

RSA - Old Walls HEP cost benefit assessment (13/08/25)

For reference - overall methodology – Water Appraisal Guidance

[LIT 13983 - Water Appraisal Guidance.docx](#)

Old Walls summary

Preferred option from August 2025 version of OAR - Addition of Q95 HoF, new 6mm screening at intake from West Webburn River, 35% take, sweetening flow, retain 25mm bar screen on outlet and add as licence condition.

1. Appraisal Summary table – The Benefits

Impact expected to the following categories. This is a general description and does not impact on the actual value of the benefits.

Category	Significance of change						Significance of change between do nothing and do
	Do something option						
	1	2	3	4	5	6	
Provisioning services							
Fresh water	o	o	o	o	o	o	Benefit
Food (e.g. crops, fruit, fish etc.)	o	o	o	o	o	o	Benefit
Fibre and fuel (e.g. timber, wool, etc.)	o	o	o	o	o	o	Benefit
Genetic resources (used for crop/stock breeding and biotechnology)	o	o	o	o	o	o	Benefit
Biochemicals, natural medicines, pharmaceuticals	o	o	o	o	o	o	Benefit
Ornamental resources (e.g. shells, flowers, etc.)	o	o	o	o	o	o	Benefit
Water for non-consumptive use	VV	o	o	o	o	o	Disbenefit
Regulating services							
Air Quality regulation	o	o	o	o	o	o	
Climate regulation (local temperature/ precipitation, greenhouse gas sequestration)	o	o	o	o	o	o	
Water regulation (timing and scale of run-off, flooding, etc.)	A	o	o	o	o	o	
Natural hazard regulation (i.e. storm protection)	o	o	o	o	o	o	
Pest regulation	o	o	o	o	o	o	
Disease regulation	o	o	o	o	o	o	
Erosion regulation	o	o	o	o	o	o	
Water purification and waste treatment	A	o	o	o	o	o	
Pollination	o	o	o	o	o	o	
Noise and Light regulation	o	o	o	o	o	o	
Cultural services							
Cultural heritage	o	o	o	o	o	o	
Recreation and tourism	AA	o	o	o	o	o	
Aesthetic value	o	o	o	o	o	o	
Spiritual and religious value	o	o	o	o	o	o	
Intellectual and scientific, educational	o	o	o	o	o	o	
Inspiration of art, folklore, architecture, etc	o	o	o	o	o	o	
Existence Values	o	o	o	o	o	o	
Social relations (e.g. fishing, grazing or cropping communities)	AA	o	o	o	o	o	
Supporting services							
Soil formation	o	o	o	o	o	o	
Primary production (in river)	A	o	o	o	o	o	
Nutrient cycling	o	o	o	o	o	o	
Water recycling	A	o	o	o	o	o	
Photosynthesis (production of atmospheric oxygen)	A	o	o	o	o	o	
Provision of habitat	A	o	o	o	o	o	

Used the NWEBS methodology (National Water Environment Benefit Survey).



Microsoft Word Document

The benefits assigned to the West Webburn waterbody as follows –

West Webburn waterbody GB108046008410 – benefit to fish from moderate to good for 18.7km

West Webburn waterbody GB108046008410 – benefit to flow from bad to good for 0.6km

These lengths of river are used to calculate the monetary benefits from the improvements.

2. Measures cost sheet – The Costs

Included costs for two actions. No costs for loss of income for HEP generation.

Moveable weir for HoF and variable % take - £61.1k capital costs, assumed 50% cost of maintenance in year 20 of the 40 years of costs.

Management of the risk of fish entrainment in intakes for hydropower turbines or water resource purposes (or pumping stations) where there is downstream fish migration - £12.8k capital costs with 50% maintenance cost in year 20 of the 40 years of costs.

Total initial capex in year 1 = £73.9k, plus £36.9k in year 20.

Operation expenditure (opex) assumed to be £0.1k per action per year over the 40 years.

Source of costs –

Weir

https://assets.publishing.service.gov.uk/media/6034edca8fa8f543294411d7/Cost_estimation_for_control_assets_1.pdf

Screening

EA WFD costs database which I removed the most relevant costs from for our RSA sites and pulled into this spreadsheet.



Microsoft Excel
Worksheet

3. Stage 1 valuation sheet – **The answer**

For this sheet, you input the benefits from the appraisal summary table and the costs from the measures cost sheet into the ‘GES – Rivers’ tab. It then calculates the required outputs.

I used the central estimate of willingness to pay for the benefit in lieu of any information to indicate could be more or less.

Based on the data entered, for Old Walls the present value benefits are £0.7m and the present value costs are £0.1m. Therefore the net present value is £0.6m. Snip from the WAG document below. These are based on the relatively old baseline values in the methodology.

7.3. Calculating the net present value

This is calculated by:

$$\text{Net Present Value (£)} = \text{Present Value Benefits (£)} - \text{Present Value Costs (£)}$$

The NPV should be greater than £0 for a project or programme to be deemed worthwhile in economic terms. This means that the values we place now on future benefits are greater than the values we place now on the future costs.

The benefits to cost ratio for Old Walls is 7.2. Snip from WAG document below. As above 1, actions considered cost-beneficial.

7.4. Calculating the benefit cost ratio

This is calculated by

$$\text{Benefit Cost Ratio} = \text{Present Value Benefits (£)} / \text{Present Value Costs (£)}$$

This tells us the amount of benefits returned for every £1 invested. For example if total present value benefits over 40 years was £150,000 and total present value costs over 40 years were £100,000 then:

$$\text{Benefit cost Ratio} = \text{£150,000} / \text{£100,000} = 1.5$$

I did not undertake sensitivity analysis as the ratio was much higher than 1.

