been assessed as having a neutral effect on Objective 8 (economic and social well being). During construction activities there would be a minor increase in resource use and waste arising along with fuel usage for vehicles and plant. The installation of PMVs may involve carrying out works in the curtilage or grounds of heritage assets but this would be temporary and managed and in consequence effects would be neutral. Given the small scale and short term nature of works under this option and focus on underground infrastructure, together with the assumption that appropriate mitigation would be adopted during construction, it is expected that effects on landscape would be neutral.</p> <p>Once works associated with the implementation of this option are complete, there is unlikely to be any effects across the majority of objectives. Ongoing maintenance activities would generate vehicle movements although air quality impacts are not expected to be significant. The option would have a design capacity of 0.44 MI/d and would therefore help to protect surface and groundwater resources from which United Utilities abstracts. This has been assessed as having a positive effect on Objectives 3 and 9. This may in-turn reduce greenhouse gas emissions and energy use associated with reduced treatment and pumping of water. However, net savings associated with this option (taking into account vehicle movements) would be negligible and therefore effects on Objectives 6 and 10 have been assessed as neutral. PMVs are likely to reduce disruption from mains failure which has been assessed as having a positive effect on Objective 7. Ongoing maintenance activities may help to sustain current employment levels, although economic benefits are unlikely to be substantial.</p>
	Operation	0	0	+	0	0	0	+	0	+	0	0	0	

		1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	2. To ensure the appropriate and efficient use of land and protect soil quality	3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies	4. To reduce the risk of flooding	5. To minimise emissions of pollutant gases and particulates and enhance air quality	6. To limit the causes and potential consequences of climate change	7. To ensure the protection and enhancement of human health	8. To maintain and enhance the economic and social well-being of the local community	9. To ensure the sustainable and efficient use of water resources	10. To promote the efficient use of resources	11. To protect and enhance cultural and historic assets	12. To protect and enhance landscape character	Commentary
<b>WC-LEA05 Increased Verification of Existing Metres (Design Capacity 0.06 MI/d)</b>	<b>Construction / Implementation</b>	0	0	0	0	0	0	0	0	0	-	0	0	<p>This option comprises an increase in the number of on-site checks to determine the accuracy of flow being registered through a meter, with inaccurate meters replaced. The implementation of this option would not involve any new development and therefore it is not expected to generate any effects on biodiversity, soils/land use, water environment/resources, flooding, historic assets or landscape. The implementation of this option would result in a small increase in vehicle movements although effects on air quality are expected to be negligible. Carbon emissions associated with the option would be negligible and in consequence effects on Objective 6 have been assessed as neutral. Implementation of the option is not expected to affect human health. This option has a low capital spend which is unlikely to generate substantial or sustained economic effects. During implementation there would be a minor increase in fuel usage for vehicles and additional resources/waste associated with the manufacture of new (and disposal of existing) meters which has been assessed as having a minor negative effect on Objective 10.</p> <p>Operation of the option is not expected to have effects on biodiversity, soil/land use, flooding, air quality, health, the local economy, heritage assets or landscape. The option would have a design capacity of 0.06 MI/d as a result of increased leakage detection (and subsequent reduction) and would therefore help to protect surface and groundwater resources from which United Utilities abstracts. This has been assessed as having a minor positive effect on Objectives 3 and 9. This may in-turn reduce greenhouse gas emissions and energy use associated with reduced treatment and pumping of water. However, savings would be negligible and therefore effects on Objectives 6 and 10 have been assessed as neutral.</p>
	<b>Operation</b>	0	0	+	0	0	0	0	0	+	0	0	0	



		1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	2. To ensure the appropriate and efficient use of land and protect soil quality	3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies	4. To reduce the risk of flooding	5. To minimise emissions of pollutant gases and particulates and enhance air quality	6. To limit the causes and potential consequences of climate change	7. To ensure the protection and enhancement of human health	8. To maintain and enhance the economic and social well-being of the local community	9. To ensure the sustainable and efficient use of water resources	10. To promote the efficient use of resources	11. To protect and enhance cultural and historic assets	12. To protect and enhance landscape character	Commentary
<b>WC-LEA06 Increased Number of Continuously Logged Meters (Design Capacity 0.01 MI/d)</b>	<b>Construction / Implementation</b>	0	0	0	0	0	0	0	0	-	0	0	<p>This option comprises the installation of temporary loggers to all customers identified as having a) high consumption (above 500 l/hr); b) in District Metered Areas (DMAs) with poor operability; c) in DMAs with good operability; to assess which customers have the biggest impact on the operability within DMAs. It is assumed that 10% of the customers temporarily logged will become permanent continuously logged users. The implementation of this option would not involve any new development or construction works and therefore it is not expected to generate any effects on biodiversity, soils/land use, water environment/resources, flooding, historic assets or landscape. This option would result in a small increase in vehicle movements although effects on air quality are expected to be negligible. Carbon emissions associated with the option would be negligible and in consequence effects on Objective 6 have been assessed as neutral. Implementation of the option is not expected to affect human health. This option has a low capital spend which is unlikely to generate substantial or sustained economic effects. During implementation there would be a minor increase in fuel usage for vehicles and additional resources associated with the manufacture of loggers which has been assessed as having a minor negative effect on Objective 10.</p> <p>Operation of the option is not expected to have effects on biodiversity, soil/land use, flooding, air quality, health, the local economy, heritage assets or landscape. The option would have a design capacity of 0.01 MI/d through enhanced leakage detection (and subsequent reduction) and would therefore help to protect surface and groundwater resources from which United Utilities abstracts. The option may also reduce customer demand. This has been assessed as having a minor positive effect on Objectives 3 and 9. This may in-turn reduce greenhouse gas emissions and energy use associated with reduced treatment and pumping of water. However, savings would be negligible and therefore effects on Objectives 6 and 10 have been assessed as neutral.</p>	
	<b>Operation</b>	0	0	+	0	0	0	0	+	0	0	0		

		1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	2. To ensure the appropriate and efficient use of land and protect soil quality	3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies	4. To reduce the risk of flooding	5. To minimise emissions of pollutant gases and particulates and enhance air quality	6. To limit the causes and potential consequences of climate change	7. To ensure the protection and enhancement of human health	8. To maintain and enhance the economic and social well-being of the local community	9. To ensure the sustainable and efficient use of water resources	10. To promote the efficient use of resources	11. To protect and enhance cultural and historic assets	12. To protect and enhance landscape character	Commentary
WC-LEA08 Widspread Metering Using AMR  (Design Capacity 0.94 MI/d)	Construction / Implementation	0	0	0	0	0	-	0	++	0	-	0	0	<p>This option consists of the (internal) installation of meters on currently unmeasured properties, plus installation of AMR units on existing metered properties with monthly meter readings taken via drive-by. The implementation of this option would not involve any new development and the installation of meters would be undertaken inside properties. In consequence, no effects are predicted on biodiversity, soils/land use, water environment/resources, flooding, historic assets or landscape. Vehicle movements (732 per annum) associated with the installation of meters may affect local air quality and generate noise/vibration disturbance. However, such impacts would be temporary such that effects on Objectives 5 and 7 have been assessed as neutral. Carbon emissions associated with the option is estimated to be 418 CO<sub>2</sub>e per annum which has been assessed as having a minor negative effect on Objective 6 (and Objective 10). Implementation of the option is not expected to affect human health. This option has a high capital spend which has been assessed as having a significant positive effect on Objective 8. During implementation there would be an increase in fuel usage for vehicles and additional resources associated with the manufacture of meters and AMR units which has been assessed as having a minor negative effect on Objective 10.</p> <p>Once meters and AMR units are installed, there is unlikely to be any effects across the majority of objectives. Ongoing maintenance and metering (via drive-by) is expected to generate vehicle movements although air quality impacts are not expected to be significant. The option would have a design capacity of 0.94 MI/d and would therefore help to protect surface and groundwater resources from which United Utilities abstracts. This has been assessed as having a minor positive effect on Objectives 3 and 9. This may in-turn reduce greenhouse gas emissions and energy use associated with reduced treatment and pumping of water. However, net savings associated with this option (taking into account vehicle movements) would be negligible and therefore effects on Objectives 6 and 10 have been assessed as neutral. Ongoing maintenance/meter reading activities may help to sustain current employment levels and generate a limited number of jobs, although economic benefits are not expected to be substantial.</p>
	Operation	0	0	+	0	0	0	0	0	+	0	0	0	

	1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	2. To ensure the appropriate and efficient use of land and protect soil quality	3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies	4. To reduce the risk of flooding	5. To minimise emissions of pollutant gases and particulates and enhance air quality	6. To limit the causes and potential consequences of climate change	7. To ensure the protection and enhancement of human health	8. To maintain and enhance the economic and social well-being of the local community	9. To ensure the sustainable and efficient use of water resources	10. To promote the efficient use of resources	11. To protect and enhance cultural and historic assets	12. To protect and enhance landscape character	Commentary
<b>WC-LEA09 Splitting DMAs (Design Capacity 0.02 MI/d)</b>	?	0	0	0	0	0	0	0	0	-	0	0	<p>This option includes a study of each non-operable DMA to determine the reason for the DMA being non-operable and to carry out the appropriate action to remedy any issues. The option scope includes office design, hydraulic modelling and site investigation, plus construction of chambers and installation of meters and repair of pipework and other equipment (including loggers). The desk-based component of this option (office design and modelling) is expected to have a neutral effect across all the objectives. Resulting activities including the installation of meters would largely not be expected to affect biodiversity, land use/soil, the water environment/resources, flooding or landscape as construction activity would be small scale and undertaken within or near to the curtilage of properties. However, it is possible that the repair of pipework could 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, as the location of pipes to be repaired is unknown, effects on Objective 1 have been assessed as uncertain. Implementation of this option is not expected to generate a large number of vehicle movements and it has therefore been assessed as having a neutral effect on air quality. Carbon emissions associated with the option would be negligible and in consequence effects on Objective 6 have been assessed as neutral. Vehicle movements and the operation of plant associated particularly with the repair of pipework may affect local air quality and generate noise/vibration disturbance. There may also be disruption to water supply. However, such impacts would be temporary and are likely to be managed such that effects on health have been assessed as neutral. This option is expected to help sustain current employment levels and is likely to generate a number of jobs. There may also be associated supply-chain benefits related to, for example, the manufacture and distribution of meters. However, the repair of infrastructure may result in short term and temporary adverse impacts on the road network (e.g. as a result of increased vehicle movements, road closures/diversions etc) although such impacts would be temporary. Overall, the implementation of this option has been assessed as having a neutral effect on Objective 8. During implementation there would be an increase in fuel usage for vehicles/plant and resource use associated with construction activity and the manufacture of equipment such as meters which has been assessed as having a minor negative effect on Objective 10. The repair of pipes may involve carrying out works in the curtilage or grounds of heritage assets but this would be temporary and managed and in consequence effects would be neutral.</p> <p>Once works associated with the implementation of this option are complete, there is unlikely to be any effects across the majority of objectives. Ongoing maintenance activities would generate vehicle movements although air quality impacts are not expected to be significant. The option would have a design capacity of 0.02 MI/d and would therefore help to protect surface and groundwater resources from which United Utilities abstracts. This has been assessed as having a positive effect on Objectives 3 and 9. This may in-turn reduce greenhouse gas emissions and energy use associated with reduced treatment and pumping of water. However, net savings associated with this option (taking into account vehicle movements) would be negligible and therefore effects on Objectives 6 and 10 have been assessed as neutral. Ongoing maintenance activities may help to sustain current employment levels and generate a limited number of jobs, although any economic benefits are unlikely to be substantial.</p>
<b>Construction / Implementation</b>	0	0	+	0	0	0	0	0	+	0	0	0	
<b>Operation</b>	0	0	+	0	0	0	0	0	+	0	0	0	

	1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	2. To ensure the appropriate and efficient use of land and protect soil quality	3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies	4. To reduce the risk of flooding	5. To minimise emissions of pollutant gases and particulates and enhance air quality	6. To limit the causes and potential consequences of climate change	7. To ensure the protection and enhancement of human health	8. To maintain and enhance the economic and social well-being of the local community	9. To ensure the sustainable and efficient use of water resources	10. To promote the efficient use of resources	11. To protect and enhance cultural and historic assets	12. To protect and enhance landscape character	Commentary
<b>WC-LEA10 Splitting Large Upstream Tiles (Design Capacity 0.13 MI/d)</b>													
<b>Construction / Implementation</b>	?	0	0	0	0	0	0	0	0	-	0	0	<p>This option includes initial desk studies and site visits to determine the validity of identified faults before replacing existing, and installing new, meters and probes on existing United Utilities' infrastructure. The desk-based component of this option is expected to have a neutral effect across all the objectives. The repair of existing/installation of new meters and probes is generally not expected to affect 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, as the location of works is unknown, effects on Objective 1 have been assessed as uncertain. Further, it would be expected that adverse effects would be mitigated where possible using best practice construction techniques. There would be no new land take associated with this option and therefore effects on soils/land use are expected to be negligible with any soil displaced through excavation returned following the completion of works. Water resources and efficiency are unlikely to be affected by the repair and installation of meters and probes and in consequence there would be no adverse effects on Objectives 3 or 9. The option is not expected to address or exacerbate flood risk during implementation. Vehicle movements and the operation of plant associated with construction activity may affect local air quality and generate noise/vibration disturbance. There may also be disruption to water supply. However, such impacts would be temporary and are likely to be managed such that effects on Objectives 5 and 7 have been assessed as neutral. Carbon emissions associated with the option would be negligible and in consequence effects on Objective 6 have been assessed as neutral. This option is expected to help sustain current employment levels and may generate a limited number of jobs. However, the repair of existing infrastructure and installation of new meters and probes may result in short term and temporary adverse impacts on the road network (e.g. as a result of increased vehicle movements, road closures/diversions etc) although such impacts would be temporary. Overall, the option has been assessed as having a neutral effect on Objective 8. During construction activities there would be a minor increase in resource use and waste arisings along with fuel usage for vehicles and plant. The repair of existing equipment and installation of new meters and probes may involve carrying out works in the curtilage or grounds of heritage assets but this would be temporary and managed and in consequence effects would be neutral. Given the small scale and short term nature of works under this option and focus on underground infrastructure, together with the assumption that appropriate mitigation would be adopted during construction, it is expected that effects on landscape would be neutral.</p>
<b>Operation</b>	0	0	+	0	0	0	0	0	+	0	0	0	

		1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits	2. To ensure the appropriate and efficient use of land and protect soil quality	3. To protect and enhance the quantity and quality of surface and groundwater resource and the ecological status of water bodies	4. To reduce the risk of flooding	5. To minimise emissions of pollutant gases and particulates and enhance air quality	6. To limit the causes and potential consequences of climate change	7. To ensure the protection and enhancement of human health	8. To maintain and enhance the economic and social well-being of the local community	9. To ensure the sustainable and efficient use of water resources	10. To promote the efficient use of resources	11. To protect and enhance cultural and historic assets	12. To protect and enhance landscape character	Commentary
WC-LEA11 Establishing Water Balance Areas (Design Capacity 0.00 MI/d)	Construction / Implementation	0	0	0	0	0	0	0	0	0	0	0	0	This option comprises a desk-based exercise to establish new hydraulic areas in Netbase. No discernable effects have been identified against any of the objectives as a result of the implementation of this option. This reflects the fact that the option does not involve any new development or construction activity.
	Operation	0	0	0	0	0	0	0	0	0	0	0	0	The operation of this option is unlikely to have any effects across any of the SEA objectives. Design capacity associated with this option would be negligible which has been assessed as having a neutral effect on Objectives 3 and 9.

# **Appendix E**

## **Preferred Option and Alternatives Assessment Matrices**





## Preferred Option and Alternatives Assessment

This appendix presents the findings of the detailed assessments of the preferred option for the West Cumbria WRZ and alternatives. These options are:

- WC01: Thirlmere Transfer into West Cumbria (the preferred dWRMP option);
- WC14d: Kielder Water Transfer to West Cumbria (Cumwhinton Treated);
- Lower Cost Option, comprising: Wastewater (negotiate part abstraction licence) (WC04); Development of New Boreholes in West Cumbria Aquifer (10 MI/d) (WC05a); Development of Boreholes in North Cumbria Aquifer (WC09); and Crummock Automated Compensation Control (WC19).

The following matrices present the findings of the assessment.

## WC01: Thirlmere Transfer into West Cumbria (Design Capacity- 80MI/d)

### Option Summary

This option would involve increasing abstraction from Thirlmere reservoir within current licence conditions by enhancing infrastructure capacity. The option would require a new treatment works and pumping station (PS) near Bridge End at the outlet of Thirlmere reservoir. Treated water would be pumped to a new service reservoir (SR) at Castle Rigg, from which the water would flow by gravity down a large diameter trunk main (LDTM) terminating at Stainburn SR. There would be three main take-offs from this LDTM to supply the Corn How, Ennerdale and Quarry Hill areas. The Ennerdale and Corn How connections would not require any additional pumping to deliver treated water to the existing Corn How SR (which would be upgraded) and a proposed new replacement SR at Ennerdale. However, additional pumping would be required to transfer flows from Corn How to Buttermere SR. The Quarry Hill take-off would require booster pumping to deliver water to Bothel Moor SR. The total length of additional new pipeline required under this option would be approximately 100km.

This option would also involve the abandonment of three existing WTWs in West Cumbria namely, Quarry Hill, Ennerdale, and Corn How. It should be noted that the option would involve the decommissioning of the sources from permanent operational use, although United Utilities may seek to retain some locations as drought sources (e.g. Scales BHs, South Egremont BHs).

### Option Assessment

The assessment of Option WC01: Thirlmere Transfer into West Cumbria is presented in **Table E.1** below.