END

Appraisal summary table (AST) - Version number 4						Version:		1		
Site name: Old Walls HEP on the West Webburn River						Unique Identification Number if applicable:				
Measures/Bundle of Measures Name/Description: Addition of Q95 HoF, new 6mm screening at intake from West Webburn River, 35% take, sweetening flow, retain 25mm bar screen on outlet and add as licence condition.						Site Specific Assumptions: Update if needed				
Description of any relevant areas of environmental importance such as areas designated under the Birds or Habitats Directive: Local driver for RSA						Name of Assessor:				
Category (Please see further guidance in comment boxes)	Category Filter- please select which categories will be likely to be impacted by the measures	Current baseline- Qualitative Description	Evolution of the baseline- 'Do nothing' scenario, Qualitative Description	Evolution of the baseline- 'Carry out measures' scenario, Qualitative Description Guidance questions: Will the change/effect(s) be positive/negative? Will the change/effect(s) be short/medium or long term? Will there be any secondary or cumulative changes/effects?	Current baseline- Quantitative Description	Evolution of the baseline- 'Do nothing' scenario, Quantitative Description	Evolution of the baseline- 'Carry out measure' scenario, Quantitative Description, Guidance questions: Will the change/effect(s) be positive/negative? Will the change/effect(s) be short/medium or long term? Will there be any secondary or cumulative changes/effects? Please refer to the Water Appraisal Guidance for further help	Significance of change/effect(s) (Significant Positive AA; Minor Positive A; No net change 0; Minor Negative V; Significant negative vv)	Who benefits and who loses? Describe groups of people, business and industry who may be impacted. E.g. deprived communities, interest groups, specific riverside businesses, navigation industry, water industry etc	Risk of failure (estimated probability that no level of improvement or reduction of loss will take place)
Provisioning services										
Fresh water	No impact expected							o		
Food (e.g. crops, fruit, fish etc.)	No impact expected							o		
Fibre and fuel (e.g. timber, wool, etc.)	No impact expected							o		
Genetic resources (used for crop/stock breeding and biotechnology)	No impact expected							o		
Biochemicals, natural medicines, pharmaceuticals	No impact expected							o		
Ornamental resources (e.g. shells, flowers, etc.)	No impact expected							o		
Water for non-consumptive use	Impact expected	Abstraction for non-consumptive use causes a deprived river reach.	Continue as it is.	The measures will reduce the water used for non-consumptive use at this site. Positive change for environment, negative change for the non-consumptive use.	At flows above Q95, the current licence allows over 80% of the flow to be abstracted. At Q50, the impact is greatest with 95% of the flow abstracted. In a year with average flows, flows in the deprived reach would be below the EPI for 336 days.	Will continue	Under the proposed licence conditions, flows are mainly above the EPI during an average year. At flows above Q95, the proposed conditions restrict the abstraction to a maximum of 30% of natural flows. This occurs at Q30.		LH loses	Low (0-20%)
Regulatory services										
Air Quality regulation	No impact expected							o		
Climate regulation (local temperature/precipitation, greenhouse gas sequestration)	No impact expected							o		
Water regulation (timing and scale of run-off, flooding, etc.)	Impact expected	River levels are greatly below what would be expected because of the abstraction and this impact is across the full FDC.	Climate change may make this impact more severe.	Summer low flows will be higher due to HoF introduction.	See Hydrology report	Will continue	See Hydrology report	o	No benefits or disbenefits as only within the deprived reach	
Natural hazard regulation (i.e. storm protection)	No impact expected							o		
Pest regulation	No impact expected							o		
Disease regulation	No impact expected							o		
Erosion regulation	No impact expected							o		
Water purification and waste treatment	Impact expected	Lower than natural flows in summer reduce dilution of sewage discharges downstream	Climate change may make this impact more severe.	Summer low flows will be higher due to HoF introduction and so provide better dilution for discharges within the deprived reach.	See Hydrology report		See Hydrology report	o	No benefits or disbenefits as only within the deprived reach	
Pollination	No impact expected							o		
Noise and Light regulation	No impact expected							o		
Cultural services										
Cultural heritage	No impact expected							o		
Recreation and tourism	Impact expected	Local fisheries group very concerned about the impact of the abstraction on fish passage up and down the river. The deprived reach is narrower than would be expected naturally when flows are low.	Increasing complaints from fisheries group, potential escalation to MP or EA Management in Head Office. General dissatisfaction with EA regulation approach.	Local fisheries group will respond positively to our action to improve the situation. We will have to spend less time dealing with their complaints and may be able to develop partnership working and a more positive relationship.	Number of fishermen? Fishing activity statistics? Number of local fisheries groups?		Improved fish numbers may boost numbers undertaking fishing as a recreational activity. Need FBG to provide potential % increase in fishing		Dart Fisheries Association	Low (0-20%)
Aesthetic value	Impact expected		Continue as it is.	Improved visual aesthetic value of the river.				A	Public	
Spiritual and religious value	No impact expected							o		
Intellectual and scientific, educational	No impact expected							o		
Inspiration of art, folklore, architecture, etc	No impact expected							o		
Existence Values	No impact expected							o		
Social relations (e.g. fishing, grazing or cropping communities)	Impact expected	Local fisheries group very concerned about the impact of the abstraction on fish passage up and down the river.	Increasing complaints from fisheries group, potential escalation to MP or EA Management in Head Office. General dissatisfaction with EA regulation approach.	Local fisheries group will respond positively to our action to improve the situation. We will have to spend less time dealing with their complaints and may be able to develop partnership working and a more positive relationship.	Number of complaints received last five years?		Expect a 50% reduction in complaints regarding this site and impact of flows on fish habitat and passage		EA and local fisheries groups benefit.	Low (0-20%)
Supporting services										
Soil formation	No impact expected							o		
Primary production (in river)	Impact expected	Deprived reach has restricted plant community as is narrower than it would be naturally.	Climate change may make this impact more severe.	Increased plant community in deprived reach and potentially d/s.	No significant difference in channel width in deprived reach compared to u/s and d/s (site visits 22 May 2018 and 19 July 2018)	Will continue	No increase anticipated as no significant difference in channel width in deprived reach compared to u/s and d/s (site visits 22 May 2018 and 19 July 2018)	A	Ecosystem will benefit	Low (0-20%)
Nutrient cycling	No impact expected							o		
Water recycling	Impact expected	River levels are greatly below what would be expected naturally when it is dry because of the abstraction.	Climate change may make this impact more severe.	Summer low flows will be higher due to HoF introduction	See Hydrology report	Will continue	See Hydrology report	A	Ecosystem will benefit	Low (0-20%)
Photosynthesis (production of atmospheric oxygen)	Impact expected	Deprived reach has restricted plant community as is narrower than it would be naturally.	Climate change may make this impact more severe.	Increased plant community in deprived reach and potentially d/s.	No significant difference in channel width in deprived reach compared to u/s and d/s (site visits 22 May 2018 and 19 July 2018)	Will continue	No significant difference in channel width in deprived reach compared to u/s and d/s (site visits 22 May 2018 and 19 July 2018)	A	Ecosystem will benefit	Low (0-20%)
Provision of habitat	Impact expected	Available habitat for fish is restricted within the deprived reach and also affected u/s due to the ponding of water above the weir. For invertebrates, good flow velocity maintained in deprived reach (as evident in invertebrate data and photos). Habitat structure in deprived reach stretch similar to control sites, only reduced in extent.	Climate change may make this impact more severe. Fish stocks will reach the point where they will not recover.	Improved availability of habitat for fish species	No significant difference in channel width in deprived reach compared to u/s and d/s (site visits 22 May 2018 and 19 July 2018)	Will continue	No significant difference in channel width in deprived reach compared to u/s and d/s (site visits 22 May 2018 and 19 July 2018)	A	Ecosystem will benefit	Low (0-20%)

Category	Significance of change					
	Do something option					
	1	2	3	4	5	6
Provisioning services						
Fresh water	o	o	o	o	o	o
Food (e.g. crops, fruit, fish etc.)	o	o	o	o	o	o
Fibre and fuel (e.g. timber, wool, etc.)	o	o	o	o	o	o
Genetic resources (used for crop/stock breeding and biotechnology)	o	o	o	o	o	o
Biochemicals, natural medicines, pharmaceuticals	o	o	o	o	o	o
Ornamental resources (e.g. shells, flowers, etc.)	o	o	o	o	o	o
Water for non-consumptive use	vv	o	o	o	o	o
Regulating services						
Air Quality regulation	o	o	o	o	o	o
Climate regulation (local temperature/ precipitation, greenhouse gas sequestration)	o	o	o	o	o	o
Water regulation (timing and scale of run-off, flooding, etc.)	^	o	o	o	o	o
Natural hazard regulation (i.e. storm protection)	o	o	o	o	o	o
Pest regulation	o	o	o	o	o	o
Disease regulation	o	o	o	o	o	o
Erosion regulation	o	o	o	o	o	o
Water purification and waste treatment	^	o	o	o	o	o
Pollination	o	o	o	o	o	o
Noise and Light regulation	o	o	o	o	o	o
Cultural services						
Cultural heritage	o	o	o	o	o	o
Recreation and tourism	^^	o	o	o	o	o
Aesthetic value	o	o	o	o	o	o
Spiritual and religious value	o	o	o	o	o	o
Intellectual and scientific, educational	o	o	o	o	o	o
Inspiration of art, folklore, architecture, etc	o	o	o	o	o	o
Existence Values	o	o	o	o	o	o
Social relations (e.g. fishing, grazing or cropping communities)	^^	o	o	o	o	o
Supporting services						
Soil formation	o	o	o	o	o	o
Primary production (in river)	^	o	o	o	o	o
Nutrient cycling	o	o	o	o	o	o
Water recycling	^	o	o	o	o	o
Photosynthesis (production of atmospheric oxygen)	^	o	o	o	o	o
Provision of habitat	^	o	o	o	o	o

Significance of change between do nothing and do something

significant	^^	Benefit
noticeable	^	
no net change	o	
noticeable	v	
significant	vv	Disbenefit

Use this table to record km/km2 of NWEBS component improved, by WFD water body ID, summarised from information in your AST.

Add a new row for each water body, copy the row above to ensure format and picklist for NWEBS component is available, alter the NWEBS component and the km/km2 as appropriate.

Use the 'Auto summary of NWEBS' tab to total the km/km2 of NWEBS component improved. NB: only numeric records below will be recognised in the automated summary.

[The 'Defining the NWEBS baseline status for WFD water bodies' guidance note can be found here on the investigations toolkit](#)

**Use guidance note to help translate WFD classifications into NWEBS baselines & summarise effects of bundle of measures on NWEBS Components.
(See link above to NWEBS status guidance note on investigations toolkit)**

Insert WB ID/ waterbody name and type	NWEBS Component	Baseline change rivers (km)						Baseline change coastal, lakes, TraC (km2)						
		River Bad - Poor	River Poor - Mod	River Bad - Mod	River Mod - Good	River Poor - Good	River Bad - Good	Coastal, lakes, TraC Bad - Poor	Coastal, lakes, TraC Poor - Mod	Coastal, lakes, TraC Bad - Mod	Coastal, lakes, TraC Mod - Good	Coastal, lakes, TraC Poor - Good	Coastal, lakes, TraC Bad - Good	
GB108046008410	Fish	0	0	0	18.7									
GB108046008410	Flow/Channel					0.6								

Go to 'data' on the tool bar, select 'refresh all'. These tables will total the information recorded in 'NWEBS by WBID' tab.

Baseline change rivers (km)

	Data					
NWEBS Component	Sum of River			Sum of River		
	Sum of River Bad - Poor	Sum of River Mod - Poor	Sum of River Bad - Mod	Sum of River Mod - Good	Sum of River Bad - Good	Sum of River Mod - Good
Fish	0	0	0	18.722049		
Flow/Channel						0.6
Grand Total	0	0	0	18.722049		0.6

Baseline change coastal, lakes, TraC (km2)

	Data					
NWEBS Component	Sum of Coastal, lakes, TraC			Sum of Coastal, lakes, TraC		
	Sum of Coastal, lakes, TraC Bad - Poor	Sum of Coastal, lakes, TraC Mod - Poor	Sum of Coastal, lakes, TraC Bad - Mod	Sum of Coastal, lakes, TraC Mod - Good	Sum of Coastal, lakes, TraC Bad - Good	Sum of Coastal, lakes, TraC Mod - Good
Fish						
Flow/Channel						
Grand Total						

About the Ecosystem Services (EcS) Filtering Tool

This tool should be used in conjunction with the Water Appraisal Guidance and the Appraisal Summary Table. It has been produced by the National Environmental Assessment Service (NEAS) to assist the appraisal process to help capture the net benefits of implementing WFD measures for the 2nd Cycle River Basin Management Plans. It will also help to capture significant environmental effects of the RBMP. These effects will need to be clearly documented in the Strategic Environmental Assessment (SEA) Environmental Report, which will accompany the draft plan.

Contents of the Worksheets

1. **Instructions** how to use the tool

2. **Measures Assessment** contains a list of all 105 Tier 3 Measures against which the Ecosystem Services categories have been filtered. 'Not Significant' (N/S) was recorded where no potentially significant effect on the EcS is predicted. Where a potential effect is predicted, a description is given to help guide the user on the type of issues to consider. When recording effects in the AST, the user should document the potential effects before recording any mitigation actions.

3. **Mitigation & Opportunities** describes potential mitigation which could be used where an adverse effect is predicted. As noted above, the user should record the effects in the AST before documenting mitigation actions. It also identifies some opportunities for enhancement which could be considered.

4. **Baseline Description** This worksheet expands on the descriptions of the Ecosystem Services from the AST and provides some guidance on what baseline information to include in the AST. It is only necessary to record baseline information where a significant effect is predicted.

Principles

1. The SEA Environmental Report will need to describe the effects (adverse and beneficial) of each RBMP on the environment. It is essential that all significant effects are captured in the ASTs along with any assumptions made about the implementation of the measures and decisions on how to mitigate adverse effect. Please be clear and concise with wording in the AST.

1. This document is a guide only and **local knowledge and experience of effects should always override it** e.g. if a category is marked not significant but you are aware of an effect, capture what you know in the AST.
2. Ensure benefits and disbenefits are captured in the AST and highlight winners and losers.
3. When completing the AST, remember to consider the combined effects of implementing a bundle of measures. In some cases, a single measure may not have a significant positive effect on some of the ecosystem services, but in combination they could be significant, e.g. water quality improvement measures combined with river habitat measures and actions to address fish passage could have a positive effect on fisheries and result in a knock on positive effect on recreation in the local area.
4. Where a potentially significant effect has been identified for more than one measure in a bundle, the user will need to consider the in-combination effects. In some cases this could increase the size of the effect.
5. Note that a number of Ecosystem Services categories (Biochemical, ornamental, religious, scientific, inspiration of art, primary production and nutrient cycling) have been filtered out as 'not significant' (N/S) for all measures. However, we have still included baseline guidance for completeness. To reiterate the point: if implementing a bundle of measures is not going to have a significant effect on e.g. ornamental services, there is no need to describe the existing baseline in the AST.

How to use the Measures Assessment worksheet?

1. When considering individual measures and their effects on current ecosystem services, use the filter in either column C or D to select (tick) the measure and then scan the descriptions of potentially significant effects. 'N/S' means no significant impact expected. Where there are potentially significant effects, some examples of likely effects are provided. This is not an exhaustive list so please apply your local knowledge. You will also need to consider the actual implementation of the measure (such as the scale of the change etc) as well as the local context and document this understanding in the AST.
2. When considering the effects of a bundle of measures on an ecosystem service, use the filter to select (tick) all of the measures in the bundle and then work through each of the Ecosystem Services columns to narrow down your assessment to those EcS where there could be a potentially significant effect. Where none are identified and this is supported by your understanding, mark the row in the AST as 'No Impact'. Where potentially significant effects have been identified, consider how the bundle of measures could effect the ecosystem service. In the AST, describe the EcS baseline (using the guidance in worksheet 4) and how you expect the baseline to change under the different scenarios in the AST.

Ecosystem Service	Description of the Ecosystem Service	Guidance on what to include in the baseline description in the AST
Fresh water	People obtain freshwater from ecosystems and therefore the supply of freshwater can be considered a provisioning service. Because water is required for other life to exist, however, it could also be considered a supporting service.	How significant is water use/abstraction from these water bodies? Consider reliance (alternative sources?) and number of users as well as future trends. Avoid double counting with 'Food' services. What is the baseline water quality? What are the baseline waste treatment facilities in the catchment? How would the measures change the quality or quantity of freshwater available for use by, for example, domestic users? Under this ecosystem service, measures such as for point source pollution, dealing with misconnections and abstractions might apply, and diffuse pollution measures such as the use of wetlands to remove phosphate and sediment which would lead to an improvement in the freshwater available for users.
Food (e.g. crops, fruit, fish etc.)	Ecosystems provide the conditions for growing food. Food comes principally from managed agro-ecosystems but marine and freshwater systems or forests also provide food for human consumption. Wild foods from forests are often underestimated.	What is the make up of agricultural land in the area - e.g. Quality/Grade and type of food produced. What is the relationship with water (e.g. mainly rain-fed pasture or crops which are reliant on irrigation abstracted from water bodies)? Are there fisheries (commercial or otherwise) which provide a food resource? (Avoid double counting with more recreational-based angling i.e. coarse fishing or catch and release). Are shellfish harvested in the area?
Fibre and fuel (e.g. timber, wool, etc.)	Ecosystems provide a great diversity of materials for construction and fuel including wood, biofuels and plant oils that are directly derived from wild and cultivated plant species.	Is there substantial water-dependent fibre and fuel production locally? Examples might include commercial forestry or coppiced forest products or peat mining for horticulture. Consider production of raw material rather than industrial process which would fall under 'Fresh Water'. Also consider whether it is a primary material or more of a by-product (leather, wool) to avoid double counting e.g. where it is a by-product of food production this should be considered under the food production service.
Genetic resources (used for crop/stock breeding and biotechnology)	This includes the genes and genetic information used for animal and plant breeding and biotechnology.	Not likely to be significant enough to record
Biochemicals, natural medicines, pharmaceuticals	Many medicines, biocides, food additives such as alginates and biological materials are derived from ecosystems.	Is there a major production of raw material for the biochemical/pharmaceutical industry? Could this be affected by our plans for the water environment?
Ornamental resources (e.g. shells, flowers, etc.)	Animal and plant products, such as skins, shells and flowers are used as ornaments, and whole plants are used for landscaping and as ornaments.	Assume that ornamental refers to the final use and doesn't include aggregate industry for construction for example. Is there a major source or a particularly valued area of extraction (e.g. fossil hunting on the Jurassic coast) which could be affected by our plans for the water environment?
Water for non-consumptive use	The use of water for economic activity that does not involve permanent abstraction, this includes water used for energy generation (hydroelectric, cooling for thermoelectric such as fossil fuel and nuclear plants), navigation and transport.	Are there major energy generation facilities reliant on the waterbody? Consider future uses such as fracking. Are the rivers, lakes, harbours and ports used for navigation. Avoid double counting with recreational effects such as pleasure boating and canoeing.
Air Quality regulation	Ecosystems both contribute chemicals to and extract chemicals from the atmosphere, influencing many aspects of air quality.	Note that the effects of the plan on Air Quality have been scoped out of the SEA as not likely to have significant effects. However, it is possible that some large-scale catchment measures could have a positive effect and therefore should be considered in the AST. Are there known air quality issues associated with car use, industry, etc, for example, are any Air Quality Management Areas present? Likely to be an issue in larger urban areas and industrial zones. What is the relationship between the river corridor (vegetation in particular) and local air quality?