**Table E.1 WC01: Thirlmere Transfer into West Cumbria**

Objective	Guide questions	Relationship		Commentary
		Construction	Operation	
<p><b>1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits</b></p>	<p>Will the option protect and enhance where possible the most important sites for nature conservation (e.g. internationally or nationally designated conservation sites such as SACs, SPAs, Ramsar and SSSIs)?</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 lead to a change in the ecological quality of habitats due to changes in groundwater/river water quality and/or quantity?</p>	-	++	<p><b>Effects of Construction</b></p> <p>Several of the proposed development sites are adjacent, or in close proximity, to designated conservation sites. These include: Bridge End (adjacent to River Derwent and Bassenthwaite Lake SAC and River Derwent and Tributaries SSSI and in close proximity to Thirlmere Woods SSSI/Ancient Woodland); Ennerdale (adjacent to River Ehen SAC/SSSI to the east and in close proximity to Lake District High Fells SAC, Pillar and Ennerdale Fells SSSI and Ennerdale SSSI); Corn How (adjacent to River Derwent and Tributaries SSSI and River Derwent and Bassenthwaite Lake SAC); and Buttermere (adjacent to Lake District High Fells SAC and Buttermere Fells SSSI). Pipeline sections would cross/run adjacent to the River Ehen SAC whilst other pipeline sections would be in close proximity to other designated sites (for example: the River Derwent and Bassenthwaite Lake SAC, Lake District High Fells SAC, Clints Quarry SAC and North Pennine Dales Meadows SAC). The HRA identifies that there is potential for significant construction effects on the River Derwent and Bassenthwaite Lake SAC, Clints Quarry SAC, Lake District High Fells SAC and River Ehen SAC if the works are not managed appropriately.</p> <p>Clints Quarry supports great crested newts (GCN) within a number of pools, with the closest unit of this SAC approximately 160m from a pipeline route within the A595. The HRA states that works entirely within the road would not affect any suitable habitat for this species, although it is possible that mitigation (exclusion fencing) may be required if the pipe trench is open during the key migration periods. Works outside the carriageway may affect habitats that are suitable for this species but are not anticipated at this stage. However, the risk of effects can be easily managed with established mitigation and no significant effects would be anticipated.</p> <p>The proposed pipeline to Buttermere SR would run immediately adjacent to the Buttermere Fells SSSI unit of the Lake District High Fells SAC, where the pipe runs up the Buttermere valley along the B5289. The HRA notes that it is not possible to determine exactly which interest features are present adjacent to the road in this sector of the SAC based on the available data but it concludes that the rocky features adjacent to the road are unlikely to be especially sensitive to indirect effects (e.g. dust deposition etc.) and that assuming all the works are retained within the existing carriageway, then the scheme would not be expected to have any effects on the SAC.</p> <p>The proposed pipeline to a new SR at Ennerdale would cross the River Ehen at</p>

Objective	Guide questions	Relationship		Commentary
		Construction	Operation	
				<p>least once and possibly (depending on the route) up to three times. It is likely that these crossings would be by existing road bridges but it is possible that a new pipebridge or sub-surface lay may be required. Atlantic salmon and freshwater pearl mussel are present throughout the SAC and works anywhere near the river could potentially affect these species directly or indirectly. However, the HRA concludes that mitigation (e.g. a specific sediment control regime and commitment to not remove any bankside trees) will ensure that significant sediment discharges do not occur. United Utilities have also stated that they intend to keep the pipeline works to existing roads and crossings where possible. The pearl mussel is also dependent on Atlantic salmon for part of its lifecycle and so any effects on this species would negatively affect pearl mussel also. Atlantic salmon will be vulnerable to the same potential effects as freshwater pearl mussel, particularly with regard to sedimentation, and the same monitoring/mitigation measures would apply. Additionally, salmon will be sensitive to noise and vibration disturbance, particularly during the key migration periods and so construction works must be timed to avoid possible effects on migrating salmon (construction within 200m of the river should be completed before late summer, prior to the autumn migration period).</p> <p>Significant construction effects on the River Derwent and Bassenthwaite Lake SAC are possible due to the proximity of the works to the St. Johns Beck tributary, which is known to provide spawning areas for Atlantic salmon. However, as with other construction works it is considered that any effects can be avoided with appropriate timing of works and construction control measures.</p> <p>UU have stated that pipelines will be routed along existing carriageways and river crossings (or via suitable alternative routes identified in discussion with Natural England and the Environment Agency). In addition, it is likely that any potential effects can be avoided or mitigated with suitable measures – for example, by timing construction works near rivers to avoid the key migration periods for salmon; and by developing specific silt control plans to manage construction run-off. On this basis, there is nothing to suggest that the scheme could not be accommodated without significant construction-related effects occurring. It should also be noted that further, scheme level investigations and appropriate assessment would be required at the project stage in any case.</p> <p>Notwithstanding the above, this option would result in the loss of greenfield land at several development sites and in consequence there is potential for localised loss of habitat and, in conjunction with decommissioning works, disturbance which has been assessed as having a minor negative effect on biodiversity.</p> <p><b>Effects of Operation</b></p>

Objective	Guide questions	Relationship		Commentary
		Construction	Operation	
				<p>The scheme is designed to relieve pressure on the River Ehen SAC. Abstraction from Ennerdale Water, which discharges into the Ehen, has been identified for amendments under the Review of Consents programme due to the impact of abstraction on interest features in the SAC (primarily fresh water pearl mussels). The decommissioning of Ennerdale WTW and associated abstraction from Ennerdale Water under this option may therefore generate benefits in respect of these features due to increased flows. In this respect, the HRA identifies that, whilst the interest features of European designated sites are not directly exposed to the likely operational effects of the scheme, increased flows within the Ehen would benefit the interest features of the SAC.</p> <p>It is assumed that compensation flow to St John's Beck would be maintained in accordance with the existing consent and in consequence no adverse effects on the River Derwent and Bassenthwaite Lake SAC and the River Derwent and Tributaries SSSI (which includes the Beck) would be expected. The decommissioning of Quarry Hill WTW would result in a reduction in abstraction from Dash Beck and Hause Gill, sources that have been investigated under the Review of Consents programme due to impacts on salmon, which are interest features of the River Derwent and Tributaries SSSI and River Derwent and Bassenthwaite Lake SAC. The decommissioning of Quarry Hill WTW and associated reduction in abstraction from Overwater Reservoir may also benefit Overwater Reservoir SSSI, which has previously been identified for reductions by the Environment Agency.</p> <p>The decommissioning of Corn How WTW and cessation of abstraction from Crummock Water may also lead to benefits in respect of the River Derwent and Tributaries SSSI and River Derwent and Bassenthwaite Lake SAC, although this source has not been identified for reduction under the Review of Consents programme.</p> <p>Changes in operating levels of the reservoir may affect local biodiversity in the reservoir although effects are not expected to be significant as mean levels would be similar to current operation.</p> <p>Taking into account the potential operational benefits in respect of the River Ehen SAC and River Derwent and Bassenthwaite Lake SAC in particular, this option has been assessed as having a significant positive effect on biodiversity.</p> <p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>• Scheme specific mitigation plans will be required to ensure that any construction related adverse effects on designated sites are avoided and localised effects on biodiversity minimised. With specific regard to the Clints</li> </ul>

Objective	Guide questions	Relationship		Commentary
		Construction	Operation	
				<p>Quarry SAC, mitigation requirements for GCN would need to be reviewed at the scheme level. With respect to the River Ehen SAC and River Derwent and Bassenthwaite Lake SAC, the scheme should be designed to ensure that no bankside trees are removed. Construction within 200m of the river should be completed before late summer, prior to the autumn migration period.</p> <ul style="list-style-type: none"> <li>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.</li> <li>Bio-security measures should be implemented during construction and operational phases.</li> </ul> <p><b>Assumptions</b></p> <ul style="list-style-type: none"> <li>It has been assumed that the new pipeline would be predominantly routed along existing roads. Where this is not possible, alternative solutions will be discussed with Natural England and the Environment Agency to mitigate any impact of those alternatives.</li> <li>It is assumed that compensation flow to St John's Beck would be maintained in accordance with the existing consent.</li> </ul> <p><b>Uncertainty</b></p> <ul style="list-style-type: none"> <li>None identified.</li> </ul>
<p><b>2. To ensure the appropriate and efficient use of land and protect soil quality</b></p>	<p>Will additional land be required for the development or implementation of the option or will the option require below ground works leading to land sterilisation?</p> <p>Will the option utilise previously developed land?</p> <p>Will the option protect and enhance protected sites designated for their geological interest and wider geodiversity?</p> <p>Will the option minimise the loss of best and most versatile soil?</p> <p>Will the option minimise conflict with existing land use patterns?</p> <p>Will the option minimise land contamination?</p>	-	0	<p><b>Effects of Construction</b></p> <p>This option would involve upgrading/replacing facilities at a number of existing sites. These sites include:</p> <ul style="list-style-type: none"> <li>Castle Rigg (upgrade of existing SR).</li> <li>Corn How (Fluoride storage &amp; dosing on existing SR outlets).</li> <li>Ennerdale (upgrade of existing SR).</li> </ul> <p>However, it is expected that several option components would be located on greenfield land. These components would include the new WTW and PS near Bridge End, SR at Bothel Moor, PS at Buttermere and PS at Quarry Hill. Further, for some of those elements that involve the upgrade of existing facilities (specifically the SRs at Castle Rigg and Ennerdale), it is assumed that some additional land take would be required.</p> <p>It is assumed that new pipeline would predominantly be routed along existing</p>

Objective	Guide questions	Relationship		Commentary
		Construction	Operation	
				<p>roads and in consequence, no substantial adverse effects on land use/soils are expected. Further, it is anticipated that any soils displaced during excavation associated with pipeline works would be replaced, supported by a revegetation scheme such that any adverse effects would be temporary.</p> <p>The majority of development sites are situated within areas of poor agricultural land quality (defined as grades 4/5 under Defra's Agricultural Land Classification system) or non-agricultural areas. Development of the SR at Bothel Moor and new PS at Quarry Hill may result in the loss of Grade 3 (good to moderate) agricultural land, dependent on the exact location of the sites. No loss of agricultural land classified as grade 1 (excellent) or grade 2 (very good) is anticipated.</p> <p>As the majority of development would be located at, or adjacent to, existing sites owned/operated by United Utilities, the option is not expected to result in substantial conflict with existing land use patterns.</p> <p>It is not expected that geologically protected sites would be adversely affected by the construction of this scheme.</p> <p>Overall, the construction of this option has been assessed as having a minor negative effect on this objective which principally reflects the loss of greenfield land required to accommodate the development of new (and upgrade of existing) facilities.</p> <p><b>Effects of Operation</b></p> <p>Once construction activity is complete, no ongoing impact on land use/soils is expected (initial loss of land during construction has been assessed under construction). At sites where existing WTWs are decommissioned, land use benefits are likely to be negligible as other water infrastructure such as PSs and SRs would be retained on site. Overall, operational effects have therefore been assessed as neutral.</p> <p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>• Appropriate construction methods should be employed to minimise the risk of contamination.</li> </ul> <p><b>Assumptions</b></p> <ul style="list-style-type: none"> <li>• It has been assumed that development sites are not contaminated.</li> <li>• It has been assumed that any decommissioned sites would be fully remediated, as required.</li> <li>• It has been assumed that the new pipeline would be predominantly routed</li> </ul>



Objective	Guide questions	Relationship		Commentary
		Construction	Operation	
				<p>along existing roads.</p> <ul style="list-style-type: none"> <li>It is expected that soils displaced during excavation associated with pipeline works would be replaced following the completion of construction activity.</li> </ul> <p><b>Uncertainty</b></p> <ul style="list-style-type: none"> <li>The exact footprint of new infrastructure required under this option is unknown at this stage.</li> </ul>
<p><b>3. To protect and enhance the quantity and quality of surface and groundwater resources and the ecological status of water bodies</b></p>	<p>Will the option minimise the demand for water resources?</p> <p>Will the option protect and improve surface, groundwater, estuarine 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 affect the ecological status of water bodies?</p>	<p>0</p>	<p>++</p>	<p><b>Effects of Construction</b></p> <p>During construction (and decommissioning), there is the potential for contaminants such as silt, concrete or fuel oil to pollute watercourses, particularly given that several development sites and pipeline works would be in close proximity to/cross rivers including the Derwent, Ehen and Eden. Contaminants may also affect Thirlmere and Ennerdale via surface run off from construction given the proximity of the proposed development sites to these reservoirs. However, 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><b>Effects of Operation</b></p> <p>Under operation, storage in Thirlmere reservoir would be lower than under current operational practice. Higher flows in St Johns Beck would be impacted as a result of the reservoir being drawn down more and not spilling as frequently. However, it is assumed that low flows in St Johns Beck would be unchanged compared to current operation as compensation flow would be maintained in accordance with the existing consent. Further, the reservoir and downstream river sections are located in the Upper Derwent Water Resources Management Unit which has a water resource availability status of 'water available'.</p> <p>The decommissioning of Quarry Hill, Ennerdale and Corn How WTWs may increase flows in the catchments in which associated abstractions are located (Dash Beck, Bassenthwaite/Derwent, Ellen, Ehen and Cocker). Taking into account the associated benefits in respect of the River Ehen SAC and River Derwent and Bassenthwaite Lake SAC in particular, on balance the option has been assessed as having a potentially significant positive effect on this objective.</p> <p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>None identified.</li> </ul>

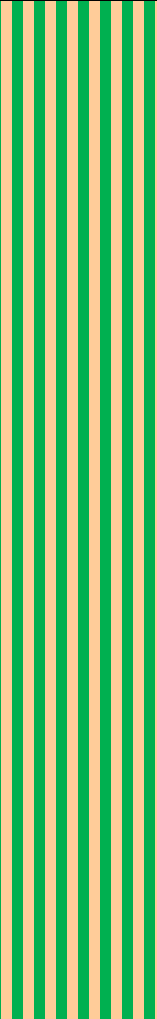
Objective	Guide questions	Relationship		Commentary
		Construction	Operation	
				<p><b>Assumptions</b></p> <ul style="list-style-type: none"> <li>It is assumed that construction activities would be undertaken in accordance with relevant best practice pollution prevention guidance and that appropriate mitigation would be implemented (such as dust suppression, soil containment and emergency response procedures).</li> </ul> <p><b>Uncertainty</b></p> <ul style="list-style-type: none"> <li>None identified.</li> </ul>
<p><b>4. To reduce the risk of flooding</b></p>	<p>Will the option have the potential to cause or exacerbate flooding in the catchment area now or in the future?</p> <p>Will the option have the potential to help alleviate flooding in the catchment area now or in the future?</p> <p>Will the option be at risk of flooding now or in the future?</p>	-	-	<p><b>Effects of Construction</b></p> <p>The Bridge End and Ennerdale sites are situated within Flood Zones 2/3. Further, as proposed, several sections of the pipelines would be routed across Flood Zones 2/3. In consequence, construction activity may be affected by flooding (dependent on timing). However, it is not expected that construction activity would increase the risk of flooding offsite.</p> <p><b>Effects of Operation</b></p> <p>The new WTW and PS near Bridge End and any above ground infrastructure associated with the new SR at Ennerdale may be at risk of flooding during operation. Being located on greenfield land, there is potential that increased surface run off could increase flood risk elsewhere, although this is currently uncertain.</p> <p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>Appropriate flood alleviation measures should be incorporated such as bunding, elevation and locating power and electrical equipment above flood level where possible.</li> <li>Measures should be considered to reduce surface water runoff.</li> </ul> <p><b>Assumptions</b></p> <ul style="list-style-type: none"> <li>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.</li> </ul> <p><b>Uncertainty</b></p> <ul style="list-style-type: none"> <li>The extent to which development may affect flooding elsewhere is unknown (although it is expected that this would be considered as part of any FRA).</li> </ul>

Objective	Guide questions	Relationship		Commentary
		Construction	Operation	
<b>5. To minimise emissions of pollutant gases and particulates and enhance air quality</b>	<p>Will the option adversely affect local air quality as a result of emissions of pollutant gases and particulates?</p> <p>Will the option exacerbate existing air quality issues (e.g. in Air Quality Management Areas)?</p> <p>Will the option maintain or enhance ambient air quality, keeping pollution below Local Air Quality Management thresholds?</p> <p>Will the option reduce the need to travel or encourage sustainable modes of transport?</p>	-	0	<p><b>Effects of Construction</b></p> <p>The option would require 4,500 HGV movements over a 2.25 year construction period which, together with emissions to air from plant, may have a minor negative effect on local air quality. Pipeline works of the proposed scale (the proposed pipeline route exceeds 100 km in length) could also result in substantial disruption to roads in the area (the roads under which new pipes would be installed or existing pipes upgraded include approximately 61 km of A-road, 19 km of B-road, 19 km of C-road and 3 km of unclassified road), increasing congestion and associated emissions to air, particularly where the route passes through or is within close proximity to the larger settlements of Cockermouth and Keswick. Impacts may be more substantial should works take place during peak tourist periods given existing traffic congestion issues in the area caused by the large seasonal influx of visitors. However, the development sites and pipeline route are not within designated Air Quality Management Areas (AQMAs) and therefore the option has been assessed as having a minor negative effect on air quality.</p> <p><b>Effects of Operation</b></p> <p>Operational emissions to air are expected to be negligible and in this respect, the option would generate only 1 HGV movement per week. In consequence, the option has been assessed as having a neutral effect on air quality.</p> <p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>• 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).</li> <li>• Measures to mitigate air quality impacts arising from construction activities should be considered within a Construction and Environmental Management Plan. These measures may include, for example, dust suppression, use of lower emissions plant, and monitoring.</li> <li>• Detailed air quality and transport assessments should be undertaken as part of the Environmental Impact Assessment (EIA) process.</li> </ul> <p><b>Assumptions</b></p> <ul style="list-style-type: none"> <li>• None identified.</li> </ul> <p><b>Uncertainty</b></p> <ul style="list-style-type: none"> <li>• None identified.</li> </ul>