Climate regulation (local temperature/precipitation, greenhouse gas sequestration)	Ecosystems influence climate both locally and globally. For example, at the local level, changes in land cover can affect both temperature and precipitation. At the global level, ecosystems play an important role in climate by either sequestering or emitting greenhouse gases.	Are there any major peat deposits or large lakes and are these capturing carbon or releasing it? Peat bogs release carbon as they dry out/decompose. Do waterbodies (such as large lakes, wetland areas) have an effect on the local microclimate? Is there riparian shading that is having an effect on the local temperature along a water body? Could these be influenced by decisions we take for the water environment? Consider the long-term use of fossil fuels (e.g. pumping) in any decisions.
Water regulation (timing and scale of run-off, flooding, etc.)	The timing and magnitude of run-off, flooding and aquifer recharge can be strongly influenced by changes in land cover, including, in particular, alterations that change the water-storage potential of the system such as the conversion of wetlands or the replacement of forests with farmland or farmland with urban areas.	Run-off is high in urban and built-up areas. Land use and different agricultural practices have an influence on run-off and groundwater recharge which in turn can influence flood risk. Agricultural soils are often drained to avoid water logging. Consider the current and future land use and how this impacts on run-off and flood risk.
Natural hazard regulation (i.e. storm protection)	The presence of coastal ecosystems such as saltmarsh can reduce the damage caused by hurricanes or large waves.	Do any existing environmental features provide protection from natural hazards (e.g. Sand Dunes and salt marshes?).
Pest regulation	Ecosystems are important for regulating pests that attack plants, animals and people. Ecosystems regulate pests through the activities of predators and parasites. Birds, bats, flies, wasps, frogs and fungi all act as natural controls.	Not likely to be significant enough to record
Disease regulation	Ecosystems are important for regulating vector borne diseases that attack plants, animals and people. Ecosystems regulate diseases through the activities of predators and parasites. Birds, bats, flies, wasps, frogs and fungi all act as natural controls.	Not likely to be significant enough to record
Erosion regulation	Soil erosion is a naturally-occurring process involving the mobilisation of soil particles, mainly by water and air. Vegetative cover plays an important role in soil retention and the prevention of landslides.	Is soil erosion an issue in the catchment? E.g. peat erosion in some upland areas. Is sedimentation of rivers/lakes an issue? It is worth remembering that erosion is also a natural feature for example on rivers and the coast and provides important habitat for some species.
Water purification and waste treatment	Ecosystems can be a source of impurities (e.g. in fresh water). However, they can help in the filtering out and decomposition of organic wastes introduced into inland waters and coastal and marine ecosystems and can also assimilate and detoxify compounds through soil and sub-soil processes.	What is the baseline water quality? Are there natural systems such as reedbeds and salt marshes that perform a water purification function? This ecosystem service could include measures such as wetland and reedbed creation, buffer strips, etc. The measures that lead to a change in this ecosystems service will tend to involve more natural treatment methods for dealing with diffuse pollution.
Pollination	Insects and wind pollinate plants and trees which is essential for the development of fruits, vegetables and seeds	Not likely to be significant enough to record
Noise and Light regulation	Noise, or unwanted sound, and light can have a negative effect on human well-being and wildlife, but can be regulated by ecosystems.	Not likely to be significant enough to record
Cultural heritage	Many societies place high value on the maintenance of both historically important landscapes ('cultural landscapes') and other features (buildings, archaeology and links to past uses of the land).	All catchments will contain cultural heritage features. It is important to identify those features which could be influenced by proposed measures to improve the water environment. These could be for example visible historical features such as weirs and structures adjacent to water bodies which may be affected by measures to improve status, or areas of preserved deposits, the conservation of which could be influenced by water-level management measures.
Recreation and tourism	The role that green space plays in maintaining mental and physical health is increasingly being recognised, despite difficulties of measurement. Ecosystems and biodiversity play an important role for many kinds of tourism which in turn provides considerable economic benefits and is a vital source of income for many countries.	All catchments contain recreation assets. Therefore focus on assets which could be affected by measures to improve the water environment. Consider the relative value/use of the resource compared to other assets elsewhere.

Aesthetic value	Many people find beauty or aesthetic value in various aspects of ecosystems, as reflected in the support for parks and scenic drives and in the selection of housing locations.	Consider the presence of designated landscapes (National Parks, Heritage Coasts, AONBs), city scapes and areas of high visual amenity.
Spiritual and religious value	Many religions attach spiritual and religious values to ecosystems or their components.	Are water bodies in the catchment used for religious or spiritual festivals? Are they any sites which are highly valued by a religious or spiritual group? Consider documenting in baseline if measures to improve the water environment could affect these features?
Intellectual and scientific, educational	Ecosystems and their components and processes provide the basis for both formal and informal research and education.	Applies particularly to highly-valued habitats (such as designations) where there is likely to be most research (bird counting on SPAs etc) but also habitats that are close to urban areas or have research facilities nearby and tend to be used by educational establishments. Sites owned by RSPB, WFWT often have a lot of educational facilities.
Inspiration of art, folklore, architecture, etc	Ecosystems provide a rich source of inspiration for art, folklore, national symbols, architecture and advertising.	Is there a prominent artistic community for which landscape (including the water environment) is a significant inspiration.
Existence Values	The value that individuals place on knowing that a resource exists, even if they never use that resource, e.g. designated valued or rare habitats and species	Are there designated habitats or species that are valued by society even where they don't necessarily provide a great deal of other services? It might be that they are not that visible or accessible to people. Examples might include Arctic Char, fresh water pearl mussels, or a rare mountain plant community.
Social relations (e.g. fishing, grazing or cropping communities)	Ecosystems can influence the types of social relations that are established and can support social cohesion and community activity.	Is there a particular community which is centred on/reliant on water? Examples might include fen-based communities in East Anglia or fishing communities on the coast.
Soil formation	Because many provisioning services depend on soil fertility, the rate of soil formation influences human wellbeing in many ways.	Are there active soil formation process evident in the catchment? Is their degradation of the existing soil resource associated with e.g. agricultural practices.
Primary production (in river)	The assimilation or accumulation of energy and nutrients by organisms.	Does the river and habitats associated with it contribute to primary production? Consider any proposed changes in the catchment when describing the baseline.
Nutrient cycling	Approximately 20 nutrients essential for life, including nitrogen and phosphorus, cycle through ecosystems and are maintained at different concentrations in different parts of ecosystems.	Water is a fundamental component in the cycling of nutrients. How much of a role do the waterbodies play in the cycling of nutrients?
Water recycling	This process produces oxygen, which is necessary for most living organisms.	Evaporation/transpiration by plants is a key component in the water cycle. What are the current strategic influences on the water cycle. Consider any proposed changes in in the catchment when describing the baseline.
Photosynthesis (production of atmospheric oxygen)	Water cycles through ecosystems and is essential for living organisms.	Describe the type and extent of vegetation present. Consider any proposed changes in in the catchment when describing the baseline.
Provision of habitat	Habitats provide everything that an individual plant or animal needs to survive: food; water; and shelter. Each ecosystem provides different habitats that can be essential for a species' lifecycle. Migratory species including birds, fish, mammals and insects all depend upon different ecosystems during their movements.	Describe the diversity of habitats and species in the catchment. Are there valued wetland habitats such as saltmarsh, raised bogs, fens, reedbeds, river corridors? Consider any proposed changes in in the catchment when describing the baseline.