Objective	Guide questions	Relationship		Commentary
		Construction	Operation	
<b>6. To limit the causes and potential consequences of climate change</b>	<p>Will the option reduce or minimise greenhouse gas emissions?</p> <p>Will the option have new infrastructure that is energy efficient or make use of renewable energy sources?</p> <p>Will the option contribute positively to adaptation to climate change?</p> <p>Will the option increase environmental resilience to the effects of climate change?</p>	--	--	<p><b>Effects of Construction</b></p> <p>During the construction phase, the use of plant on-site and transportation of materials by road would result in increased emissions of greenhouse gases whilst the materials used for construction would contain embodied carbon. This option would generate 53,692 tonnes CO<sub>2</sub>e during constructions (comprising both embodied carbon in construction materials and emissions from HGV movements) which has been assessed as having a significant negative effect on this objective.</p> <p><b>Effects of Operation</b></p> <p>During operation, this option would involve the treatment and pumping of water which would result in a long term increase in energy use and associated emissions (there would also be embodied carbon in chemicals used to treat water). Operational vehicle movements would also contribute to emissions, although the number of HGV movements associated with the operation of this option would be small (1 movement per week). Operational emissions would be 11,009 tonnes CO<sub>2</sub>e/a. However, this option would also result in the closure of existing WTWs (Quarry Hill, Ennerdale, and Corn How) and may therefore generate some energy savings, reducing carbon emissions. In this respect, emissions savings associated with this option are estimated to be 3,008 tonnes CO<sub>2</sub>e/a.</p> <p>There are no immediate plans to include renewable energy provision within the design of this option.</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/storage.</p> <p>Overall, net operational greenhouse gas emissions are expected to be high (8,001 tonnes CO<sub>2</sub>e/a) and whilst the option may generate benefits in respect of climate change adaptation, on balance it has been assessed as having a significant negative effect on climate change.</p> <p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>Measures to reduce greenhouse gas emissions during construction should be considered including, for example, the use of low emission plant.</li> <li>Where appropriate, the design of new infrastructure should incorporate the use of energy efficient materials and building techniques and, if appropriate, renewable energy provision.</li> </ul> <p><b>Assumptions</b></p>

Objective	Guide questions	Relationship		Commentary
		Construction	Operation	
				<ul style="list-style-type: none"> <li>None identified.</li> </ul> <b>Uncertainty</b> <ul style="list-style-type: none"> <li>None identified.</li> </ul>
<b>7. To ensure the protection and enhancement of human health</b>	<p>Will the option ensure the continuity of a safe and secure drinking water supply?</p> <p>Will the option affect opportunities for recreation and physical activity?</p> <p>Will the option maintain surface water and bathing water quality within statutory standards?</p> <p>Will the option adversely affect human health by resulting in increased nuisance and disruption (e.g. as a result of increased noise levels)?</p>	-	++	<p><b>Effects of Construction</b></p> <p>Construction activity and decommissioning works may have an adverse effect on health as a result of air quality/noise impacts, particularly larger scale works in close proximity to residential receptors (e.g. new/upgraded SRs at Castle Rigg and Bothel Moor). The proposed pipeline would also pass through/be adjacent to a number of settlements including Cockermouth and Keswick and associated works/HGV movements may therefore affect receptors along this route.</p> <p>Works may affect the amenity recreational users such as walkers, particularly in respect of those sites located within the Lake District National Park which is a popular tourist destination and recreational area.</p> <p>Notwithstanding the above, works would be temporary and associated effects are expected to be felt in the short term only (i.e. over the 2.25 year construction period). Further, it is likely that impacts would be managed/mitigated where possible using best practice (e.g. Considerate Constructors' Scheme).</p> <p>Overall, the option has been assessed as having a minor negative effect on health.</p> <p><b>Effects of Operation</b></p> <p>Once operational, the option is not expected to have any adverse effects on health as a result of noise or air quality impacts. As the mean operating level of the reservoir would be similar to current operation, effects on informal recreation are expected to be negligible. Impacts on higher flows in St Johns Beck may affect angling and in-stream recreation such as canoeing. However, given that the option is only likely to affect higher flows, effects are not expected to be significant. Further, reductions in abstraction associated with the closure of the three WTWs may generate potential benefits to river users such as canoeists and also anglers (primarily due to changes in flow in the catchments in which the abstractions are located, which contain watercourses that are important spawning/ breeding grounds for salmonids).</p> <p>The option has a design capacity of 80 Ml/d, serving to address deficit within the West Cumbrian WRZ. The option may also remove the vulnerability to short duration droughts within this zone. Further, the decommissioning of existing sources may benefit downstream abstractors (where hands off flow constraints are in place) or present opportunities for new abstractions (subject to licensing).</p>

Objective	Guide questions	Relationship		Commentary
		Construction	Operation	
				<p>Overall, the option has been assessed as having a significant positive effect on health.</p> <p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>No additional mitigation identified.</li> </ul> <p><b>Assumptions</b></p> <ul style="list-style-type: none"> <li>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).</li> </ul> <p><b>Uncertainty</b></p> <ul style="list-style-type: none"> <li>None identified.</li> </ul>
<p><b>8. To maintain and enhance the economic and social well-being of the local community</b></p>	<p>Will the option ensure sufficient infrastructure is in place for predicted population increases?</p> <p>Will the option ensure sufficient infrastructure is in place to sustain a seasonal influx of tourists?</p> <p>Will the option help to meet the employment needs of local people?</p> <p>Will the option ensure that an affordable supply of water is maintained and vulnerable customers protected?</p> <p>Will the option improve access to local services and facilities (e.g. sport and recreation)?</p> <p>Will the option contribute to sustaining and growing the local and regional economy?</p> <p>Will the option avoid disruption through effects on the transport network?</p> <p>Will the option be resilient to future changes in resources (both financial and human)?</p>	<p>++</p>	<p>++</p>	<p><b>Effects of Construction</b></p> <p>The construction of this option would represent a large capital investment. This is likely 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). Whilst the degree to which this would benefit the local labour market and local businesses would depend to an extent on the recruitment practices of contractors appointed to undertake the works, skills within the local labour market and the procurement policies of both United Utilities and any sub-contractors, benefits are expected to be substantial.</p> <p>HGV movements and pipeline works of the proposed scale (exceeding 100 km in length) and duration (2.25 years) could result in disruption to roads in the area (the roads under which new pipes would be installed or existing pipes upgraded include approximately 61 km of A-road, 19 km of B-road, 19 km of C-road and 3 km of unclassified road). Impacts may be more substantial should works take place during peak tourist periods given existing traffic congestion issues in the area caused by the large seasonal influx of visitors. However, any effects would be temporary and felt in the short term only whilst the magnitude of effects are likely to be lessened by the adoption of mitigation measures at the project level, informed by a detailed transport assessment.</p> <p>Works may affect the amenity of recreational users particularly in respect of those sites located within the Lake District National Park which is a popular tourist destination. However, construction activity is not expected to have a substantial adverse impact on the local tourist economy given that works would be temporary and impacts are likely to be managed/mitigated where possible using best practice (e.g. Considerate Constructors' Scheme).</p>

Objective	Guide questions	Relationship		Commentary
		Construction	Operation	
				<p>Taking into account the potential for substantial economic benefits to arise during construction but the likelihood of traffic disruption in particular, the option has been as having a mixed significant positive and minor negative effect on this objective.</p> <p><b>Effects of Operation</b></p> <p>As noted above (under Objective 7), no significant adverse effects on recreation are anticipated. Reductions in abstraction associated with the closure of the three WTWs may generate potential benefits to river users such as canoeists and also anglers (primarily due to changes in flow in the catchments in which the abstractions are located, which contain watercourses that are important spawning/breeding grounds for salmonids).</p> <p>The option has a design capacity of 80 Ml/d, serving to meet short term peak demands as well as addressing the deficit within the West Cumbria WRZ which is based on critical period average demand. Further, the decommissioning of existing sources may benefit downstream abstractors (where hands off flow constraints are in place) or present opportunities for new abstractions (subject to licensing). This may support economic and population growth in the West Cumbria area and help sustain the seasonal influx of tourists to the area. The additional supply may also help to ensure that an affordable supply of water is maintained in the long term, serving to protect vulnerable customers.</p> <p>This option would not require significant levels of additional resource (financial or human) during operation and in consequence, it is likely to be resilient to any future changes in these resources.</p> <p>New above ground infrastructure would (with the exception of Bothel Moor and Quarry Hill) be located within the Lake District National Park which may affect the tourist economy (due to associated visual amenity impacts). However, a number of new assets would be located within/adjacent to existing sites which, alongside the implementation of appropriate mitigation such as sympathetic design and use of local materials, is likely to reduce the magnitude of visual impacts such that no adverse effects on the tourist economy are expected during the operational phase.</p> <p>Overall, the operation of this option has been assessed as having a significant positive effect on this objective.</p> <p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>• Where possible, United Utilities and any contractors should seek to utilise local labour.</li> <li>• Where possible, United Utilities and any contractors should seek to appoint local contractors/sub-contractors and utilise locally sourced materials.</li> </ul>



Objective	Guide questions	Relationship		Commentary
		Construction	Operation	
				<p><b>Assumptions</b></p> <ul style="list-style-type: none"> <li>None identified.</li> </ul> <p><b>Uncertainty</b></p> <ul style="list-style-type: none"> <li>The extent to which the construction of this option would benefit the local economy/local labour market is uncertain. However, given the scale of investment, benefits are nonetheless expected to be significant.</li> <li>A detailed transport assessment should be undertaken as part of the EIA process.</li> </ul>
<p><b>9. To ensure the sustainable and efficient use of water resources</b></p>	<p>Will the option lead to reduced leakage from the supply network?</p> <p>Will the option improve efficiency in water consumption?</p>	0	0	<p><b>Effects of Construction and Operation</b></p> <p>The option would not lead to a reduction in losses from the supply network. There are no measures in the option that would improve water efficiency. In consequence, the option has been assessed as having a neutral effect on this objective during both construction and operation.</p> <p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>None identified.</li> </ul> <p><b>Assumptions</b></p> <ul style="list-style-type: none"> <li>None identified.</li> </ul> <p><b>Uncertainty</b></p> <ul style="list-style-type: none"> <li>None identified.</li> </ul>
<p><b>10. To promote the efficient use of resources</b></p>	<p>Will the option seek to minimise the demand for raw materials?</p> <p>Will the option reduce the total amount of waste produced and the proportion of waste sent to landfill?</p> <p>Will the option encourage the use of sustainable design and materials?</p> <p>Will the option reduce or minimise energy use?</p>	---	---	<p><b>Effects of Construction</b></p> <p>This option comprises several infrastructure components including new/upgraded SRs, a WTW and PSs as well as over 100km of new pipeline that would require a large volume of raw materials and energy to construct. Using the embodied carbon associated with the construction phase (53,692 tonnes of CO<sub>2</sub>e) as a proxy, material use and energy requirements are considered to be substantial and the option has therefore been assessed as having a significant negative effect on this objective.</p> <p>This option would generate construction wastes which may include excavation waste, replaced infrastructure components and, potentially, demolition waste associated with the closure of three existing WTWs.</p> <p>Overall, this option has been assessed as having a significant negative effect on resource use during construction.</p>

Objective	Guide questions	Relationship		Commentary
		Construction	Operation	
				<p><b>Effects of Operation</b></p> <p>The operation of this option would require additional resources such as chemicals used in the treatment of raw water although this increase would be partially offset by the closure of the three existing WTWs. The treatment and pumping of water would also result in a long term increase in energy use (operational energy usage is estimated to be approximately 650 KWh/MI). However, this option would also result in the closure of existing WTWs (Quarry Hill, Ennerdale and Corn How) and may therefore generate some energy savings. In this respect, energy savings associated with this option are estimated to be 272 KWh/MI.</p> <p>The treatment of water would generate waste (e.g. sludge), although quantities are uncertain at this stage.</p> <p>On balance, the operation of this option has been assessed as having a significant negative effect on resource use.</p> <p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>• Opportunities to utilise reused/recycled materials during construction should be considered where appropriate.</li> <li>• Construction and operational wastes should be reused/recycled where possible.</li> <li>• Measures to reduce energy usage during construction should be considered including, for example, the use of low energy usage plant.</li> <li>• Where appropriate, the design of new infrastructure should incorporate the use of energy efficient materials and building techniques and, if appropriate, renewable energy provision.</li> </ul> <p><b>Assumptions</b></p> <ul style="list-style-type: none"> <li>• None identified.</li> </ul> <p><b>Uncertainty</b></p> <ul style="list-style-type: none"> <li>• Opportunities to reduce waste, reuse materials and use recycled materials for construction are unknown at this stage.</li> <li>• The requirement for disposal of redundant WTW infrastructure is uncertain at this stage.</li> <li>• The exact resource requirements (e.g. volumes of specific materials) associated with the construction/operation of this option are unknown at this stage.</li> </ul>

Objective	Guide questions	Relationship		Commentary
		Construction	Operation	
				<ul style="list-style-type: none"> <li>The volume of waste generated under operation of this option is uncertain at this stage.</li> </ul>
<b>11. To protect and enhance cultural and historic assets</b>	<p>Will the option conserve or enhance historic buildings, places, conservation areas and spaces that enhance local distinctiveness, character and the appearance of the public realm?</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	<p><b>Effects of Construction</b></p> <p>The majority of the proposed development sites do not contain, and are not within close proximity to, designated cultural heritage assets. However, works associated with the construction of a new SR at Bothel Moor may affect the settings of listed buildings in Topenhow (and in particular Croft House Grade II Listed Building immediately to the north). Pipeline works may also affect the settings of listed buildings and scheduled monuments along the proposed route (e.g. Castle How Hillfort and assets at Papcastle) and excavations could disturb unknown archaeological assets (although this is currently uncertain). However, any impacts would be temporary and it is assumed that mitigation would be adopted where possible to avoid significant adverse effects (e.g. pipeline routing to avoid direct impacts on assets). In consequence, the option has been assessed as having a minor negative effect on this objective.</p> <p><b>Effects of Operation</b></p> <p>As noted above, the development of the new SR at Bothel Moor may affect the settings of listed buildings in Topenhow. However, as the SR would be buried with planting and re-seeding minimising any visual impacts in the medium to long term (i.e. within a year, depending on the season in which works are undertaken), effects are expected to be negligible. It is also expected that new pipeline would be buried with planting and re-seeding likely to return land to a pre-development state within a year (depending on the season in which works are undertaken) such that there would be no long term adverse effects on the settings of designated cultural heritage assets along the route. In consequence, the option has been assessed as having a neutral effect on this objective during operation.</p> <p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>Pipelines should be routed so as to avoid direct impacts on cultural heritage assets.</li> </ul> <p><b>Assumptions</b></p> <ul style="list-style-type: none"> <li>None identified.</li> </ul> <p><b>Uncertainty</b></p> <ul style="list-style-type: none"> <li>The presence of undiscovered items of archaeological interest is currently uncertain.</li> </ul>

Objective	Guide questions	Relationship		Commentary
		Construction	Operation	
<b>12. To protect and enhance landscape character</b>	<p>Will the option avoid adverse effects on, and enhance where possible, protected/designated landscapes (including woodlands) such as National Parks or AONBs?</p> <p>Will the option protect and enhance landscape character, townscape and seascape?</p> <p>Will the option affect public access to existing landscape features?</p> <p>Will the option minimise adverse visual impacts?</p>	--	-	<p><b>Effects of Construction</b></p> <p>The majority of development sites (with the exception of Bothel Moor and Quarry Hill) are located within the Lake District National Park and in consequence there is potential for significant landscape impacts. However, a number of new assets would be located within existing sites (although some additional land take is likely to be required), including:</p> <ul style="list-style-type: none"> <li>• Castle Rigg (upgrade of existing SR).</li> <li>• Corn How (Fluoride storage &amp; dosing on existing SR outlets).</li> <li>• Ennerdale (upgrade of existing SR).</li> </ul> <p>Further, development of the new WTW and PS near Bridge End and PS at Buttermere would be adjacent to existing sites. Alongside the implementation of appropriate mitigation such as screening, this would be likely to reduce the magnitude of landscape impacts associated with development of these sites.</p> <p>Approximately 50% of the pipeline length would lie within the Lake District National Park and therefore there is potential for substantial landscape effects associated with pipeline works. However, the majority of the route would follow existing linear features (roads) and adverse effects would be over a short timescale with planting and re-seeding likely to return land to a pre-development state within a year (depending on the season in which works are undertaken).</p> <p>Development sites outwith the Lake District National Park include Bothel Moor and Quarry Hill which are within rural areas. Construction activity associated with a new SR at Bothel Moor in particular would be relatively large scale and would take place on greenfield land in a relatively open setting and may therefore affect local landscape character. Pipeline works outside the Lake District National Park may also affect local landscape character as well as townscapes (where the route is through/adjacent to Keswick and Cockermouth).</p> <p>Whilst development would be within the Lake District National Park, it is not expected that construction activity would affect public access to the area.</p> <p>Construction activity may affect the visual amenity of residential receptors in close proximity to the development sites. However, the majority of sites are in rural and remote locations with few residential receptors likely to experience adverse effects. Notwithstanding, the proposed Castle Rigg and Bothel Moor sites are in close proximity to residential receptors to the north of the sites, the visual amenity of which may be affected during construction particularly given the relatively large scale of works likely to be required in these locations. Further, the visual amenity of receptors along the route of the proposed pipeline as well as along transport</p>

Objective	Guide questions	Relationship		Commentary
		Construction	Operation	
				<p>corridors may be affected.</p> <p>In view of the location of several development sites and sections of pipeline with the Lake District National Park, there is potential for construction activity to affect the visual amenity of recreational receptors such as walkers.</p> <p>Taking into account the scale of the scheme and location of components within the Lake District National Park, this option has been assessed as having a significant negative effect on landscape.</p> <p><b>Effects of Operation</b></p> <p>The new/upgraded SRs and pipeline would be buried and it is expected that planting and re-seeding would minimise any landscape effects associated with these assets in the longer term (i.e. within a year, depending on the season in which works are undertaken). New above ground infrastructure would (with the exception of Bothel Moor and Quarry Hill) be located within the Lake District National Park and in consequence there is potential for significant landscape impacts. New assets may also affect the visual amenity of residential receptors in close proximity to the development sites (and in particular receptors to the north of Castle Rigg and Bothel Moor) as well as recreational users. However, as noted above, a number of new assets would be located within/adjacent to existing sites which, alongside the implementation of appropriate mitigation such as sympathetic design and use of local materials, is likely to reduce the magnitude of landscape impacts. Further, appropriate screening and landscaping would be likely to lessen the immediate landscape/visual impact over time (as vegetation matures).</p> <p>At sites where existing WTWs are decommissioned, landscape benefits are likely to be negligible as other water infrastructure such as PSs and SRs would be retained on site.</p> <p>Operation of the option would result in additional draw-down of Thirlmere which may be perceptible to recreational users.</p> <p>Overall, the option has been assessed as having a minor negative effect on landscape during operation.</p> <p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>• Construction activity should be screened where possible so as to avoid/minimise adverse landscape/visual impacts.</li> <li>• Where possible, new above ground infrastructure should adopt high quality design principles (e.g. use of local materials).</li> <li>• Landscaping/screening measures should be utilised to minimise adverse</li> </ul>

Objective	Guide questions	Relationship		Commentary
		Construction	Operation	
				<p>landscape/visual amenity impacts.</p> <p><b>Assumptions</b></p> <ul style="list-style-type: none"> <li>It is assumed that the land above the pipeline would be restored to its former quality after construction works have finished.</li> </ul> <p><b>Uncertainty</b></p> <ul style="list-style-type: none"> <li>The exact design and scale of new infrastructure required under this option is unknown at this stage.</li> </ul>
<b>Summary</b>	<p><b>Effects of Construction</b></p> <p>This option represents a large scale scheme comprising several infrastructure components including new/upgraded SRs, a WTW, PSs and over 100km of new pipeline together with the decommissioning of three existing WTWs. Construction (including decommissioning) activity is therefore expected to have a significant negative effect on climate change as a result of associated greenhouse gas emissions from HGV movements, construction plant and embodied carbon in raw materials (the option would generate 53,692 tonnes CO<sub>2</sub>e during construction). Using the embodied carbon associated with the construction phase as a proxy, material use and energy requirements are considered to be substantial and, taking into account waste generation, the option has therefore been assessed as having a significant negative effect on resource use. The majority of development sites (with the exception of Bothel Moor and Quarry Hill) are located within the Lake District National Park. Approximately 50% of the pipeline length would also lie within the Lake District National Park and therefore there is potential for substantial landscape effects associated with construction activity. Development may also affect the visual amenity of residential receptors in close proximity to the development sites (and in particular receptors to the north of Castle Rigg and Bothel Moor) and along the pipeline route as well as recreational users. Overall, the option has been assessed as having a significant negative effect on landscape.</p> <p>The construction of this option would represent a large capital investment which is likely to generate a number of employment opportunities and supply chain benefits as well as increased spend in the local economy by contractors and construction workers. However, HGV movements and pipeline works of the proposed scale may cause traffic disruption. The option has therefore been assessed as having a mixed significant positive and minor negative effect on economic and social wellbeing.</p> <p>The assessment has not identified any further significant negative or significant positive effects. The HRA identifies that there is potential for significant construction effects on the River Derwent and Bassenthwaite Lake SAC, Clints Quarry SAC, Lake District High Fells SAC and River Ehen SAC, primarily due to pipeline works. However, taking into account scheme specific mitigation that can be relied on, and a commitment for pipeline works to be within existing roads (or suitable alternatives identified in discussion with Natural England and the Environment Agency), no significant construction-related effects would be anticipated. It should also be noted that further, scheme level investigations and appropriate assessment would be undertaken at the project stage. Notwithstanding, this option would result in the loss of greenfield land at several development sites and in consequence there is potential for localised loss of habitat and, in conjunction with decommissioning works, disturbance which has been assessed as having a minor negative effect on biodiversity. The option may also generate minor negative effects in respect of land use/soils (due to additional lank take required under this option), flood risk (the Bridge End and Ennerdale sites are situated within Flood Zones 2/3 whilst several sections of the pipelines would be routed across Flood Zones 2/3) and cultural heritage (due to potential effects on the settings of listed buildings and scheduled monuments). Emissions to air from HGV movements and construction plant may also have a minor negative effect on air quality and, together with noise/vibration, human health.</p> <p>Neutral effects have been identified in respect of two objectives during construction relating to water quality/resources (Objectives 3 and 9).</p> <p><b>Effects of Operation</b></p> <p>Similar to the construction phase, the option is likely to have significant negative effects on climate change and resource use SEA objectives. This principally reflects the</p>			

Objective	Guide questions	Relationship		Commentary
		Construction	Operation	
				<p>net additional energy requirements (and related greenhouse gas emissions) associated with the treatment and pumping of water.</p> <p>The scheme is designed to relieve pressure on the River Ehen SAC. Abstraction from Ennerdale Water, which discharges into the Ehen, has been identified for amendments under the Review of Consents programme due to the impact of abstraction on interest features in the SAC (primarily fresh water pearl mussels). The decommissioning of Ennerdale WTW and associated abstraction from Ennerdale Water under this option may therefore generate benefits in respect of these features due to increased flows. Additionally, the decommissioning of Quarry Hill WTW would result in a reduction in abstraction from Dash Beck and Hause Gill, sources that have been investigated under the Review of Consents programme due to impacts on salmon which are interest features of the River Derwent and Tributaries SSSI and River Derwent and Bassenthwaite Lake SAC whilst the decommissioning of Corn How WTW and cessation of abstraction from Crummock Water may also lead to benefits in respect of the SSSI and SAC (although this source has not been identified for reduction under the Review of Consents programme). Taking into account the potential operational benefits in respect of the River Ehen SAC and River Derwent and Bassenthwaite Lake SAC in particular, this option has been assessed as having a significant positive effect on biodiversity. The decommissioning of Quarry Hill, Ennerdale and Corn How WTWs has also been assessed as having a significant positive effect on water quantity and quality due to increases in flows in the catchments in which associated abstractions are located (Dash Beck, Bassenthwaite/Derwent, Ellen, Ehen and Cocker). The option has a design capacity of 80 Ml/d, serving to address deficit within the West Cumbrian WRZ. Further, the decommissioning of existing sources may benefit downstream abstractors (where hands off flow constraints are in place) or present opportunities for new abstractions (subject to licensing). This has been assessed as having a significant positive effect on health (in helping to ensure the continuity of a safe and secure drinking water supply) and economic and social wellbeing (given the potential for additional supply to support economic/population growth).</p> <p>No further significant negative or significant positive effects have been identified. The operation of this option is expected to have minor negative effects on flood risk (owing to the location of assets within Flood Zones 2/3) and landscape (principally reflecting the requirement for new above ground infrastructure within the Lake District National Park).</p> <p>Neutral effects have been identified in respect of four objectives during operation. These objectives relate to soils/land use (Objective 2), water resources (Objective 9), air quality (Objective 5) and cultural heritage (Objective 11).</p> <p><b>Mitigation</b></p> <p>Adverse environmental effects associated with the construction/operation of this option could be reduced, and positive effects enhanced, through the adoption of the following mitigation measures:</p> <ul style="list-style-type: none"> <li>• Scheme specific mitigation plans will be required to ensure that any construction related adverse effects on designated sites are avoided and localised effects on biodiversity minimised. With specific regard to the Clints Quarry SAC, mitigation requirements for GCN would need to be reviewed at the scheme level. With respect to the River Ehen SAC, the scheme should be designed to ensure that no bankside trees are removed. Construction within 200m of the river should be completed before late summer, prior to the autumn migration period.</li> <li>• 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.</li> <li>• Bio-security measures should be implemented during construction and operational phases.</li> <li>• Appropriate construction methods should be employed to minimise the risk of contamination.</li> <li>• Appropriate flood alleviation measures should be incorporated such as bunding, elevation and locating power and electrical equipment above flood level where possible.</li> <li>• Measures should be considered to reduce surface water runoff.</li> </ul>



Objective	Guide questions	Relationship		Commentary
		Construction	Operation	
				<ul style="list-style-type: none"> <li>• 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).</li> <li>• Measures to mitigate air quality impacts arising from construction activities should be considered within a Construction and Environmental Management Plan. These measures may include, for example, dust suppression, use of lower emissions plant, and monitoring.</li> <li>• Detailed air quality and transport assessments should be undertaken as part of the Environmental Impact Assessment (EIA) process.</li> <li>• Measures to reduce greenhouse gas emissions during construction should be considered including, for example, the use of low emission plant.</li> <li>• Where appropriate, the design of new infrastructure should incorporate the use of energy efficient materials and building techniques and, if appropriate, renewable energy provision.</li> <li>• Where possible, United Utilities and any contractors should seek to utilise local labour.</li> <li>• Where possible, United Utilities and any contractors should seek to appoint local contractors/sub-contractors and utilise locally sourced materials.</li> <li>• Opportunities to utilise reused/recycled materials during construction should be considered where appropriate.</li> <li>• Construction and operational wastes should be reused/recycled where possible.</li> <li>• Pipelines should be routed so as to avoid direct impacts on cultural heritage assets.</li> <li>• Construction activity should be screened where possible so as to avoid/minimise adverse landscape/visual impacts.</li> <li>• Where possible, new above ground infrastructure should adopt high quality design principles (e.g. use of local materials).</li> <li>• Landscaping/screening measures should be utilised to minimise adverse landscape/visual amenity impacts.</li> </ul>

## WC14d: Kielder Water Transfer to West Cumbria (Cumwhinton Treated) (Design Capacity - 80MI/d)

### Option Summary

This option comprises the transfer of water from Kielder Water in the Northumbrian Water supply region to the West Cumbria WRZ. The option would require:

- new intake structure, pumping station (PS) and screening equipment at Kielder Water with a 80MI/d capacity;
- new 40km raw water transfer main from Kielder to Carlisle;
- new booster PS located a Catgallow service reservoir (SR);
- new WTW facility adjacent to Cumwhinton WTW;
- 23km raw water transfer main to Quarry Hill WTW;
- new bulk supply point (BSP) located close to Quarry Hill WTW;
- new continuation of previous LDTM between the new Quarry Hill BSP and a further BSP located close to Corn How SR;
- new branch main feed into Corn How SR;
- new main between Corn How BSP and Corn How SR and fluoridation at the reservoir;
- new continuation of previous LDTM between Corn How PS and Summergrove SR (with fluoridation at the reservoir).

This option would also involve the abandonment of three existing WTWs in West Cumbria namely, Quarry Hill, Ennerdale, and Corn How. It should be noted that the option would involve the decommissioning of the sources from permanent operational use, although United Utilities may seek to retain some locations as drought sources (e.g. Scales BHs, South Egremont BHs).

### Option Assessment

The assessment of Option WC14d Kielder Water Transfer to West Cumbria (Cumwhinton Treated) is presented in **Table E.2** below.

**Table E.2 WC14d: Kielder Water Transfer to West Cumbria (Cumwhinton Treated)**

Objective	Guide questions	Relationship		Commentary
		Construction	Operation	
<p><b>1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits</b></p>	<p>Will the option protect and enhance where possible the most important sites for nature conservation (e.g. internationally or nationally designated conservation sites such as SACs, SPAs, Ramsar and SSSIs)?</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 lead to a change in the ecological quality of habitats due to changes in groundwater/river water quality and/or quantity?</p>	-	++	<p><b>Effects of Construction</b></p> <p>The sites at Kielder Water Reservoir, Catgallow and Cumwhinton do not contain any statutory or non-statutory designations. Two SSSIs, Kielder Mires and Kielderhead Moors, lie around 0.5km to the south and north of Kielder Reservoir. The River Eden SAC/SSSI is 1km to the east of Cumwhinton and Cotehill Pastures and Ponds SSSI is 1km to the south. Construction of a new intake, PS and WTW may have short term negative effects on biodiversity due to disturbance/habitat loss, although significant adverse effects on designated sites are not anticipated given distance to the sites listed above and the scale of works.</p> <p>The WTWs proposed for decommissioning include Ennerdale (adjacent to River Ehen SAC/SSSI to the east and in close proximity to Lake District High Fells SAC, Pillar and Ennerdale Fells SSSI and Ennerdale SSSI) and Corn How (adjacent to River Derwent and Tributaries SSSI and River Derwent and Bassenthwaite Lake SAC. There is therefore potential for construction effects on these sites if the works are not managed appropriately.</p> <p>The HRA identifies that effects on European designated sites would depend heavily on the pipeline routes. Under current proposals, the primary pipeline from Kielder to the United Utilities supply area is assumed to be a straight line across Kielder Forest (and hence across the Border Mires, Kielder – Butterburn SAC, River Eden SAC, River Eden and Tributaries and Kielder Mires SSSIs). The pipeline from Cumwhinton to Quarry Hill would also cross the River Eden SAC as well as ancient woodland whilst the pipeline from Quarry Hill to Summergrove would run adjacent to the River Derwent and Bassenthwaite Lake SAC and River Derwent and Tributaries SSSI for part of its route and would cross the SAC/SSSI. Under current proposals, the HRA concludes that it is likely that the scheme would have significant construction effects on the Border Mires, Kielder – Butterburn SAC and (probably) the River Eden SAC (since several tributaries are crossed, not at existing crossing points). It is also possible that some of the breeding birds interest features of the North Pennine Moors SPA could be disturbed by construction. However, the HRA states that it is likely that these effects could be managed/avoided with scheme specific mitigation (e.g. re-routing to avoid designated sites). In this respect, it is considered reasonable to assume that pipelines will be routed along existing carriageways (probably via the B6357 and then either the A6071 or the B6318) and river crossings (or via suitable alternative routes identified in discussion with Natural England and the Environment Agency). In addition, it is likely that any potential effects can be avoided or mitigated with suitable measures – for example, by timing construction works near rivers to avoid the key migration periods; and by developing specific silt control plans to manage construction run-</p>

Objective	Guide questions	Relationship		Commentary
		Construction	Operation	
				<p>off. It should also be noted that scheme level investigations and appropriate assessment would be undertaken at the project stage should the option form part of the final Water Resources Management Plan.</p> <p>Notwithstanding the above, this option would result in the loss of greenfield land at several development sites and in consequence there is potential for localised loss of habitat and, in conjunction with decommissioning works, disturbance which has been assessed as having a minor negative effect on biodiversity.</p> <p><b>Effects of Operation</b></p> <p>An additional abstraction of up to 80 MI/d from Kielder Water would impact upon water levels in the reservoir compared to current operation. Effects on biodiversity of additional draw on the reservoir would depend on the storage fluctuations under the current abstraction regime but are not expected to be significant.</p> <p>Compensation releases from the reservoir would remain unchanged from current operation, and therefore downstream impacts on conservation features in the River North Tyne are not expected. Two SSSIs, Kielder Mires and Kielderhead Moors, lie around 0.5km to the south and north of Kielder Reservoir. Being away from the reservoir shoreline, it is not thought drawdown fluctuations would impact these SSSIs.</p> <p>The HRA identifies that the operation of this option is unlikely to have any adverse effects on designated European sites. Use of water from Kielder would not affect any water resource dependent (WRD) interest features at sites within its catchment and the only real mechanism for impacts would be indirect, through increases in discharges after useage (in theory, 80MI/d could be entering the West Cumbria WRZ). In reality, however, it is assumed that the transfer would be tailored to the deficit and any increase in, for example, river flows would be well within natural variation (and arguably providing additional support). Although the option constitutes an interbasin transfer of raw water, it would be treated immediately on arrival and risks associated with this (e.g. invasive species transfer) would not be expected.</p> <p>Abstraction from Ennerdale Water, which discharges into the Ehen, has been identified for amendments under the Review of Consents programme due to the impact of abstraction on interest features in the SAC (primarily fresh water pearl mussels). The decommissioning of Ennerdale WTW and associated abstraction from Ennerdale Water under this option may therefore generate benefits in respect of these features due to increased flows. In this respect, the HRA identifies that, whilst the interest features of European designated sites are not directly exposed to the likely operational effects of the scheme, increased flows within the Ehen would benefit the interest features of the SAC.</p> <p>It is assumed that the current abstraction levels from, and compensation releases to, the River Derwent would be maintained in accordance with the existing consent (i.e. there</p>

Objective	Guide questions	Relationship		Commentary
		Construction	Operation	
				<p>would be no change in flows in the upper Derwent). The decommissioning of Quarry Hill WTW would result in a reduction in abstraction from Dash Beck and Hause Gill, sources that have been investigated under the Review of Consents programme due to impacts on salmon, which are interest features of the River Derwent and Tributaries SSSI and River Derwent and Bassenthwaite Lake SAC. The decommissioning of Quarry Hill WTW and associated reduction in abstraction from Overwater Reservoir may also benefit Overwater Reservoir SSSI, which has previously been identified for reductions by the Environment Agency.</p> <p>The decommissioning of Corn How WTW and cessation of abstraction from Crummock Water may also lead to benefits in respect of the River Derwent and Tributaries SSSI and River Derwent and Bassenthwaite Lake SAC, although this source has not been identified for reduction under the Review of Consents programme.</p> <p>Taking into account the potential operational benefits in respect of the River Ehen SAC and River Derwent and Bassenthwaite Lake SAC in particular, this option has been assessed as having a significant positive effect on biodiversity.</p> <p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>• Scheme specific mitigation plans will be required to ensure that any construction related adverse effects on designated sites are avoided and localised effects on biodiversity minimised.</li> <li>• 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.</li> <li>• Bio-security measures should be implemented during construction and operational phases.</li> </ul> <p><b>Assumptions</b></p> <ul style="list-style-type: none"> <li>• It has been assumed that the new pipeline would be predominantly routed along existing roads. Where this is not possible, alternative solutions will be discussed with Natural England and the Environment Agency to mitigate any impact of those alternatives.</li> </ul> <p><b>Uncertainty</b></p> <ul style="list-style-type: none"> <li>• None identified.</li> </ul>
<b>2. To ensure the appropriate and efficient use of land and protect</b>	Will additional land be required for the development or implementation of the option or will the option require	-	0	<p><b>Effects of Construction</b></p> <p>The new intake structure, PS and WTW would be built on undeveloped land (it has been</p>

Objective	Guide questions	Relationship		Commentary
		Construction	Operation	
<b>soil quality</b>	<p>below ground works leading to land sterilisation?</p> <p>Will the option utilise previously developed land?</p> <p>Will the option protect and enhance protected sites designated for their geological interest and wider geodiversity?</p> <p>Will the option minimise the loss of best and most versatile soil?</p> <p>Will the option minimise conflict with existing land use patterns?</p> <p>Will the option minimise land contamination?</p>			<p>assumed that BSPs at Corn How and Quarry Hill as well as works at Summergrove would be within existing site boundaries). Under current proposals, the pipeline between Kielder and Quarry Hill would be predominantly across open countryside although it is anticipated that any soils displaced during excavation associated with pipeline works would be replaced, supported by a revegetation scheme such that adverse effects would be temporary.</p> <p>Works at Kielder would be situated within an area of poor agricultural land quality (defined as grades 4/5 under Defra's Agricultural Land Classification system). However, development at Cumwhinton, Catgallow, Quarry Hill and Summergrove may result in the loss of Grade 3 (good to moderate) agricultural land. No loss of agricultural land classified as grade 1 (excellent) or grade 2 (very good) is anticipated.</p> <p>As the majority of development would be located at, or adjacent to, existing sites owned/operated by United Utilities, the option is not expected to result in substantial conflict with existing land use patterns.</p> <p>It is not expected that geologically protected sites would be adversely affected by the construction of this scheme.</p> <p>Overall, the construction of this option has been assessed as having a minor negative effect on this objective which principally reflects the loss of greenfield land required to accommodate new infrastructure.</p> <p><b>Effects of Operation</b></p> <p>Once construction activity is complete, no ongoing impact on land use/soils is expected (initial loss of land during construction has been assessed under construction). Overall, operational effects have therefore been assessed as neutral.</p> <p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>• Appropriate construction methods should be employed to minimise the risk of contamination.</li> </ul> <p><b>Assumptions</b></p> <ul style="list-style-type: none"> <li>• It has been assumed that development sites are not contaminated.</li> <li>• It is expected that soils displaced during excavation associated with pipeline works would be replaced following the completion of construction activity.</li> <li>• It has been assumed that any decommissioned sites would be fully remediated, as required.</li> </ul> <p><b>Uncertainty</b></p> <ul style="list-style-type: none"> <li>• The exact footprint of new infrastructure required under this option is unknown at this</li> </ul>