Measures, bundles and costs sheet - Read Me

This spreadsheet has been designed to:

- i) house an auditable list of measures required at an operational catchment/irrigated waterbody level.
- ii) allow measures to be chosen to create a bundle of measures/A number of alternative bundles of measures.
- iii) aggregate up costs for bundles of measures.
- iv) report on costs which have been already paid for/not yet paid for, for designated sites/non designated sites, for different types of water body and for different sectors.
- v) report on costs for measures to reach an alternative objective to 'good' status.
- vi) provide evidential data to be fed into strategic assessments.

The spreadsheet gives you the flexibility to record all of the measures and associated costs required at the level you are assessing measures at i.e. operational catchment level, in the 'Full list of measures INPUT' tab.

The 'Aggregated Cost OUTPUT' tab will then aggregate costs for the part of the bundle which will undergo cost benefit analysis in the stage 1 valuation sheet.

For example, if measures which improved protected sites were not subject to cost benefit analysis, then you would use the pivot tables in the 'Aggregated Cost OUTPUT' sheet to aggregate costs for this scenario, without protected area measure costs.

Full list of measures INPUT tab

Inputs required for use in strategic assessments are highlighted in lighter orange (do not affect specific calculations in this workbook)

Inputs required for cost aggregation are highlighted in darker orange (do affect the calculations)

Inputs for information only are highlighted in green (do not affect the calculations)

Cell A2	Please enter operational catchment/assessment area name here.
Column A	Please select the appropriate measure code - tier 3, 2 or CAM/JUC (for 'package' of measures generated from the cost of agricultural measures tool or urban diffuse calculator).
Column B	Please record the name/detail of the measure. If the row is for a 'package' of measures generated from the cost of agricultural measures tool or urban diffuse calculator, you can just state the tool used and include additional comments if appropriate. If there are any comments related to measures which are important for the costing of them, please outline this here.
Column C	Since the benefits calculations depend on whether the water body is a river, groundwater or coastal, lake or Trac water body, please select the appropriate option here. <i>If the water body is a canal or surface water transfer, please select 'river'</i>
Column D-BK	Please re-name boxes D4-BK4 with the unique identification number (or short name of the water bodies) in the operational catchment/assessment area i.e. the GB_XX_... Please mark 'X' using the picklist for columns D-AG, which water bodies the measure is implemented in, and for columns AH-BK, which water bodies the measures impact on.
Column BL	If this measure has been developed as a project with an allocated budget and will be implemented before the start year of the appraisal, please mark 'Yes' in column BL which asks if the measure has been funded and is underway. This is so these measures and their costs can be split out from those which require cost benefit analysis.
Column BM	For River Basin Management Planning appraisal, measures planned in the PR14 process should be marked 'No' since they will not be paid for and implemented before 2015. Measures marked 'yes' will not be subject to cost benefit analysis, since it is assumed that this has already been undertaken in the business case stage.
Column BN	This asks if the measure's primary objective is an improvement to prevent deterioration in a protected area. This information is required if protected area measures are not subject to cost benefit analysis, indicating this in this column means these measures and their costs can be split out from those which require cost benefit analysis. <i>Protected areas under WFD include: Drinking Water Protected Areas, Special Areas of Conservation, Special Protection Areas, Bathing Waters, Shellfish Waters, Nitrate Vulnerable Zones, Sensitive Areas (Nitrate and Eutrophication). They are not subject to cost benefit analysis for river basin management purposes.</i>
Column BN-BD	This column asks whether the measure is to prevent deterioration and/or to improve a water body/lies from current status to a higher status. <i>Measures which are to prevent deterioration are not subject to cost benefit analysis for river basin management planning purposes, and can be excluded from the totals in the 'Aggregated Cost OUTPUT' tab using the supplied filters.</i>
Column BP-DC	Please enter costs using the 40 year cost schedule provided. These can be CAPEX costs or irregular (non annual) OPEX costs. Please remember that if there is asset replacement over the 40 year lifetime these costs should be included.
Column BP-DC	Please enter any annual costs (in current prices as far as possible). These could be maintenance costs or capital costs which have been annualised.
Column DD	This asks what year the annual costs start.
Column DF	This column asks how many years the annual costs continue for. If they continue for the duration of the appraisal, enter '40' years.
Column DG	What sector is responsible for delivering these measures? This is in order to understand the apportionment of cost by sector. If there is a collaboration of two sectors, please choose the one with the biggest share. Here you should think about the beneficiary/polluter. Only when both is 'the general public' should you choose one of the government sectors.
Column DH-DS	This column allows you to pick different bundle scenarios. Bundle 2 might act as a full shopping list and include all the measures which have been put forward. You may like to create a shorter 'shopping list' through bundle of measure options 2-5 whereby almost all of the measures (except the measures which you suspect may not be cost beneficial) are included. Each of these bundle options can be put forward for cost benefit analysis (options appraisal). If you need to work with more than five bundle options, use a second copy of this workbook.

Aggregated Cost OUTPUT tab

This tab calculates the total costs under different scenarios. You should use the filters in column B to choose the scenario which you are interested in.

Ensure you refresh the pivot tables (instruction on tab).

Input and Output summary tabs

These tabs are blank worksheets where you can copy flattened versions of the INPUT and OUTPUT worksheets, removing any formulas, picklists etc and leaving the data in a raw format. You will need to do this if reviewing and/or redacting information in these worksheets, to prevent values that depend on or feed programmed formulas from being affected by any redacting.

This is useful should you ever want to share the measure, bundles and cost information with others (internal or external) but need to redact sensitive information without affecting totals (outputs).

To flatten the worksheet manually, select all the cells in the 'Full list of measures INPUT' tab by clicking on the box that is above Row 1 and to the left of Column A. Then right-click and select 'Copy'. Now go to the 'Input summary' tab and right-click in cell A1. Select 'Paste Special...', select 'Values' and click 'OK'. Now right-click again in cell A1 and select 'Paste Special...' again but this time select 'Formats' and click 'OK'.

Repeat this process for the 'Aggregated Cost OUTPUT' Output summary tabs.

2025 - No new costs sought. Removed fish pass provision from the bundle of actions.

Checked the document on the link below - still valid and same costs in table 1.1.

Costs for HoF and variable % take taken from the following report -

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/411175/Cost_estimation_for_control_assets.pdf

https://assets.publishing.service.gov.uk/media/6034edca8fa8f543294411d7/Cost_estimation_for_control_assets_1_.pdf

1.3 Weirs and sluices

1.3.1 Capital costs

Estimated capital costs for fixed and movable weirs are available within the Environment Agency's Unit Cost Database (Environment Agency 2007). Indicative costs are based on out-turn costs from a total of 15 fixed and moveable weirs of varying widths. The costs include direct construction costs as well as contractors' overheads, temporary works and all associated works.

Average costs per structure are as shown in Table 1.1. Full details of the case studies for the four different types of weir summarised are available in the Unit Cost Database. These summary costs are applicable for indicative cost estimates for early assessments or high level cost appraisals. More detailed estimates require additional specialist assessment in terms of design and cost estimation.

Table 1.1 Environment Agency Unit Cost Database weir capital costs

Type	Average cost	Average width	Count
Narrow fixed weir (<5 m)	£29,100	3.6	1
Fixed weir (width 5–20 m)	£6,900	12.4	8
Fixed weir (width 20–40 m)	£2,800	30.5	2
Moveable weir	£61,100	15.1	4

Cost from the measures database was only £9k which seemed too low.