Objective	Guide questions	Relationship		Commentary
		Construction	Operation	
				stage.
<b>3. To protect and enhance the quantity and quality of surface and groundwater resources and the ecological status of water bodies</b>	<p>Will the option minimise the demand for water resources?</p> <p>Will the option protect and improve surface, groundwater, estuarine 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 affect the ecological status of water bodies?</p>	0	++	<p><b>Effects of Construction</b></p> <p>During construction, there is the potential for contaminants such as silt, concrete or fuel oil to pollute watercourses, particularly given that several development (and decommissioning) sites and pipeline works would be in close proximity to/cross rivers including the Eden, Ehen and Derwent. Contaminants may also affect Kielder as works would be required within/adjacent to the reservoir. However, 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><b>Effects of Operation</b></p> <p>The abstraction of up to 80 Ml/d would impact upon water levels in Kielder reservoir compared to current operation. However, compensation releases from the reservoir would remain unchanged from current operation.</p> <p>The decommissioning of Quarry Hill, Ennerdale and Corn How WTWs may increase flows in the catchments in which associated abstractions are located (Dash Beck, Bassenthwaite/Derwent, Ellen, Ehen and Cocker). Taking into account the associated benefits in respect of the River Ehen SAC and River Derwent and Bassenthwaite Lake SAC in particular, on balance the option has been assessed as having a potentially significant positive effect on this objective.</p> <p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>• None identified.</li> </ul> <p><b>Assumptions</b></p> <ul style="list-style-type: none"> <li>• 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).</li> </ul> <p><b>Uncertainty</b></p> <ul style="list-style-type: none"> <li>• None identified.</li> </ul>
<b>4. To reduce the risk of flooding</b>	<p>Will the option have the potential to cause or exacerbate flooding in the catchment area now or in</p>	-	0	<p><b>Effects of Construction</b></p> <p>The site of the new intake would be within Flood Zone 3 whilst the proposed pipeline</p>



Objective	Guide questions	Relationship		Commentary
		Construction	Operation	
	<p>the future?</p> <p>Will the option have the potential to help alleviate flooding in the catchment area now or in the future?</p> <p>Will the option be at risk of flooding now or in the future?</p>			<p>routes would cross Flood Zones 2/3 at several points. Ennerdale WTW is also situated within Flood Zones 2/3. As a result, construction/decommissioning activity may be affected by flooding (depending on timing) although the option would not cause or significantly exacerbate flooding in the area.</p> <p><b>Effects of Operation</b></p> <p>During operation, this option is not expected to cause or exacerbate flooding in the area nor would new infrastructure be at risk of flooding (the only above ground infrastructure component of the scheme within Flood Zones 2/3 would be the new intake at Kielder which is not considered to be vulnerable to flooding).</p> <p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>None identified.</li> </ul> <p><b>Assumptions</b></p> <ul style="list-style-type: none"> <li>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.</li> </ul> <p><b>Uncertainty</b></p> <ul style="list-style-type: none"> <li>None identified.</li> </ul>
<p><b>5. To minimise emissions of pollutant gases and particulates and enhance air quality</b></p>	<p>Will the option adversely affect local air quality as a result of emissions of pollutant gases and particulates?</p> <p>Will the option exacerbate existing air quality issues (e.g. in Air Quality Management Areas)?</p> <p>Will the option maintain or enhance ambient air quality, keeping pollution below Local Air Quality Management thresholds?</p> <p>Will the option reduce the need to travel or encourage sustainable modes of transport?</p>	-	0	<p><b>Effects of Construction</b></p> <p>The option would require 5,750 HGV movements over a 3 year construction period which, together with emissions to air from plant, may have a minor negative effect on local air quality. Pipeline works could also result in disruption to roads in the area, increasing congestion and associated emissions to air, particularly where the route passes through or is within close proximity to Carlisle, Cockermouth and Whitehaven. Impacts may be more substantial should works take place during peak tourist periods given existing traffic congestion issues in the area caused by the large seasonal influx of visitors. However, the development sites and pipeline route are not within designated Air Quality Management Areas (AQMAs) (although there are several designated AQMAs within the urban area of Carlisle) and therefore the option has been assessed as having a minor negative effect on air quality.</p> <p><b>Effects of Operation</b></p> <p>Operational emissions to air are expected to be negligible and in this respect, the option would generate only 104 HGV movements per year. In consequence, the option has been assessed as having a neutral effect on air quality.</p>

Objective	Guide questions	Relationship		Commentary
		Construction	Operation	
				<p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>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.</li> <li>Measures to mitigate air quality impacts arising from construction activities should be considered within a Construction and Environmental Management Plan. These measures may include, for example, dust suppression, use of lower emissions plant, and monitoring.</li> <li>Detailed air quality and transport assessments should be undertaken as part of the Environmental Impact Assessment (EIA) process.</li> </ul> <p><b>Assumptions</b></p> <ul style="list-style-type: none"> <li>None identified.</li> </ul> <p><b>Uncertainty</b></p> <ul style="list-style-type: none"> <li>None identified.</li> </ul>
<p><b>6. To limit the causes and potential consequences of climate change</b></p>	<p>Will the option reduce or minimise greenhouse gas emissions?</p> <p>Will the option have new infrastructure that is energy efficient or make use of renewable energy sources?</p> <p>Will the option contribute positively to adaptation to climate change?</p> <p>Will the option increase environmental resilience to the effects of climate change?</p>	<p>--</p>	<p>--</p>	<p><b>Effects of Construction</b></p> <p>During the construction phase, the use of plant on-site and transportation of materials by road would result in increased emissions of greenhouse gases whilst the materials used for construction would contain embodied carbon. This option would generate 67,204 tonnes CO<sub>2</sub>e during construction/decommissioning (comprising both embodied carbon in construction materials and emissions from HGV movements) which has been assessed as having a significant negative effect on this objective.</p> <p><b>Effects of Operation</b></p> <p>During operation, this option would involve the treatment and pumping of water which would result in a long term increase in energy use (approximately 1424 kWh/MI) and associated emissions (there would also be embodied carbon in chemicals used to treat water). Operational vehicle movements would also contribute to emissions, although the number of HGV movements associated with the operation of this option would be small (104 movements per year). Operational emissions would be 24,547 tonnes CO<sub>2</sub>e/a. However, this option would also result in the closure of existing WTWs (Quarry Hill, Ennerdale and Corn How) and may therefore generate some energy savings, reducing carbon emissions. In this respect, emissions savings associated with this option are estimated to be 3,008 tonnes CO<sub>2</sub>e/a.</p> <p>There are no immediate plans to include renewable energy provision within the design of this option.</p> <p>The predicted effects of climate change (including drier summers) mean that this option</p>

Objective	Guide questions	Relationship		Commentary
		Construction	Operation	
				<p>would contribute positively to climate change adaptation by increasing water supply/storage.</p> <p>Overall, net operational greenhouse gas emissions are expected to be high and whilst the option may generate benefits in respect of climate change adaptation, on balance it has been assessed as having a significant negative effect on climate change.</p> <p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>Measures to reduce greenhouse gas emissions during construction should be considered including, for example, the use of low emission plant.</li> <li>Where appropriate, the design of new infrastructure should incorporate the use of energy efficient materials and building techniques and, if appropriate, renewable energy provision.</li> </ul> <p><b>Assumptions</b></p> <ul style="list-style-type: none"> <li>None identified.</li> </ul> <p><b>Uncertainty</b></p> <ul style="list-style-type: none"> <li>None identified.</li> </ul>
<p><b>7. To ensure the protection and enhancement of human health</b></p>	<p>Will the option ensure the continuity of a safe and secure drinking water supply?</p> <p>Will the option affect opportunities for recreation and physical activity?</p> <p>Will the option maintain surface water and bathing water quality within statutory standards?</p> <p>Will the option adversely affect human health by resulting in increased nuisance and disruption (e.g. as a result of increased noise levels)?</p>	-	++	<p><b>Effects of Construction</b></p> <p>Construction activity and decommissioning works may have an adverse effect on health as a result of air quality/noise impacts. Whilst the developments sites are not located in close proximity to significant numbers of residential receptors, and the scale of works at each site would be relatively small, construction of the new WTW at Cumwhinton would constitute a more substantial development that may affect residential receptors to the north of the site. Further, the proposed pipeline would also pass through/be adjacent to a number of settlements including Carlisle, Cockermouth and Whitehaven and associated works/HGV movements may therefore affect receptors along this route. Notwithstanding the above, works would be temporary and associated effects are expected to be felt in the short term only (i.e. over the 3 year construction period). Further, it is likely that impacts would be managed/mitigated where possible using best practice (e.g. Considerate Constructors' Scheme).</p> <p>Kielder Reservoir is a regionally/nationally important recreation site and therefore the amenity of visitors may be affected during construction. However, any negative effects on these receptors would be temporary and are likely to be minimised through the adoption of best practice construction techniques.</p> <p>Overall, the option has been assessed as having a minor negative effect on health during construction.</p>

Objective	Guide questions	Relationship		Commentary
		Construction	Operation	
				<p><b>Effects of Operation</b></p> <p>Once operational, the option is not expected to have any adverse effects on health as a result of noise or air quality impacts. As noted above Kielder Reservoir is a regionally/nationally important recreation site and there are a wide range of recreational activities that take place in and around the lake including walking, cycling, sailing/water sports and fishing. The east end of the reservoir also lies within the Northumberland National Park. In this context, there may be the potential for impacts on the recreational use of Kielder reservoir due to changes in water levels as a result of abstraction. However, reductions in abstraction associated with the closure of the three WTWs may generate potential benefits to river users such as canoeists and also anglers (primarily due to changes in flow in the catchments in which the abstractions are located, which contain watercourses that are important spawning/breeding grounds for salmonids).</p> <p>The option has a design capacity of 80 MI/d, serving to address deficit within the West Cumbrian WRZ. The option may also remove the vulnerability to short duration droughts within this zone. On balance, the option has therefore been assessed as having a significant positive effect on health.</p> <p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>No additional mitigation identified.</li> </ul> <p><b>Assumptions</b></p> <ul style="list-style-type: none"> <li>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).</li> </ul> <p><b>Uncertainty</b></p> <ul style="list-style-type: none"> <li>None identified.</li> </ul>
<p><b>8. To maintain and enhance the economic and social well-being of the local community</b></p>	<p>Will the option ensure sufficient infrastructure is in place for predicted population increases?</p> <p>Will the option ensure sufficient infrastructure is in place to sustain a seasonal influx of tourists?</p> <p>Will the option help to meet the employment needs of local people?</p> <p>Will the option ensure that an affordable supply of water is maintained and vulnerable customers protected?</p> <p>Will the option improve access to local services and</p>	<p>+++/-</p>	<p>++</p>	<p><b>Effects of Construction</b></p> <p>The construction of this option would represent a large capital investment. This is likely 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). Whilst the degree to which this would benefit the local labour market and local businesses would depend to an extent on the recruitment practices of contractors appointed to undertake the works, skills within the local labour market and the procurement policies of both United Utilities and any sub-contractors, benefits are expected to be substantial.</p> <p>Works may affect the amenity of recreational users particularly in respect of those sites located within the Lake District National Park which is a popular tourist destination.</p>

Objective	Guide questions	Relationship		Commentary
		Construction	Operation	
	<p>facilities (e.g. sport and recreation)?</p> <p>Will the option contribute to sustaining and growing the local and regional economy?</p> <p>Will the option avoid disruption through effects on the transport network?</p> <p>Will the option be resilient to future changes in resources (both financial and human)?</p>	<p>Construction</p>		<p>However, construction activity at these sites would be small scale and is not expected to have a substantial adverse impact on the local tourist economy.</p> <p>HGV movements and pipeline works could result in disruption to roads in the area although any effects would be temporary and felt in the short term only whilst the magnitude of effects are likely to be lessened by the adoption of mitigation measures at the project level, informed by a detailed transport assessment.</p> <p>Taking into account the potential for substantial economic benefits to arise during construction but the potential for short term disruption to roads, the option has been assessed as having a mixed significant positive and minor negative effect on this objective.</p> <p><b>Effects of Operation</b></p> <p>As noted above (under Objective 7), Kielder Reservoir is a regionally/nationally important recreation site and there are a wide range of recreational activities that take place in and around the lake including walking, cycling, sailing/water sports and fishing. The east end of the reservoir also lies within the Northumberland National Park. In this context, there may be the potential for impacts on the recreational use of Kielder reservoir due to changes in water levels as a result of abstraction. However, reductions in abstraction associated with the closure of the three WTWs may generate potential benefits to river users such as canoeists and also anglers (primarily due to changes in flow in the catchments in which the abstractions are located, which contain watercourses that are important spawning/breeding grounds for salmonids).</p> <p>The option has a design capacity of 80 MI/d, serving to meet short term peak demands as well as addressing the deficit within the West Cumbria WRZ which is based on critical period average demand. This may support economic and population growth in the West Cumbria area and help sustain the seasonal influx of tourists. The additional supply may also help to ensure that an affordable supply of water is maintained in the long term, serving to protect vulnerable customers.</p> <p>This option would not require significant levels of additional resource (financial or human) during operation and in consequence, it is likely to be resilient to any future changes in these resources.</p> <p>Overall, in view of the substantial capacity of this option, effects on this objective have been assessed as significant.</p> <p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>• Where possible, United Utilities and any contractors should seek to utilise local labour.</li> <li>• Where possible, United Utilities and any contractors should seek to appoint local</li> </ul>

Objective	Guide questions	Relationship		Commentary
		Construction	Operation	
				<p>contractors/sub-contractors and utilise locally sourced materials.</p> <p><b>Assumptions</b></p> <ul style="list-style-type: none"> <li>None identified.</li> </ul> <p><b>Uncertainty</b></p> <ul style="list-style-type: none"> <li>The extent to which the construction of this option would benefit the local economy/local labour market is uncertain. However, given the scale of investment, benefits are nonetheless expected to be significant.</li> <li>A detailed transport assessment should be undertaken as part of the EIA process.</li> </ul>
<b>9. To ensure the sustainable and efficient use of water resources</b>	<p>Will the option lead to reduced leakage from the supply network?</p> <p>Will the option improve efficiency in water consumption?</p>	<b>0</b>	<b>0</b>	<p><b>Effects of Construction and Operation</b></p> <p>The option would not lead to a reduction in losses from the supply network. There are no measures in the option that would improve water efficiency. In consequence, the option has been assessed as having a neutral effect on this objective during both construction and operation.</p> <p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>None identified.</li> </ul> <p><b>Assumptions</b></p> <ul style="list-style-type: none"> <li>None identified.</li> </ul> <p><b>Uncertainty</b></p> <ul style="list-style-type: none"> <li>None identified.</li> </ul>
<b>10. To promote the efficient use of resources</b>	<p>Will the option seek to minimise the demand for raw materials?</p> <p>Will the option reduce the total amount of waste produced and the proportion of waste sent to landfill?</p> <p>Will the option encourage the use of sustainable design and materials?</p> <p>Will the option reduce or minimise energy use?</p>	--	--	<p><b>Effects of Construction</b></p> <p>This option comprises several infrastructure components including an intake, PS, new WTW and pipeline that would require a large volume of raw materials and energy to construct. Using the embodied carbon associated with the construction phase (67,204 tonnes of CO<sub>2</sub>e) as a proxy, material use and energy requirements are considered to be substantial and the option has therefore been assessed as having a significant negative effect on this objective.</p> <p>This option would generate construction wastes which may include excavation waste and, potentially, demolition waste associated with the closure of four existing WTWs.</p> <p>Overall, this option has been assessed as having a significant negative effect on resource use during construction.</p> <p><b>Effects of Operation</b></p>

Objective	Guide questions	Relationship		Commentary
		Construction	Operation	
				<p>The operation of this option would require additional resources such as chemicals used in the treatment of raw water, although this increase would be partially offset by the closure of the three existing WTWs. 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 1,424 KWh/Ml). However, this option would also result in the closure of existing WTWs (Quarry Hill, Ennerdale and Corn How) and may therefore generate some energy savings. In this respect, energy savings associated with this option are estimated to be 272 KWh/Ml.</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 significant negative effect on resource use.</p> <p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>• Opportunities to utilise reused/recycled materials during construction should be considered where appropriate.</li> <li>• Construction and operational wastes should be reused/recycled where possible.</li> <li>• Measures to reduce energy usage during construction should be considered including, for example, the use of low energy usage plant.</li> <li>• Where appropriate, the design of new infrastructure should incorporate the use of energy efficient materials and building techniques and, if appropriate, renewable energy provision.</li> </ul> <p><b>Assumptions</b></p> <ul style="list-style-type: none"> <li>• None identified.</li> </ul> <p><b>Uncertainty</b></p> <ul style="list-style-type: none"> <li>• Opportunities to reduce waste, reuse materials and use recycled materials for construction are unknown at this stage.</li> <li>• The exact resource requirements (e.g. volumes of specific materials) associated with the construction/operation of this option are unknown at this stage.</li> <li>• The volume of waste generated under operation of this option is uncertain at this stage.</li> </ul>
<b>11. To protect and enhance cultural and historic assets</b>	Will the option conserve or enhance historic buildings, places, conservation areas and spaces that enhance local distinctiveness, character and the appearance of	-	0	<p><b>Effects of Construction</b></p> <p>There are several heritage and archaeological sites around the shoreline of Kielder Water (Haw Hill Camp, a Romano-British settlement located on the south shoreline), although</p>



Objective	Guide questions	Relationship		Commentary
		Construction	Operation	
	<p>the public realm?</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>			<p>these would be unaffected by construction activity. There are no designated cultural heritage assets at, or within close proximity to, the other development sites with the exception of Cumwhinton which is approximately 700m from Corby Castle Registered Park and Garden, although no effects on the setting of this asset are expected due to distance from the site (approximately 700m) and the presence of physical barriers (e.g. woodland). However, there are a number of heritage features on the transfer pipeline routes, such as Maiden Way Roman Road, Beacon Pasture early post-medieval dispersed settlement and Hadrians Wall World Heritage Site/Scheduled Monument, although it is assumed that these features would be avoided when the transfer pipeline route would be scoped in more detail (for example by routing the pipeline along roads etc). Notwithstanding, the settings of some assets may be temporarily affected during the works. There is also the potential for unknown archaeology to be encountered on the route due to the number of ancient monuments present in the area and the length of the pipeline route. Overall, the option has been assessed as having a minor negative effect on this objective.</p> <p><b>Effects of Operation</b></p> <p>It is expected that new pipeline would be buried with planting and re-seeding likely to return land to a pre-development state within a year (depending on the season in which works are undertaken) such that there would be no long term adverse effects on the settings of designated cultural heritage assets along the route. In consequence, the option has been assessed as having a neutral effect on this objective during operation.</p> <p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>• Pipelines should be routed so as to avoid direct impacts on cultural heritage assets.</li> </ul> <p><b>Assumptions</b></p> <ul style="list-style-type: none"> <li>• None identified.</li> </ul> <p><b>Uncertainty</b></p> <ul style="list-style-type: none"> <li>• The presence of undiscovered items of archaeological interest is currently uncertain.</li> </ul>
<b>12. To protect and enhance landscape character</b>	<p>Will the option avoid adverse effects on, and enhance where possible, protected/designated landscapes (including woodlands) such as National Parks or AONBs?</p> <p>Will the option protect and enhance landscape character, townscape and seascape?</p> <p>Will the option affect public access to existing landscape features?</p>	-	-	<p><b>Effects of Construction</b></p> <p>The Corn How and Ennerdale sites are within the Lake District National Park although works at these locations would be of a small scale and contained within an existing operational site such that significant landscape impacts are not expected. The other development sites are not affected by any national landscape designations. However, the sites are generally within more rural locations and new infrastructure would be constructed on greenfield land such that there is potential for adverse landscape impacts. The construction of a new bankside intake structure and PS at Kielder in particular may have adverse effects on this aspect of the objective given the existing landscape character,</p>

Objective	Guide questions	Relationship		Commentary
		Construction	Operation	
	Will the option minimise adverse visual impacts?			<p>although it is noted that existing vegetation around the bankside may offer opportunities for screening works. Construction activity associated with the new WTW at Cumwhinton would be relatively substantial although this would be adjacent to an existing site such that significant landscape impacts are not anticipated. Works at the other development sites may also have temporary landscape impacts although construction activity would be of a smaller scale, would be adjacent to existing facilities and may benefit from existing screening (e.g. trees/hedgerows). Alongside the implementation of appropriate mitigation, this would be likely to reduce the magnitude of landscape impacts associated with development of these sites.</p> <p>Pipeline works may also affect landscape character, albeit temporarily. A large section of pipeline between Quarry Hill and Summergrove would be within the Lake District National Park and therefore there is potential for substantial landscape effects associated with pipeline works. However, the route would predominantly follow existing linear features (roads) and adverse effects would be over a short timescale with planting and re-seeding likely to return land to a pre-development state within a year (depending on the season in which works are undertaken). Works associated with other sections of the pipeline may also affect local landscape character as well as townscapes (where the route is through/adjacent to Carlisle, Cockermouth and Whitehaven).</p> <p>Whilst development would be within the Lake District National Park, it is not expected that construction activity would affect public access to the area.</p> <p>Construction activity may affect the visual amenity of residential receptors in close proximity to the development sites. However, the majority of sites are in rural and remote locations with few residential receptors likely to experience adverse effects. Notwithstanding, development of a new WTW at Cumwhinton may affect the visual amenity of a limited number of residential receptors to the north of the site. Further, the visual amenity of receptors along the route of the proposed pipeline as well as along transport corridors may be affected.</p> <p>Construction activity associated with the new intake and PS at Kielder may affect the visual amenity of recreational receptors such as walkers and lake users, particularly given that the reservoir is a regionally/nationally important recreation site. However, any adverse effects would be temporary and are not expected to be significant. No substantial adverse effects on recreational users within the Lake District National Park associated with development at Corn How or pipeline works are anticipated.</p> <p>Overall, this option has been assessed as having a minor negative effect on landscape during construction.</p> <p><b>Effects of Operation</b></p> <p>The new bankside intake structure and pumping station at Kielder may have adverse</p>

Objective	Guide questions	Relationship		Commentary
		Construction	Operation	
				<p>effects on landscape character and the visual amenity of recreational users. The east end of reservoir lies within the Northumberland National Park and whilst new above ground infrastructure would not be expected to affect its character, additional draw-down of the reservoir may be perceptible.</p> <p>The new WTW at Cumwhinton may affect local landscape character and the visual amenity of residential receptors to the north, although adverse effects may be lessened by the adoption of appropriate mitigation such as screening, sympathetic design and use of local materials. New above ground infrastructure at the other development sites would have negligible landscape/visual impacts as they would be of a relatively small scale and adjacent to existing sites whilst the number of visual receptors likely to be affected would be small.</p> <p>At sites where existing WTWs are decommissioned, landscape benefits are likely to be negligible as other water infrastructure such as PSs and SRs would be retained on site.</p> <p>Overall, the option has been assessed as having a minor negative effect on landscape during operation.</p> <p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>• Construction activity should be screened where possible so as to avoid/minimise adverse landscape/visual impacts.</li> <li>• Where possible, new above ground infrastructure should adopt high quality design principles (e.g. use of local materials).</li> <li>• Landscaping/screening measures should be utilised to minimise adverse landscape/visual amenity impacts.</li> </ul> <p><b>Assumptions</b></p> <ul style="list-style-type: none"> <li>• It is assumed that the land above the pipeline would be restored to its former quality after construction works have finished.</li> </ul> <p><b>Uncertainty</b></p> <ul style="list-style-type: none"> <li>• The exact design and scale of new infrastructure required under this option is unknown at this stage.</li> </ul>
<b>Summary</b>	<p><b>Effects of Construction</b></p> <p>This option represents a large scale scheme comprising several infrastructure components including a new intake, WTW, PS and pipeline together with the decommissioning of three existing WTWs. Construction (including decommissioning) activity is therefore expected to have a significant negative effect on climate change as a result of associated greenhouse gas emissions from HGV movements, construction plant and embodied carbon in raw materials (the option would generate 67,204 tonnes CO<sub>2</sub>e during construction). Using the embodied carbon associated with the construction phase as a proxy, material use and energy requirements are considered to be substantial and, taking into account waste generation, the option has therefore been assessed as having a significant negative effect on resource use.</p>			

Objective	Guide questions	Relationship		Commentary
		Construction	Operation	
				<p>The construction of this option would represent a large capital investment which is likely to generate a number of employment opportunities and supply chain benefits as well as increased spend in the local economy by contractors and construction workers. However, HGV movements and pipeline works could result in disruption to roads in the area. Overall, the option has therefore been as having a mixed significant positive and minor negative effect on economic and social wellbeing.</p> <p>The assessment has not identified any further significant negative or significant positive effects. Whilst the development sites do not contain any statutory or non-statutory designations, under current proposals the primary pipeline from Kielder to the United Utilities supply area is assumed to be a straight line across Kielder Forest (and hence across the Border Mires, Kielder – Butterburn SAC, River Eden SAC, River Eden and Tributaries and Kielder Mires SSSIs). The pipeline from Cumwhinton to Quarry Hill would also cross the River Eden SAC as well as ancient woodland whilst the pipeline from Quarry Hill to Summergrove would run adjacent to the River Derwent and Bassenthwaite Lake SAC and River Derwent and Tributaries SSSI for part of its route and would cross the SAC/SSSI. However, the HRA states that it is likely that effects on these sites arising from pipeline works could be managed/avoided with scheme specific mitigation (e.g. re-routing to avoid designated sites). In this respect, it is considered reasonable to assume that pipelines will be routed along existing carriageways (probably via the B6357 and then either the A6071 or the B6318) and river crossings (or via suitable alternative routes identified in discussion with Natural England and the Environment Agency). In addition, it is likely that any potential effects can be avoided or mitigated with suitable measures. It should also be noted that further, scheme level investigations and appropriate assessment would be undertaken at the project stage. Notwithstanding, this option would result in the loss of greenfield land at several development sites and in consequence there is potential for localised loss of habitat and, in conjunction with decommissioning works, disturbance which has been assessed as having a minor negative effect on biodiversity. The option may also generate minor negative effects in respect of land use/soils (due to additional lank take required under this option), flood risk (the site of the new intake and some decommissioning works would be within Flood Zones 2/3 whilst the proposed pipeline routes would cross Flood Zones 2/3 at several points) and cultural heritage (due to potential effects on the settings of listed buildings and scheduled monuments). The Corn How and Ennerdale sites are within the Lake District National Park although works at these locations would be of a small scale and contained within an existing operational site. A large section of pipeline between Quarry Hill and Summergrove would also be within the Lake District National Park. However, the route would predominantly follow existing linear features (roads) and adverse effects would be over a short timescale with planting and re-seeding likely to return land to a pre-development state within a year (depending on the season in which works are undertaken). In consequence, effects on this objective have been assessed as minor. Emissions to air from HGV movements and construction plant may also have a minor negative effect on air quality and, together with noise/vibration, human health.</p> <p>Neutral effects have been identified in respect of two objectives during construction relating to water quality/resources (Objectives 3 and 9).</p> <p><b>Effects of Operation</b></p> <p>Similar to the construction phase, the option is likely to have significant negative effects on climate change and resource use SEA objectives. This principally reflects the net additional energy requirements (and related greenhouse gas emissions) associated with the treatment and pumping of water.</p> <p>Abstraction from Ennerdale Water, which discharges into the Ehen, has been identified for amendments under the Review of Consents programme due to the impact of abstraction on interest features in the SAC (primarily fresh water pearl mussels). The decommissioning of Ennerdale WTW and associated abstraction from Ennerdale Water under this option may therefore generate benefits in respect of these features due to increased flows. Additionally, the decommissioning of Quarry Hill WTW would result in a reduction in abstraction from Dash Beck and Hause Gill, sources that have been investigated under the Review of Consents programme due to impacts on salmon which are interest features of the River Derwent and Tributaries SSSI and River Derwent and Bassenthwaite Lake SAC whilst the decommissioning of Corn How WTW and cessation of abstraction from Crummock Water may also lead to benefits in respect of the SSSI and SAC (although this source has not been identified for reduction under the Review of Consents programme). Taking into account the potential operational benefits in respect of the River Ehen SAC and River Derwent and Bassenthwaite Lake SAC in particular, this option has been assessed as having a significant positive effect on biodiversity. The decommissioning of Quarry Hill, Ennerdale and Corn How WTWs has also been assessed as having a significant positive effect on water quantity and quality due to increases in flows in the catchments in which associated abstractions are located (Dash Beck, Bassenthwaite/Derwent, Ellen, Ehen and Cocker).</p> <p>The option has a design capacity of 80 Ml/d, serving to address deficit within the West Cumbrian WRZ. This has been assessed as having a significant positive effect on health (in helping to ensure the continuity of a safe and secure drinking water supply) and economic and social wellbeing (given the potential for additional supply to support economic/population growth).</p> <p>No further significant negative or significant positive effects have been identified. The operation of this option is expected to have minor negative effects on landscape which principally</p>

Objective	Guide questions	Relationship		Commentary
		Construction	Operation	
	<p>reflects the potential for adverse landscape/visual impacts associated with new above ground infrastructure and additional draw-down of the reservoir.</p> <p>Neutral effects have been identified in respect of the following objectives: soils/land use (Objective 2); flood risk (Objective 4); water resources (Objective 9); air quality (Objective 5); and cultural heritage (Objective 11).</p> <p><b>Mitigation</b></p> <p>Adverse environmental effects associated with the construction/operation of this option could be reduced, and positive effects enhanced, through the adoption of the following mitigation measures:</p> <ul style="list-style-type: none"> <li>• Scheme specific mitigation plans will be required to ensure that any construction related adverse effects on designated sites are avoided and localised effects on biodiversity minimised.</li> <li>• 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.</li> <li>• Bio-security measures should be implemented during construction and operational phases.</li> <li>• Appropriate construction methods should be employed to minimise the risk of contamination.</li> <li>• 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.</li> <li>• Measures to mitigate air quality impacts arising from construction activities should be considered within a Construction and Environmental Management Plan. These measures may include, for example, dust suppression, use of lower emissions plant, and monitoring.</li> <li>• Detailed air quality and transport assessments should be undertaken as part of the Environmental Impact Assessment (EIA) process.</li> <li>• Measures to reduce energy demand/greenhouse gas emissions during construction should be considered including, for example, the use of low emission plant.</li> <li>• Where appropriate, the design of new infrastructure should incorporate the use of energy efficient materials and building techniques and, if appropriate, renewable energy provision.</li> <li>• Where possible, United Utilities and any contractors should seek to utilise local labour.</li> <li>• Where possible, United Utilities and any contractors should seek to appoint local contractors/sub-contractors and utilise locally sourced materials.</li> <li>• Opportunities to utilise reused/recycled materials during construction should be considered where appropriate.</li> <li>• Construction and operational wastes should be reused/recycled where possible.</li> <li>• Pipelines should be routed so as to avoid direct impacts on cultural heritage assets.</li> <li>• Where possible, new above ground infrastructure should adopt high quality design principles (e.g. use of local materials).</li> <li>• Landscaping/screening measures should be utilised to minimise adverse landscape/visual amenity impacts.</li> </ul>			

Lower Cost Option: Wastwater (negotiate part abstraction licence) (WC04); Development of new boreholes in West Cumbria aquifer (WC05a); Development of Boreholes in North Cumbria aquifer (WC09); and Crummock Automated Compensation Control (WC19); (Design Capacity – 27.2 MI/d)

### Option Summary

This option would involve the collective implementation of four individual smaller scale options (assessed during the feasible options stage) that together would deliver 27.2 MI/d to the West Cumbria WRZ. A summary of each constituent option is provided below:

- Wastwater (negotiate part abstraction licence): This component involves an agreement with third party licence holders for water transfer from Brow Top Service Reservoir to Ennerdale WTW. It would require the construction of a new 10 MI/d pumping station (PS) at Brow Top, 13.5km pipeline and a new mixing tank at Ennerdale.
- Development of new boreholes in West Cumbria aquifer (10 ML/d): This component would involve the construction of seven new boreholes at Sandwith, Rottington and Moor Platts in addition to utilising an existing borehole at Catgill. The scheme would require drilling of a borehole at each site, a new fixed speed borehole pump and a new headworks GRP kiosk. The Catgill site would also require a new break tank, aeration tower and raw water PS. A total of 1.5km of pipeline would be required from Sandwith to Rottington, 4km from Rottington to Moor Platts and 2.5km from Moor Platts to Catgill. Finally, a 13km pipeline would transfer all raw water to Ennerdale WTW. A new 1km washout main would also be needed at Catgill to the nearest Egremont sewer. The assessment of this option is based on discussions with the Environment Agency that have indicated that this amount of water is available for licensing from the West Cumbria Aquifer. However, it should be highlighted that confirmation that a scheme capacity of 20 MI/d is viable can only be confirmed once a detailed investigation has been completed.
- Development of Boreholes in North Cumbria aquifer: This component comprises the construction of two new boreholes at Waverton and Thursby for abstraction and transfer to Quarry Hill WTW. The scheme would also require a new 8km raw water transfer pipe from Waverton to the WTW and a 15km transfer pipe from Thursby to the WTW.
- Crummock Automated Compensation Control: This component would involve the replacement of Crummock weir's penstock with automated compensation control. This would allow for an automated control of the compensation flow to the River Derwent.

In addition to the above, treated water would be transferred to Summergrove SR from Quarry Hill WTW (linked to Option WC09) and Stainburn SR (linked to Option WC19). This would require a further 41km of pipeline from Quarry Hill WTW to Summergrove reservoir via Stainburn.

### Option Assessment

The assessment of the Lower Cost Option is presented in **Table E.3** below.