Ref cost - Intro HoF - Public Water Supply: Raise existing reservoir or construct new reservoir

Cost for fish pass

Enable fish passage (installation during maintenance) FISH PASS ON WEIR

one off costs available as quoted below

Simple £20k, intermediate £50k or complex £120K

Maintenance costs available as quoted below

Simple £2k, intermediate £4k or complex £10K

Chose SIMPLE FISH PASS costs for version 1 of CBA

40 year mid way costs and annual maint costs - SAME AS BELLBROOK

Added in 50% of initial capital cost for the fish pass, screening and HoF and flow management infrastructure in year 20 for refit

Adding in 0.1 annual maint cost for the inlet screen and HoF and flow management infrastructure starting in year 1

GES - Rivers and GES - Coastal, Lakes & Trans - Read Me

This Read Me sheet provides some explanation and guidance on how to fill in the **GES Sensitivity Analysis, Stage 1 + and Key output tabs**.

The Water Appraisal Guidance should also be followed when carrying out a stage 1 valuation economic appraisal. This will indicate the need to complete an Appraisal Summary Table (AST) as an initial step. During the AST preparation you will identify the significant positive and negative impacts of your bundle of measures on ecosystem services.

If you have any questions not answered by this guidance, please contact Kathryne Moore in the Water Environment Objective Setting team or Steve Arnold in the Economics and Social Science Team.

GES tabs

On the worksheets called 'GES - Rivers' and 'GES - Coastal, Lakes & Trans' there are a series of questions where data needs to be entered for benefits to be estimated.

The calculator then provides a ball park expected benefit cost ratio and ballpark expected net present value.

Inputs which affect the Benefit Cost Ratio and Net Present Value are highlighted in orange

Inputs for information only are highlighted in green (do not affect the calculations)

Automatically calculated outputs are highlighted in blue

Guidance on answering the questions

Q.1

Generate a unique identification number for this assessment.

Q.2

Provide a short description of the bundle of measures (1-3 sentences), or measure if only assessing one measure.

Q.3

Select the WFD management catchment for the relevant water body or group of waterbodies (i.e. catchment) from a drop down list

Q.4

Select the main type of activity from the five broad categories from the drop down box. Select **'more than one'** if there is no dominant activity type.

Habitat improvement (includes Fish Passage)

Non-Agricultural Diffuse Pollution

Agricultural Diffuse Pollution

Metal Mines

Invasive Non-Native Species

More than one

Note: this column does not affect the calculations and can be hidden if preferred

Q.5

Select the Significant Water Management issue which the measure/bundle of measures relates to. If there is more than one, then please also use Q.5b and 5c.

Phosphorus

Physical Modification

Flow/Abstraction

Chemicals

Nitrates

Faecal Indicator Organisms (FIOs)

Sediment

Alien Species

Acidification

Ammonia & BOD

Combination of SWMI or other

Note: this column does not affect the calculations and can be hidden if preferred

Q.6

Is the measure/bundle of measures designed to improve the condition of the waterbody/group of water bodies or for no deterioration?

Q.7

This question asks you to identify some water quality related outcomes of your measure/bundle of measures. The following are six indicators of water quality that were used in a survey of the general public to estimate the economic value of improvements in water quality:

Fish – will the measure(s) improve fish populations in the water body/ies?

Plants – will the measure(s) improve plant populations in the water body/ies?

Other animals such as invertebrates – will the measure(s) improve the populations of other animals e.g. macro invertebrates in the water body/ies?

Water clarity – will the measure(s) improve the turbidity and aesthetic appearance of water, i.e. less cloudy

The condition of the river channel and flow of water – will the measure(s) return the water body to a more natural state?

Suitable for contact – will the measure(s) make the water more suitable for water sports recreation, i.e. reduction in pollution causing health problems, such as sewage/faecal indicators and/or chemical quality.

Note: this column does not affect the calculations and can be hidden if preferred

Please identify how many of these six aspects of water quality your measure/bundle of measures will improve, and enter the number of aspects in your row. For example, a fish pass would only improve 1 aspect (fish), but a river channel restoration project might improve fish, plants, other animals & human modification – 4 aspects.

Please include any secondary impacts within this evaluation.

Note: this column does not affect the calculations and can be hidden if preferred

Q.8-13a

This question asks about the six water quality related aspects of improvements in more detail, so asks you to identify the status change for each of the identified water quality aspects from Q7 and how many km/km2 or equivalent the measure/bundle of measures will affect i.e. how many km/km2 or equivalent in the catchment will experience some degree of improvement. This question is asked for each water quality related outcome outlined in question 7.

You will not need to enter information where there is no status change. All changes to high are, for the purposes of valuation, equivalent to good. For example, a change from good to high will not need to be entered into this spreadsheet as it is the equivalent of good to good for the purposes of stage 1 valuation.

Q.8-13b

This question asks which willingness to pay values should be applied to each improvement. The default values used should be the central values.

Q.14

This question asks you to state how much one off costs will be needed for the measure/bundle of measures identified in thousands of pounds.

If you haven't already added a contingency/accounted for uncertainty within your costs please adjust costs by an uplift of 6% to represent optimism bias i.e. overly optimistic cost estimates.

Cells can be unhidden so that a 40 year schedule of costs can be inputted, if necessary.

Q.15

This question asks you to state what the annual costs of the measure/bundle of measures are.

Qs.16 & 17

Question 16 asks when these annual costs start & question 17 asks how long they'll be needed to maintain the improvement/no deterioration. Don't worry if you don't know precisely how long they'll be needed in the future, an estimate is OK.

Q.18

This question asks you when the environmental improvements – the water body status changes described in question 5 – and/or non-deterioration will start. This is because sometimes it takes a while for the environment to respond to the actions we take.

Q.19

This question asks you to estimate approximately how long the environmental outcome/benefits are likely to last, for example the environmental outcome due to awareness raising or campaigns activities may only be effective for 10 years but the benefits of a river channel restoration much longer.

The default entry for this cell is 40 years; an agreed upon appraisal period by EA economists which is based upon the estimated average return period for WFD projects. If you don't use 40 years, make a note of why you chose an alternative.

Q.20 & 21

This question asks if there have been any cost savings which have occurred due to the delivery of the actions. This might include reductions in existing maintenance costs. This should not include Environment Agency staff costs.

Use this column to include, where relevant, any additional market benefits which are not recreational, aesthetic or non-use benefits e.g. water company treatment savings or market value of commercial fish

Q.22

This spreadsheet monetises recreational, aesthetic and non-use benefits. This question asks whether any of the benefits below are also significant?

If you have filled out an Appraisal Summary Table for, this should reflect that analysis. These are only a number of the total ecosystem services which can be affected.

Outlining these extra variables will not change the benefits calculation in the spreadsheet but can help us understand some of the significant values which could be considered in any future, stage 2 valuation, where necessary.

Q. 23 a, b&c

If the measure/bundle of measures will create wetland habitat, enter the hectares in Q23a (nb: 0.01km² = 1 hectare.)

There are values for three levels of wetland creation, based on the Ecosystem Services expected to be supplied.

Enter the value arising from the new wetland per ha in Q23b and the value arising per ha from the old land use in Q23c. For more details see the Water Appraisal Guidance.

WETLANDS VALUES:	£/ha
Low quality	350
Medium quality	1500
High quality	7000

The high value wetlands must only be used in cases where the wetlands are justifiably exceptional and will provide flood benefits.

AGRICULTURE LAND USE VALUES	£/ha
Cereals	79
General croppir	140
Dairy	85
Cattle and sheep	0
Cattle and shee	35

Q. 24 a&b

This questions asks you to input any additional market benefits which are realised as a result of improvements (or maintained due to no deterioration). You can also input the results of the Stage 1+ tab here in "annual market benefits". These should not be recreational, aesthetic or non-use benefits including angling benefits. For example, these can be water company treatment savings or market value of commercial fish

Q. 25

This question asks what the risk of failure is (the measure/bundle of measures will not meet objectives)? Low (0-30%), Med (35%-65%) High (70%-100%).

This is so estimate expected benefits can be calculated. Type in a number between 0 and 100 and do not format into percentages e.g. 50.

Reminder: Expected benefits = sum of (probability x outcome). If a measure/bundle of measures is at risk of failing to meet objectives 5 out of 100 times, then this spreadsheet will calculate expected benefits as (total benefits x 0.95)

This allows risk to be included within calculations.