**Table E.3 Lower Cost Option**

Objective	Guide questions	Relationship		Commentary
		Construction	Operation	
<p><b>1. To protect and enhance biodiversity, key habitats and species, working within environmental capacities and limits</b></p>	<p>Will the option protect and enhance where possible the most important sites for nature conservation (e.g. internationally or nationally designated conservation sites such as SACs, SPAs, Ramsar and SSSIs)?</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 lead to a change in the ecological quality of habitats due to changes in groundwater/river water quality and/or quantity?</p>	-	?	<p><b>Effects of Construction</b></p> <p>Crummock Water is within the River Derwent and Bassenthwaite Lake SAC/SSSI which may be affected by the replacement of Crummock weir's penstock with automated compensation control. However, the HRA states that, as construction works required to deliver this option would be relatively minor and effects could be controlled/managed with current best practice and scheme-specific measures (e.g. avoiding key migration periods, etc), no adverse effects on the SAC/SSSI would be anticipated.</p> <p>No other development sites are affected by nature conservation designations. The HRA indicates that pipeline works may affect several European designated sites including the River Ehen SAC and River Derwent and Bassenthwaite Lake SAC/SSSI. The River Ehen SAC would be crossed by the new transfer pipelines associated with the Brow Top transfer to Ennerdale and construction of seven new boreholes at Sandwith, Rottington and Moor Platts. The pipeline from Quarry Hill to Summergrove would run adjacent to the River Derwent and Bassenthwaite Lake SAC/SSSI for part of its route and would cross the SAC/SSSI at Cockermonth. However, the HRA states that it is likely that these effects could be managed/avoided with scheme specific mitigation (e.g. re-routing to avoid designated sites). In this respect, it is considered reasonable to assume that pipelines will be routed along existing carriageways and river crossings (or via suitable alternative routes identified in discussion with Natural England and the Environment Agency). In addition, it is likely that any potential effects can be avoided or mitigated with suitable measures – for example, by timing construction works near rivers to avoid the key migration periods; and by developing specific silt control plans to manage construction run-off. It should also be noted that scheme level investigations and appropriate assessment would be undertaken at the project stage should the option form part of the final Water Resources Management Plan.</p> <p>Whilst the development sites are not affected by any nature conservation designations (with the exception of Crummock Water), works associated with the new boreholes would take place on greenfield land whilst some pipeline works would cross fields and in consequence, there would be potential for disturbance/habitat loss (e.g. from the drilling of new boreholes).</p> <p>Overall, the construction of this option has been assessed as having a minor negative effect on biodiversity.</p> <p><b>Effects of Operation</b></p> <p>Under the Option WC04 component of this scheme, water would be taken from Wastwater, which is designated as a SSSI and SAC. A 3km stretch of the River Irt</p>



Objective	Guide questions	Relationship		Commentary
		Construction	Operation	
				<p>downstream of Wastwater has the potential for reduced flows. Whilst the option would be under an existing license, additional abstraction would result in reservoir levels being lower than the current average which may impact on Wastwater SAC/SSSI, although this is currently uncertain.</p> <p>Whilst the new West Cumbria aquifer boreholes are outside the surface water catchment of the River Ehen and therefore any localised drawdown would not affect tributaries of the river, it is possible that abstraction may affect groundwater supplies to the Ehen. The HRA states that it is not clear what contribution to flow these are likely to make and that whilst any effects are likely to be felt outside of the SAC, reduced flow may affect mobile species (Atlantic salmon) migrating through the lower reaches.</p> <p>New borehole abstractions at Waverton and Thursby have the potential to impact on the nearby River Waverly and River Wampool, which discharges into the Solway Firth. The Waverton site is located approximately 12km upstream of Solway Firth, whilst Thursby is around 17 km upstream of the same site (SAC, SPA and Ramsar site). It has been assumed that a 1.5km reach downstream of the abstraction could be impacted however, and therefore the HRA concludes that significant effects would not be expected. All other European designated sites are almost certainly too distant for the abstraction to have a significant direct effect, including the River Eden SAC and the South Solway Mosses SAC which are both over 5km from the nearest borehole. However, abstraction may affect water dependent SSSIs downstream of the borehole sites although no readily available flow data could be found for the River Waverley or Wampool to contextualise the abstraction volumes and current flow.</p> <p>Automated compensation release control at Crummock Water would be within the terms of the existing licence and it is therefore unlikely that significant or adverse operational effects would occur. However, compensation flows into the River Cocker would be reduced relative to the current volumes as the releases currently 'over-compensate' for the inaccuracies in gauging and in this respect the HRA identifies that effects on the River Derwent and Bassenthwaite Lake SAC are uncertain.</p> <p>Whilst the majority of the scheme components are unlikely to have any significant adverse effects on European designated in view of the findings of the HRA, this option has been assessed as having an uncertain effect on biodiversity at this stage. Should this option be taken forward, further investigation in respect of potential effects on European designated sites is likely to be required.</p> <p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>• Scheme specific mitigation plans will be required to ensure that any construction related adverse effects on designated sites are avoided and localised effects on biodiversity minimised.</li> </ul>

Objective	Guide questions	Relationship		Commentary
		Construction	Operation	
				<ul style="list-style-type: none"> <li>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.</li> <li>Bio-security measures should be implemented during construction and operational phases.</li> <li>Potential operational effects associated with the operation of the new West Cumbria aquifer boreholes should be investigated further if this option is taken forward.</li> </ul> <p><b>Assumptions</b></p> <ul style="list-style-type: none"> <li>It has been assumed that the new pipeline would be predominantly routed along existing roads. Where this is not possible, alternative solutions will be discussed with Natural England and the Environment Agency to mitigate any impact of those alternatives.</li> </ul> <p><b>Uncertainty</b></p> <ul style="list-style-type: none"> <li>None identified.</li> </ul>
<p><b>2. To ensure the appropriate and efficient use of land and protect soil quality</b></p>	<p>Will additional land be required for the development or implementation of the option or will the option require below ground works leading to land sterilisation?</p> <p>Will the option utilise previously developed land?</p> <p>Will the option protect and enhance protected sites designated for their geological interest and wider geodiversity?</p> <p>Will the option minimise the loss of best and most versatile soil?</p> <p>Will the option minimise conflict with existing land use patterns?</p> <p>Will the option minimise land contamination?</p>	-	0	<p><b>Effects of Construction</b></p> <p>The new PS and mixing tank required to support the Brow Top transfer to Ennerdale and replacement of Crummock Weir's penstock would be located on existing sites. However, new boreholes and associated infrastructure would be situated on greenfield land. Additionally, temporary loss of land would occur during the pipeline works, although it is assumed that any soil displaced during excavations would be returned following completion of construction supported by a revegetation scheme such that adverse effects would be temporary.</p> <p>Development at several sites would result in the loss of Grade 3 agricultural land (as defined under Defra's Agricultural Land Classification system). These sites include: Brow Top; Sandwith; Rottington; Moor Platt; Catgill; Waverton; and Thursby (the remaining sites would be within areas of Grade 5/non-agricultural land). Sections of pipeline would also cross Grade 3 agricultural land. However, no loss of agricultural land classified as grade 1 (excellent) or grade 2 (very good) is anticipated.</p> <p>Whilst this option would involve the development of greenfield sites, the scale of works at each location would be relatively small and in consequence are considered unlikely to result in substantial conflicts with existing land use patterns.</p> <p>It is not expected that geologically protected sites would be adversely affected by the construction of this scheme.</p>

Objective	Guide questions	Relationship		Commentary
		Construction	Operation	
				<p>Overall, the construction of this option has been assessed as having a minor negative effect on this objective which principally reflects the loss of greenfield land required to accommodate new infrastructure.</p> <p><b>Effects of Operation</b></p> <p>Once construction activity is complete, no ongoing impact on land use/soils is expected (initial loss of land during construction has been assessed under construction). Overall, operational effects have therefore been assessed as neutral.</p> <p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>• Appropriate construction methods should be employed to minimise the risk of contamination.</li> </ul> <p><b>Assumptions</b></p> <ul style="list-style-type: none"> <li>• It has been assumed that development sites are not contaminated.</li> <li>• It is expected that soils displaced during excavation associated with pipeline works would be replaced following the completion of construction activity.</li> </ul> <p><b>Uncertainty</b></p> <ul style="list-style-type: none"> <li>• The exact footprint of new infrastructure required under this option is unknown at this stage.</li> </ul>
<p><b>3. To protect and enhance the quantity and quality of surface and groundwater resources and the ecological status of water bodies</b></p>	<p>Will the option minimise the demand for water resources?</p> <p>Will the option protect and improve surface, groundwater, estuarine 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 affect the ecological status of water bodies?</p>	0	-	<p><b>Effects of Construction</b></p> <p>During construction, there is the potential for contaminants such as silt, concrete or fuel oil to pollute watercourses, particularly given that pipeline works would be in close proximity to/cross rivers including the Ehen and Derwent. Contaminants may also affect Crummock Water as works associated with the replacement of the penstock would be required within/adjacent to this waterbody. However, 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><b>Effects of Operation</b></p> <p>This option would result in reduced flows in the River Irt and Cocker and reduce levels in Wastwater. A minor reduction in groundwater levels (and potentially river flows) would also be expected due to the borehole abstractions under operation. Overall, the option has therefore been assessed as having a minor negative effect on this objective.</p>

Objective	Guide questions	Relationship		Commentary
		Construction	Operation	
				<p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>None identified.</li> </ul> <p><b>Assumptions</b></p> <ul style="list-style-type: none"> <li>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).</li> </ul> <p><b>Uncertainty</b></p> <ul style="list-style-type: none"> <li>None identified.</li> </ul>
<p><b>4. To reduce the risk of flooding</b></p>	<p>Will the option have the potential to cause or exacerbate flooding in the catchment area now or in the future?</p> <p>Will the option have the potential to help alleviate flooding in the catchment area now or in the future?</p> <p>Will the option be at risk of flooding now or in the future?</p>	-	-	<p><b>Effects of Construction</b></p> <p>The proposed new mixing tank at Ennerdale would be located within Flood Zone 2 whilst construction works associated with the replacement of the penstock at Crummock weir would be within Flood Zones 2/3 (the remaining development sites are not within Flood Zones 2/3). Sections of the proposed pipelines would also cross Flood Zones 2/3. As a result, construction activity may be affected by flooding (subject to timing) although the option would not be expected to cause or significantly exacerbate flooding in the area.</p> <p><b>Effects of Operation</b></p> <p>During operation, this option is not expected to cause or exacerbate flooding in the area although the new mixing tank at Ennerdale may be at risk of flooding being located within Flood Zone 2. In consequence, the option has been assessed as having a minor negative effect on this objective.</p> <p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>None identified.</li> </ul> <p><b>Assumptions</b></p> <ul style="list-style-type: none"> <li>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.</li> </ul> <p><b>Uncertainty</b></p> <ul style="list-style-type: none"> <li>None identified.</li> </ul>
<p><b>5. To minimise emissions of pollutant gases and particulates</b></p>	<p>Will the option adversely affect local air quality as a result of emissions of pollutant gases and particulates?</p> <p>Will the option exacerbate existing air quality issues</p>	-	0	<p><b>Effects of Construction</b></p> <p>The option would require 5,250 HGV movements over an estimated 2 year construction period which, together with emissions to air from plant, may have a minor negative effect</p>

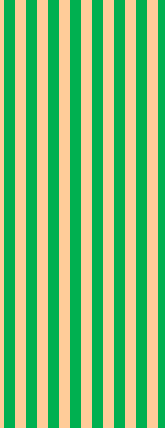

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<b>and enhance air quality</b>	<p>(e.g. in Air Quality Management Areas)?</p> <p>Will the option maintain or enhance ambient air quality, keeping pollution below Local Air Quality Management thresholds?</p> <p>Will the option reduce the need to travel or encourage sustainable modes of transport?</p>			<p>on local air quality. Pipeline works could also result in disruption to roads in the area, increasing congestion and associated emissions to air, particularly as pipelines would be routed through/adjacent to larger settlements such as Egremont, Workington, Whitehaven and Cockermouth. Impacts may be more substantial should works take place during peak tourist periods given existing traffic congestion issues in the area caused by the large seasonal influx of visitors. However, the development sites and pipeline routes are not within designated Air Quality Management Areas (AQMAs) and therefore the option has been assessed as having a minor negative effect on air quality.</p> <p><b>Effects of Operation</b></p> <p>Operational emissions to air are expected to be negligible and in this respect, the option would generate only 212 HGV movements per year. In consequence, the option has been assessed as having a neutral effect on air quality.</p> <p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>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.</li> <li>Measures to mitigate air quality impacts arising from construction activities should be considered within a Construction and Environmental Management Plan. These measures may include, for example, dust suppression, use of lower emissions plant, and monitoring.</li> <li>Detailed air quality and transport assessments should be undertaken as part of the Environmental Impact Assessment (EIA) process.</li> </ul> <p><b>Assumptions</b></p> <ul style="list-style-type: none"> <li>None identified.</li> </ul> <p><b>Uncertainty</b></p> <ul style="list-style-type: none"> <li>None identified.</li> </ul>
<b>6. To limit the causes and potential consequences of climate change</b>	<p>Will the option reduce or minimise greenhouse gas emissions?</p> <p>Will the option have new infrastructure that is energy efficient or make use of renewable energy sources?</p> <p>Will the option contribute positively to adaptation to climate change?</p> <p>Will the option increase environmental resilience to the effects of climate change?</p>	--	--	<p><b>Effects of Construction</b></p> <p>During the construction phase, the use of plant on-site and transportation of materials by road would result in increased emissions of greenhouse gases whilst the materials used for construction would contain embodied carbon. This option would generate 9,885 tonnes CO<sub>2</sub>e during construction (comprising both embodied carbon in construction materials and emissions from HGV movements) which has been assessed as having a significant negative effect on this objective.</p> <p><b>Effects of Operation</b></p>

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				<p>During operation, this option would involve the treatment and pumping of water which would result in a long term increase in energy use and associated emissions (there would also be embodied carbon in chemicals used to treat water). Operational vehicle movements would also contribute to emissions, although the number of HGV movements associated with the operation of this option would be small (212 movements per year). Operational emissions would be 6,158 tonnes CO<sub>2</sub>e/a.</p> <p>There are no immediate plans to include renewable energy provision within the design of this option.</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/storage.</p> <p>Overall, net operational greenhouse gas emissions are expected to be high and whilst the option may generate benefits in respect of climate change adaptation, on balance it has been assessed as having a significant negative effect on climate change.</p> <p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>Measures to reduce greenhouse gas emissions during construction should be considered including, for example, the use of low emission plant.</li> <li>Where appropriate, the design of new infrastructure should incorporate the use of energy efficient materials and building techniques and, if appropriate, renewable energy provision.</li> </ul> <p><b>Assumptions</b></p> <ul style="list-style-type: none"> <li>None identified.</li> </ul> <p><b>Uncertainty</b></p> <ul style="list-style-type: none"> <li>None identified.</li> </ul>
<b>7. To ensure the protection and enhancement of human health</b>	<p>Will the option ensure the continuity of a safe and secure drinking water supply?</p> <p>Will the option affect opportunities for recreation and physical activity?</p> <p>Will the option maintain surface water and bathing water quality within statutory standards?</p> <p>Will the option adversely affect human health by resulting in increased nuisance and disruption (e.g. as a result of increased noise levels)?</p>	-	++	<p><b>Effects of Construction</b></p> <p>Construction activity may have an adverse effect on health as a result of air quality/noise impacts. In particular, the Thursby site is adjacent to the settlement boundary of Thursby with residential receptors to the east whilst several farms may be affected by development at Waverton. Works at Rottington may also affect residential receptors to the west of the proposed borehole site (although receptors are limited in number). Works at Brow Top and Ennerdale are not expected to have any discernible effect on health given the remoteness of these sites. The proposed pipelines would pass through/be adjacent to a number of settlements including Egremont, Cockermouth, Workington and Whitehaven and associated works/HGV movements may therefore affect receptors along this route.</p>

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				<p>Notwithstanding the above, works would be temporary and associated effects are expected to be felt in the short term only (i.e. over the estimated 2 year construction period). Further, it is likely that impacts would managed/mitigated where possible using best practice (e.g. Considerate Constructors' Scheme).</p> <p>No substantial effects on recreation are anticipated although it is noted that some sections of pipeline would cross a number of public footpaths whilst development at the Sandwith site may affect the adjacent public footpath. However, any impacts are likely to be of short duration at any one location and suitable diversions are assumed to be put in place.</p> <p>Overall, the option has been assessed as having a minor negative effect on health during construction.</p> <p><b>Effects of Operation</b></p> <p>Once operational, the option is not expected to have any adverse effects on health (e.g. as a result of noise or air quality impacts). The Brow Top transfer to Ennerdale may impact upon informal recreation and angling due to reduced flows in the River Irt to its confluence with the River Bleng downstream of Wastwater, although this is only expected to be noticeable at times of low flow (i.e. drought years, which occur approximately 1 in 20 years).</p> <p>The option has a design capacity of 27.2 Ml/d, serving to address deficit within the West Cumbrian WRZ. On balance, the option has therefore been assessed as having a significant positive effect on health.</p> <p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>No additional mitigation identified.</li> </ul> <p><b>Assumptions</b></p> <ul style="list-style-type: none"> <li>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).</li> <li>It is assumed that suitable diversions would be put in place where works are likely to affect public footpaths.</li> </ul> <p><b>Uncertainty</b></p> <ul style="list-style-type: none"> <li>None identified.</li> </ul>
<p><b>8. To maintain and enhance the economic and social well-being of</b></p>	<p>Will the option ensure sufficient infrastructure is in place for predicted population increases?</p> <p>Will the option ensure sufficient infrastructure is in</p>	<p>++/-</p>	<p>++</p>	<p><b>Effects of Construction</b></p> <p>The construction of this option would represent a large capital investment. This is likely to generate a number of employment opportunities and supply chain benefits (e.g.</p>



Objective	Guide questions	Relationship		Commentary
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<p><b>the local community</b></p>	<p>place to sustain a seasonal influx of tourists?</p> <p>Will the option help to meet the employment needs of local people?</p> <p>Will the option ensure that an affordable supply of water is maintained and vulnerable customers protected?</p> <p>Will the option improve access to local services and facilities (e.g. sport and recreation)?</p> <p>Will the option contribute to sustaining and growing the local and regional economy?</p> <p>Will the option avoid disruption through effects on the transport network?</p> <p>Will the option be resilient to future changes in resources (both financial and human)?</p>			<p>associated with the supply of raw materials and appointment of contractors to undertake the works). Whilst the degree to which this would benefit the local labour market and local businesses would depend to an extent on the recruitment practices of contractors appointed to undertake the works, skills within the local labour market and the procurement policies of both United Utilities and any sub-contractors, benefits are expected to be substantial.</p> <p>Works may affect the amenity of recreational users particularly in respect of those sites located within the Lake District National Park which is a popular tourist destination. However, construction activity is not expected to have a substantial adverse impact on the local tourist economy given that works would be temporary and impacts are likely to be managed/mitigated where possible using best practice (e.g. Considerate Constructors' Scheme).</p> <p>HGV movements and pipeline works of the proposed scale (exceeding 98km in length) and duration (circa 2 years) could result in disruption to roads in the area. In particular, the pipeline between Quarry Hill and Summergrove would follow the A66, A596 and A595 as well as B and C roads for its circa 40km length and associated works would be likely to cause traffic disruption and congestion along these routes. However, any effects would be temporary and felt in the short term only whilst the magnitude of effects are likely to be lessened by the adoption of mitigation measures at the project level, informed by a detailed transport assessment.</p> <p>Taking into account the potential for substantial economic benefits to arise during construction but the likelihood of traffic disruption, the option has been as having a mixed significant positive and minor negative effect on this objective.</p> <p><b>Effects of Operation</b></p> <p>As noted above, the Brow Top transfer to Ennerdale may impact upon informal recreation and angling due to reduced flows in the River Irt to its confluence with the River Bleng downstream of Wastwater, although this is only expected to be noticeable at times of low flow (i.e. drought years, which occur approximately 1 in 20 years).</p> <p>The option has a design capacity of 27.2 Ml/d, serving to address deficit within the West Cumbrian WRZ. This may support economic and population growth in the West Cumbria area and help sustain the seasonal influx of tourists. The additional supply may also help to ensure that an affordable supply of water is maintained in the long term, serving to protect vulnerable customers.</p> <p>This option would not require significant levels of additional resource (financial or human) during operation and in consequence, it is likely to be resilient to any future changes in these resources.</p> <p>Overall, in view of the substantial capacity of this option, effects on this objective have</p>