Q. 26

This question asks whether this measure/bundle of measures should be taken forward, for example, for inclusion in a river basin management plan.

This is so that the spreadsheet can aggregate the costs and the benefits of all the actions taken forward over a geographical area in order to report a total.

You can only input Yes or No when the results of the cost benefit analysis has been taken in account.

For example, if there were five measures/bundles of measures inputted to improve the same problem on a waterbody, the most cost beneficial option may be selected as 'yes'.

Sensitivity Tests (within GES tabs)

Sensitivity analysis is the process of evaluating how much the final result of the CBA is dependent upon the different input values and assumptions.

If the NPV and benefit cost ratio change by a large amount after a small change in a key input parameter, the result is sensitive; if the change is small, it is robust.

Some limited automatic sensitivity testing has been included on the GES - Rivers and GES - Coastal, Lakes & Trans tabs.

In order to run this analysis, please follow these steps:

Cell A60: enter the unique reference number for the bundle of measures

The analysis will now run. It will populate columns D through to O with the results of several "what-if" and tipping-point tests, as follows:

Column D (Base): this is the benefit cost ratio for this measure/ bundle of measures and is shown for reference purposes only.

Column F (whole life costs x 2): this is the benefit cost ratio if costs (one off and maintenance) were to multiply by 2. This test checks the result if the costs were underestimated.

Column G (whole life costs x 0.8): this is the benefit cost ratio if costs (one off and maintenance) were to multiply by 0.8. This test checks the result if the costs were overestimated.

Column H (Change in one off costs for BCR to 1): this is the change in the one off costs (but not maintenance costs) required in order to change the expected benefit cost ratio to 1.

Column I (50% decrease in km benefitted): this is the benefit cost ratio if the km benefitted values entered in the 'Cal-Ges' tab were halved.

Column J (Using low WTP value): this is the benefit cost ratio if the low Willingness to Pay values are used.

Column K (Using central WTP value): this is the benefit cost ratio if the central Willingness to Pay values are used.

Column L (Using high WTP value): this is the benefit cost ratio if the high Willingness to Pay values are used.

Column M (Risk of failure is 0%): this is the benefit cost ratio if there was no expected risk of failure with regards to the benefits occurring.

Column N (Risk of failure is 25%): this is the benefit cost ratio if there was an expected risk of failure of 25% with regards to the benefits occurring.

Column O (Risk of failure is 50%): this is the benefit cost ratio if there was an expected risk of failure of 50% with regards to the benefits occurring.

The results cells will also be colour coded using a traffic-light system.

For the benefit cost ratio results in Row 59:

Green = when the ratio is still greater than 1

Amber = when the ratio is now less than 1

However for Column H, there is no traffic-light system. The reported values are:

In cell H60, the whole-number multiplier that would give a BCR of 1.0 or higher

In cell H59, the corresponding BCR that results from using the above multiplier (to two decimal places)

If the required multiplier is more than 20x or less than 1/20x, it may be said that such a change would indicate an unlikely degree of over- or under-estimation of the initial costs

In these cases the multiplier is reported as ">20x" or "<1/20x", accordingly.

Note: remember that this tipping-point test only examines the sensitivity of the one-off cost input and not annual costs

A space has been provided in column P for you to state whether or not the bundle/option has passed all sensitivity tests (a Yes/No box)

In column Q you can summarise your reasons if you picked No, for example if you wish to note which tests highlighted particularly sensitive variables.

Sensitivity Analysis tab

You may wish to record the sensitivity test results separately, particularly if you have several measures/bundles of measures to compare and contrast.

A tab called "Sensitivity Analysis" has been provided for you to do this.

To complete this tab, which must be done iteratively after each individual sensitivity analysis:

Highlight cells A59:D60 in the relevant GES - Rivers or GES - Coastal, Lakes & Trans tab. Select "Copy"

Right-click in the next available cell in column A of the Sensitivity Analysis tab. Select "Paste special..."

Select "Values" and click OK. The results of your bundle/option tests will populate the two rows of test results. Formatting should be retained.

Please remember that you can and should carry out manual sensitivity tests if you identify other inputs which may be key to the final results.

Stage 1+ tab

A stage 1+ is to be used to provide additional benefit detail and can be applied where the measure/bundle of measures meets the prerequisite (see questions 1 - 3 for agricultural measures and question 1 for water abstraction measures).

A tab called "Stage 1+" has been provided for you to do this.

To complete the tab, answer the questions and paste calculated figures into the relevant columns in the GES tabs.

Key Outputs tab

A Final Appraisal Report should include the 4 key result outputs (NPV, BCR, PVC, PVC) from this stage 1 valuation sheet, for the recommended bundle of measures (and others as required).

A tab called "Key Outputs" extracts these 4 outputs for each water body type.

An additional table has been provided which combines these 4 outputs where more than one water body type i.e. lakes, other surface waters and groundwater are part of one appraisal.

Stage 1 +

Agricultural measures

- 1 Is your BCR from stage 1 between 0.5 and 1.5?
- 2 Does your AST highlight biodiversity benefits?
- 3 Does your bundle of measures include agri-environmental schemes?

*if all 3 are yes,
then proceed*

- 4 Number of farms in the catchment under the agri-environmental scheme?

- Central value:**
- 5 Paste this value into column DR on the stage 1 valuation sheet and record the corresponding NPV and BCR in the cells in columns F and G)

£	560,000	2016£ £ per yr
---	---------	-------------------

NPV (column DT)	BCR (column DU)
<input type="text"/>	<input type="text"/>

- 6 Sensitivity test - low value:
- 7 Sensitivity test - high value:

£	280,000	£ per yr
£	840,000	£ per yr

<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>

Repeat process for the sensitivity values

Fresh Water Abstraction

- 1 Does the bundle of measures mean that there will be an increase in abstraction of fresh water for public water supply?
- 2 What is the best estimate of the abstraction in m3 per year?
or
- 3 What is the best estimate of the abstraction on ML per day ML/day

if yes, continue

- Central value:**
- 4 Paste this value into column DR on the stage 1 valuation sheet and record the corresponding NPV and BCR in the cells in columns F and G)

£	-	£ per yr
---	---	----------

<input type="text"/>	<input type="text"/>
----------------------	----------------------

- Sensitivity test - low value:
- Sensitivity test - high value:

£	-	£ per yr
£	-	£ per yr

<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>

The values on this page can be pasted into the Final Appraisal Report (FAR) sections. Use the final table for aggregated results where more than one water body type has been appraised.

The following applies when using version 9 onwards of the stage 1 valuation sheet:

Please use the following statement in appraisal reporting i.e. a final appraisal report
The NWEBS values have been inflated from 2012 to 2016 prices. They still reflect the preferences of the population in 2012 but are comparable to costs in 2016.

If you are assessing measures for lakes, other surface waters and groundwater as part of one appraisal then you must represent them using one set of results in your FAR.

Copy and past the values (as values) from each of the key output tables into the 'to good'/alternative' combined takes below. The results will be aggregated and a combined result will be provided.

Keep/remove the yellow 'RECOMMENDED' box next to the results table/s as appropriate. The results with 'RECOMMENDED' next to it, should be the outputs that you record in your FAR as the recommended bundle of measures.