Objective	Guide questions	Relationship		Commentary
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				<p>been assessed as significant.</p> <p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>Where possible, United Utilities and any contractors should seek to utilise local labour.</li> <li>Where possible, United Utilities and any contractors should seek to appoint local contractors/sub-contractors and utilise locally sourced materials.</li> </ul> <p><b>Assumptions</b></p> <ul style="list-style-type: none"> <li>None identified.</li> </ul> <p><b>Uncertainty</b></p> <ul style="list-style-type: none"> <li>The extent to which the construction of this option would benefit the local economy/local labour market is uncertain. However, given the scale of investment, benefits are nonetheless expected to be significant.</li> <li>A detailed transport assessment should be undertaken as part of the EIA process.</li> </ul>
<p><b>9. To ensure the sustainable and efficient use of water resources</b></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><b>0</b></p>	<p><b>0</b></p>	<p><b>Effects of Construction and Operation</b></p> <p>The option would not lead to a reduction in losses from the supply network. There are no measures in the option that would improve water efficiency. In consequence, the option has been assessed as having a neutral effect on this objective during both construction and operation.</p> <p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>None identified.</li> </ul> <p><b>Assumptions</b></p> <ul style="list-style-type: none"> <li>None identified.</li> </ul> <p><b>Uncertainty</b></p> <ul style="list-style-type: none"> <li>None identified.</li> </ul>
<p><b>10. To promote the efficient use of resources</b></p>	<p>Will the option seek to minimise the demand for raw materials?</p> <p>Will the option reduce the total amount of waste produced and the proportion of waste sent to landfill?</p> <p>Will the option encourage the use of sustainable design and materials?</p>	<p>--</p>	<p>--</p>	<p><b>Effects of Construction</b></p> <p>This option comprises several infrastructure components including 9 new boreholes and associated facilities, mixing tank, 2 PS's and penstock together with approximately 98km of new pipeline that would require a large volume of raw materials and energy to construct. Using the embodied carbon associated with the construction phase (9,885 tonnes of CO<sub>2</sub>e) as a proxy, material use and energy requirements are considered to be substantial and the option has therefore been assessed as having a significant negative effect on this</p>

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	Will the option reduce or minimise energy use?			<p>objective.</p> <p>This option would generate construction wastes (e.g. excavation waste and replaced infrastructure such as Crummock weir's penstock) although it is expected that a large proportion of this waste would be reused/recycled.</p> <p>Overall, this option has been assessed as having a significant negative effect on resource use during construction.</p> <p><b>Effects of Operation</b></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 result in a long term increase in energy use (operational energy usage is estimated to be approximately 3,935 KWh/MI).</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 significant negative effect on resource use.</p> <p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>• Opportunities to utilise reused/recycled materials during construction should be considered where appropriate.</li> <li>• Construction and operational wastes should be reused/recycled where possible.</li> <li>• Measures to reduce energy usage during construction should be considered including, for example, the use of low energy usage plant.</li> <li>• Where appropriate, the design of new infrastructure should incorporate the use of energy efficient materials and building techniques and, if appropriate, renewable energy provision.</li> </ul> <p><b>Assumptions</b></p> <ul style="list-style-type: none"> <li>• None identified.</li> </ul> <p><b>Uncertainty</b></p> <ul style="list-style-type: none"> <li>• Opportunities to reduce waste, reuse materials and use recycled materials for construction are unknown at this stage.</li> <li>• The exact resource requirements (e.g. volumes of specific materials) associated with the construction/operation of this option are unknown at this stage.</li> <li>• The volume of waste generated under operation of this option is uncertain at this</li> </ul>

Objective	Guide questions	Relationship		Commentary
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				stage.
<b>11. To protect and enhance cultural and historic assets</b>	<p>Will the option conserve or enhance historic buildings, places, conservation areas and spaces that enhance local distinctiveness, character and the appearance of the public realm?</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	<p><b>Effects of Construction</b></p> <p>There are no designated cultural heritage assets at, or within close proximity to, the development sites with the exception of Moor Platts which is adjacent to a Grade II Listed Building (Moorleys Farmhouse), the setting of which may be affected by construction activity. A scheduled monument (the moated site of Loweswater Pele) is located approximately 500m from Crummock weir although this is not expected to be affected by construction activities whilst development at the borehole sites is unlikely to affect the settings of listed buildings in the settlements of Thursby and Waverton (due to distance from these assets and the presence of existing screening/physical barriers).</p> <p>There are a number of heritage features on the transfer pipeline routes, the settings of which may be affected by associated pipeline works. These assets include, for example, a number of listed buildings, Workington Hall Registered Park and Garden and Parton Roman Fort Scheduled Monument. As proposed, the pipeline between Thursby and Quarry Hill would cross through Old Carlisle Scheduled Monument although it is assumed that this asset would be avoided when the transfer pipeline route is scoped in more detail. There is also the potential for unknown archaeological items to be encountered during pipeline works particularly given the number of ancient monuments present in the area and the length of the pipeline route although this is currently uncertain.</p> <p>Overall, the option has been assessed as having a minor negative effect on this objective.</p> <p><b>Effects of Operation</b></p> <p>As noted above, the Moor Platts site is adjacent to a Grade II Listed Building (Moorleys Farmhouse), the setting of which may be affected by new above ground infrastructure (although any adverse effects could be mitigated by screening).</p> <p>It is expected that new pipeline would be buried with planting and re-seeding likely to return land to a pre-development state within a year (depending on the season in which works are undertaken) such that there would be no long term adverse effects on the settings of designated cultural heritage assets along the route. In consequence, the option has been assessed as having a neutral effect on this objective during operation.</p> <p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>Pipelines should be routed so as to avoid direct impacts on cultural heritage assets.</li> </ul> <p><b>Assumptions</b></p> <ul style="list-style-type: none"> <li>None identified.</li> </ul>

Objective	Guide questions	Relationship		Commentary
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				<b>Uncertainty</b> <ul style="list-style-type: none"> <li>The presence of undiscovered items of archaeological interest is currently uncertain.</li> </ul>
<b>12. To protect and enhance landscape character</b>	<p>Will the option avoid adverse effects on, and enhance where possible, protected/designated landscapes (including woodlands) such as National Parks or AONBs?</p> <p>Will the option protect and enhance landscape character, townscape and seascape?</p> <p>Will the option affect public access to existing landscape features?</p> <p>Will the option minimise adverse visual impacts?</p>	-	-	<b>Effects of Construction</b> <p>Ennerdale WTW and Crummock weir are located within the Lake District National Park and in consequence there is potential for substantial landscape impacts during construction. However, the scale of works at these sites would be small (construction of a new mixing tank and replacement of an existing penstock) whilst in the case of Ennerdale development would be within an existing site. In consequence, landscape impacts are not expected to be significant.</p> <p>The proposed pipeline route under the Brow Top transfer component of this scheme coincides with the boundary of the Lake District National Park for most of its course and runs inside the National Park for its northern section to Ennerdale WTW. Similarly, the new West Cumbria aquifer boreholes element also requires 21km of new transfer piping to be laid which would cross the Lake District National Park for approximately 6km. Pipeline works between Quarry Hill and Stainburn would also be within/alongside the boundary of the Lake District National Park (for approximately 5km). In consequence, there is potential for substantial landscape effects associated with construction activity. However, the majority of the proposed pipeline routes would follow existing linear features (roads) and adverse effects would be over a short timescale with planting and re-seeding likely to return land to a pre-development state within a year (depending on the season in which works are undertaken).</p> <p>Development sites outside the Lake District National Park would be in rural settings and on greenfield land. In consequence there may be potential for adverse effects on local landscape character (although the PS at Brow Top and works at Catgill would be within existing sites). Pipeline works outside the Lake District National Park may also affect local landscape character as well as townscapes (e.g. where routed through/adjacent to Egremont, Workington, Whitehaven and Cockermouth).</p> <p>Whilst development would be within the Lake District National Park, it is not expected that construction activity would affect public access to the area.</p> <p>Construction activity may affect the visual amenity of residential receptors in close proximity to the development sites. However, the sites are in rural and remote locations with few residential receptors likely to experience adverse effects. Notwithstanding, construction of new boreholes at Rottington may affect the visual amenity of residential receptors to the west of the site whilst works at Waverton and Thursby may affect residential receptors to the north and east respectively (although visual intrusion would only be to very few receptors). Further, the visual amenity of receptors along the route of</p>

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				<p>the proposed pipeline as well as along transport corridors may be affected.</p> <p>No substantial effects on the visual amenity of recreational receptors are anticipated. Installation of a replacement penstock at Crummock weir may affect the visual amenity recreational users of the lake such as walkers, particularly given the location of the site within the Lake District National Park. However, in view of the scale of works, any adverse effects are not expected to be significant. Some sections of pipeline would cross public footpaths whilst development at the Sandwith site may affect the adjacent public footpath. However, any impact on recreational users of these footpaths is likely to be of short duration at any one location.</p> <p>Overall, this option has been assessed as having a minor negative effect on landscape during construction.</p> <p><b>Effects of Operation</b></p> <p>This option would result in new above ground infrastructure within the Lake District National Park and in consequence there would be potential for substantial landscape impacts. However, the new mixing tank at Ennerdale WTW would be small scale and within an existing site, benefitting from screening whilst no permanent landscape impacts are expected once the penstock at Crummock weir is operational (as it would replace an existing unit).</p> <p>New above ground infrastructure outside the Lake District National Park would be in rural settings and on greenfield land and in consequence there may be potential for adverse effects on local landscape character (although the PS at Brow Top and works at Catgill would be within existing sites).</p> <p>New assets may also affect the visual amenity of residential receptors in close proximity to the development sites. However, as noted above the sites are in rural and remote locations with few residential receptors likely to experience adverse effects. Notwithstanding, new borehole infrastructure (e.g. kiosks and pumps) at Rottington, Waverton and Thursby may affect residential receptors in close proximity to these sites although the scale of new development would be small and with appropriate screening effects are unlikely to be significant.</p> <p>Overall, the option has been assessed as having a minor negative effect on landscape during operation.</p> <p><b>Mitigation</b></p> <ul style="list-style-type: none"> <li>• Construction activity should be screened where possible so as to avoid/minimise adverse landscape/visual impacts.</li> <li>• Where possible, new above ground infrastructure should adopt high quality design</li> </ul>

Objective	Guide questions	Relationship		Commentary
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				<p>principles (e.g. use of local materials).</p> <ul style="list-style-type: none"> <li>Landscaping/screening measures should be utilised to minimise adverse landscape/visual amenity impacts.</li> </ul> <p><b>Assumptions</b></p> <ul style="list-style-type: none"> <li>It is assumed that the land above the pipeline would be restored to its former quality after construction works have finished.</li> </ul> <p><b>Uncertainty</b></p> <ul style="list-style-type: none"> <li>The exact design and scale of new infrastructure required under this option is unknown at this stage.</li> </ul>
<b>Summary</b>	<p><b>Effects of Construction</b></p> <p>This option would involve the collective implementation of four individual smaller scale options (assessed during the feasible options stage) and would comprise nine new boreholes and associated facilities, mixing tank, two PS;s and penstock together with approximately 98km of new pipeline. Reflecting the scale of this option, construction activity is expected to have a significant negative effect on climate change as a result of associated greenhouse gas emissions from HGV movements, construction plant and embodied carbon in raw materials (the option would generate 9,885 tonnes CO<sub>2</sub>e during construction). Using the embodied carbon associated with the construction phase as a proxy, material use and energy requirements are considered to be substantial and the option has therefore been assessed as having a significant negative effect on resource use.</p> <p>The construction of this option would represent a large capital investment which is likely to generate a number of employment opportunities and supply chain benefits as well as increased spend in the local economy by contractors and construction workers. However, HGV movements and pipeline works of the proposed scale may cause traffic disruption. The option has therefore been assessed as having a mixed significant positive and minor negative effect on economic and social wellbeing.</p> <p>The assessment has not identified any further significant negative or significant positive effects. Crummock Water is within the River Derwent and Bassenthwaite Lake SAC/SSSI which may be affected by the replacement of the Crummock weir penstock. However, the HRA states that, as construction works required to deliver this option would be relatively minor and effects could be controlled/managed with normal best practice and scheme-specific measures e.g. avoiding key migration periods, etc, no adverse effects would be anticipated. Whilst no other development sites are affected by nature conservation designations, pipeline works may affect several European designated sites including the River Ehen SAC and River Derwent and Bassenthwaite Lake SAC/SSSI. However, the HRA states that it is likely that effects on these sites arising from pipeline works could be managed/avoided with scheme specific mitigation (e.g. re-routing to avoid designated sites). In this respect, it is considered reasonable to assume that pipelines will be routed along existing carriageways and river crossings (or via suitable alternative routes identified in discussion with Natural England and the Environment Agency). In addition, it is likely that any potential effects can be avoided or mitigated with suitable measures. It should also be noted that further, scheme level investigations and appropriate assessment would be undertaken at the project stage.</p> <p>Notwithstanding, this option would result in the loss of greenfield land at several development sites and in consequence there is potential for localised loss of habitat and disturbance which has been assessed as having a minor negative effect on biodiversity. The option may also generate minor negative effects in respect of land use/soils (due to additional lank take required under this option), flood risk (the proposed new mixing tank at Ennerdale, replacement penstock at Crummock weir and sections of the proposed pipelines would be within/cross Flood Zones 2/3) and cultural heritage (due to potential effects on the settings of listed buildings and scheduled monuments). With regard to landscape, Ennerdale WTW and Crummock weir are located within the Lake District National Park and in consequence there is potential for significant landscape impacts. However, the scale of works at these sites would be small (construction of a new mixing tank and replacement of an existing penstock) whilst in the case of Ennerdale development would be within an existing site. The proposed pipelines would also cross the Lake District National Park although routes would generally follow existing linear features (roads) and adverse effects would be over a short timescale with planting and re-seeding likely to return land to a pre-development state within a year (depending on the season in which works are undertaken). In consequence, effects on this objective have been assessed as minor. Emissions to air from HGV movements and construction plant may also have a minor negative effect on air quality and, together with noise/vibration, human health.</p>			



Objective	Guide questions	Relationship		Commentary
		Construction	Operation	
	<p>Neutral effects have been identified in respect of two objectives during construction relating to water quality/resources (Objectives 3 and 9).</p> <p><b>Effects of Operation</b></p> <p>Similar to the construction phase, this option is likely to have significant negative effects on climate change and resource use SEA objectives. This principally reflects the additional energy requirements (and related greenhouse gas emissions) associated with the treatment and pumping of water.</p> <p>The option has a design capacity of 27.2 Ml/d, serving to address deficit within the West Cumbrian WRZ. This has been assessed as having a significant positive effect on health (in helping to ensure the continuity of a safe and secure drinking water supply) and economic and social wellbeing (given the potential for additional supply to support economic/population growth).</p> <p>No further significant negative or significant positive effects have been identified. The operation of this option is expected to have minor negative effects on water quantity (Objective 3), due to a minor reduction in river flows and groundwater levels, and flood risk (Objective 4), due to the location of the mixing tank at Ennerdale within Flood Zone 2. There may also be minor negative effects on landscape which principally reflects the potential for adverse landscape/visual impacts associated with new above ground infrastructure.</p> <p>Neutral effects have been identified in respect of the following objectives: soils/land use (Objective 2); water resources (Objective 9); air quality (Objective 5); and cultural heritage (Objective 11).</p> <p>Effects on biodiversity have been assessed as uncertain at this stage. Whilst the majority of the scheme components are unlikely to have any significant adverse effects on European designated sites, the findings of the HRA in respect of the operation of the new West Cumbria aquifer boreholes, Wastewater transfer and Crummock Automated Compensation Control indicate that effects on several European designated sites are uncertain. Further, new borehole abstractions at Waverton and Thursby have the potential to impact on the nearby River Waverly and River Wampool and may affect water dependent SSSIs downstream of the borehole sites although no readily available flow data could be found for the River Waverley or Wampool to contextualise the abstraction volumes and current flow.</p> <p><b>Mitigation</b></p> <p>Adverse environmental effects associated with the construction/operation of this option could be reduced, and positive effects enhanced, through the adoption of the following mitigation measures:</p> <ul style="list-style-type: none"> <li>• Scheme specific mitigation plans will be required to ensure that any construction related adverse effects on designated sites are avoided and localised effects on biodiversity minimised.</li> <li>• 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.</li> <li>• Bio-security measures should be implemented during construction and operational phases.</li> <li>• Potential operational effects associated with the operation of the new West Cumbria aquifer boreholes should be investigated further if this option is taken forward.</li> <li>• Appropriate construction methods should be employed to minimise the risk of contamination.</li> <li>• 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.</li> <li>• Measures to mitigate air quality impacts arising from construction activities should be considered within a Construction and Environmental Management Plan. These measures may include, for example, dust suppression, use of lower emissions plant, and monitoring.</li> <li>• Detailed air quality and transport assessments should be undertaken as part of the Environmental Impact Assessment (EIA) process.</li> <li>• Measures to reduce energy demand/greenhouse gas emissions during construction should be considered including, for example, the use of low emission plant.</li> </ul>			

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				<ul style="list-style-type: none"> <li>• Where appropriate, the design of new infrastructure should incorporate the use of energy efficient materials and building techniques and, if appropriate, renewable energy provision.</li> <li>• Where possible, United Utilities and any contractors should seek to utilise local labour.</li> <li>• Where possible, United Utilities and any contractors should seek to appoint local contractors/sub-contractors and utilise locally sourced materials.</li> <li>• Opportunities to utilise reused/recycled materials during construction should be considered where appropriate.</li> <li>• Construction and operational wastes should be reused/recycled where possible.</li> <li>• Pipelines should be routed so as to avoid direct impacts on cultural heritage assets.</li> <li>• Where possible, new above ground infrastructure should adopt high quality design principles (e.g. use of local materials).</li> <li>• Landscaping/screening measures should be utilised to minimise adverse landscape/visual amenity impacts.</li> </ul>