RIVERS					COASTAL, LAKE & TRANS					GROUNDWATER					COMBINED RESULTS						
Bundle Unique Identification Number	NPV (£million)	BCR	PV Benefits (£ million)	PV Costs (£ million)	Bundle Unique Identification Number	NPV (£million)	BCR	PV Benefits (£ million)	PV Costs (£ million)	Bundle Unique Identification Number	NPV (£million)	BCR	PV Benefits (£ million)	PV Costs (£ million)	To good status bundle of measures (for all water body types)	Bundle Unique Identification Number	NPV (£million)	BCR	PV Benefits (£ million)	PV Costs (£ million)	
1002	6.1	12.9	6.6	0.5	98765	0.5	4.3	0.6	0.1	0	0	#DIV/0!	0	0							RECOMMENDED
RSA001	0.6	7.2	0.7	0.1	0	0.0	0.0	0.0	0.0	0	0	#DIV/0!	0	0	Rivers						
0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0	#DIV/0!	0	0	Coastal, Lakes & Trans						
0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0	#DIV/0!	0	0	Groundwater						
0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0	#DIV/0!	0	0	Combined results		0.00	#DIV/0!	0.00	0.00	
0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0	#DIV/0!	0	0	Alternative bundle of measures (could include 'to good status' for some water body types)	Bundle Unique Identification Number	NPV (£million)	BCR	PV Benefits (£ million)	PV Costs (£ million)	RECOMMENDED
0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0	#DIV/0!	0	0	Rivers						
0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0	#DIV/0!	0	0	Coastal, Lakes & Trans						
0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0	#DIV/0!	0	0	Groundwater						
0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0	#DIV/0!	0	0	Combined results		0.00	#DIV/0!	0.00	0.00	
0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0	#DIV/0!	0	0	Alternative bundle of measures (could include 'to good status' for some water body types)	Bundle Unique Identification Number	NPV (£million)	BCR	PV Benefits (£ million)	PV Costs (£ million)	RECOMMENDED
0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0	#DIV/0!	0	0	Rivers						
0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0	#DIV/0!	0	0	Coastal, Lakes & Trans						
0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0	#DIV/0!	0	0	Groundwater						
0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0	#DIV/0!	0	0	Combined results		0.00	#DIV/0!	0.00	0.00	

Groundwater Valuation - Read Me

This Read Me sheet provides some explanation and guidance on how to fill in the **Groundwater Valuation** tab.
The Water Appraisal Guidance should also be followed when carrying out a stage 1 valuation economic appraisal. This will indicate the need to complete an Appraisal Summary Table (AST) as an initial step. During the AST preparation you will identify the significant positive and negative impacts of your bundle of measures on ecosystem services.
If you have any questions not answered by this guidance, please contact Kathryn Moore in the Water Environment Objective Setting team or Stew Arnold in the Economics and Social Science Team.
For further information about the groundwater appraisal please see the updated version of the Groundwater Appraisal Guidance (EA, 2015), a supplementary document to the Water Appraisal Guidance.

Groundwater Valuation

Take a proportionate approach:

The most significant benefits resulting from your groundwater remediation scheme are likely to be under '5. Freshwater' in this stage 1 valuation tool.

Users who have identified very significant additional benefits fall outside of the 'Freshwater' provision; however under the AST this may be the only value that you have to enter. It may be worth calculating the benefit cost ratio of measures/bundles of measures just using the '5. Freshwater' values before attempting to monetise other benefits.

Things to note:

Use the central benefit value in each case unless you have very strong evidence to recommend using the high or low benefit value.

The less frequently used benefits values are hidden in columns AC - HW. Only unhide and use these columns if the AST reveals significant benefits under these headings.

Sensitivity tests and valuing potential use:

The Groundwater Valuation stage 1 tool does not have automated sensitivity tests within it.

Instead you can capture the effects on benefits cost ratio (BCR) and net present value (NPV) of: doubling costs, halving benefits and different measures/bundles of measures on different rows below the base valuation.

Variables such as length of time of the measure's and year that the benefits begin will also have an impact on results.

Make it clear that these additional tests are part of your sensitivity testing by adding a note next to the column '56' 'Backup expected BCR'.

Potential use value can be used to represent the value that people place on having the option to derive a benefit from groundwater in the future even if they derive no benefit from it at present.

The method for assessing the potential use value is explained in Section 5 of the Groundwater Appraisal Guidance (EA, 2015).

Key to the spreadsheet colours:

Values which affect the Benefit Cost Ratio and Net Present Value are highlighted in orange

Inputs for calculation are highlighted in green; not affect the calculations

Automatically calculated outputs are highlighted in blue

Q.1

Create a unique identification number for this assessment.

Q.2

Provide a short description of the bundle of measures (2-3 sentences), or measure if only assessing one measure.

Q.3

Select the WFD management catchment for the relevant water body or group of waterbodies (i.e. catchment) from a drop down list

Q.4

Select the main base of activity from the five broad categories from the drop down box. Select 'none than one' if there is no dominant activity base.

Habitat improvement (includes Fish Passage)

Non-Agricultural Diffuse Pollution

Agricultural Diffuse Pollution

Marine Mires

Invasive Non Native Species

Note: this column does not affect the calculations.

Q.5 - Q.6

The less frequently used benefits values are hidden in columns AC - HW. Only unhide and use these columns if the AST reveals significant benefits under these headings.

Note that, in each of the benefit categories (e.g. 'Freshwater') you should only select one of the values (e.g. 'Savings from direct abstraction' - central value).

If you try to select more than one value, an error message will appear.

If you are uncertain about the meaning of any of the headlines in the following columns you can look up the baseline ecosystem service description in the AST.

Q5. Freshwater

The largest measurable ecosystem service benefit of any groundwater scheme is likely to be under 'Q5 Freshwater'. The values in this section reflect the benefit of having more good quality freshwater available in an existing borehole, rather than the cost of more good quality freshwater in a borehole that hasn't yet been created.

Q5. Food

'Savings to agriculture from direct abstraction based on average yield value increase due to irrigation per m³'

This is the additional crop yield that farmers are able to generate as a result of more good quality freshwater being available. At the scale at which stage 1 valuations are being undertaken, if you use this value you will have to make a number of assumptions and generalisations e.g. about the type of crop mostly grown (potatoes etc are used as proxies for low-high value crops), bunding all farms together and not going into detail about crop rotation and changing farm practices. If this ecosystem service is a significant impact on the AST you may also want to capture and quantify the potential dibenefits to agriculture on the AST. Please note assumptions on the Audit & Assumptions tab.

Q7. Air Quality Regulation

Will the measure/bundle of measures significantly reduce the amount of the following gases being released? If so quantify in tonnes.

Q8. Climate Regulation

Will the measure/bundle of measures have a net positive or negative impact on amount of carbon released? Capture available net impact here in tonnes. Or, if the net impact is negative and significant, quantify the dibenefits in the AST.

Increasing groundwater supply may provide additional supply for hydropower schemes, reducing the need for other higher-carbon forms of power generation. This can be captured under

Q9. Water regulation

As with all the other values captured in the stage 1 valuation, only capture it here if the measure/bundle of measures will significantly reduce the risk of flood OR drought to a specified

if the measure/bundle of measures is likely to increase the net risk of flood or drought to a number of houses capture this in the AST

Q10. Natural Hazard Regulation - N/A

Q11. Water purification and waste treatment

This is about the benefits that households gain as a result of a groundwater body being able to reduce the concentrations of harmful chemicals in their water.

If there is a risk of double counting with public water supply benefits (Q5) then it is best to focus on that rather than the private water purification benefits here.

Q12. Recreation & Tourism

If the measure/bundle of measures will impact positively on the flow in connected surface waters and there is a significant benefit for recreation in those surface waters, enter benefits here.

Only use these values if the benefits are not included in WQWES and the content of the appraisal means that surface water benefits should be valued here rather than in the relevant surface water appraisal.

Surface water flow = benefits to local residents and local households to alleviate low flow issues

Surface water fish/hour = positive impact on bird-watching

Surface water fish/hour = positive impact on fishing

Q13. Aesthetic Value

This value is about increasing the value of house prices due to improved water quality and flow.

Two options are given here - one for houses fronting on to a waterbody and another for properties near to a water body.

Q14. Social Relations

Where the measure/bundle of measures will cause disruption (e.g. closed footpaths). Note that this is a dibenefit and will therefore have a negative impact on the final result.

Q15. Provision of habitat

Where a groundwater measure will improve habitat or reduce species loss. Either use the habitat/wetland creation values or the protection of species values, but not both.

Q16. Potential use value

Where a groundwater measure will lead to potential future benefits in any of the above categories, you should:

i. Estimate the additional volume of groundwater that people do not currently benefit from in any way but which could be used to derive a benefit in the future

ii. Multiply each estimate of volume by the estimated probability that that volume of groundwater will be put to the purpose anticipated.

iii. Attach a value to each of the resultant volumes of groundwater according to the use to which it could be put.

For information on how to use potential use values please see the Groundwater Appraisal Guidance (EA, 2015).

Q17. Costs

Q17a. This question asks you to state what the annual costs of the measure/bundle of measures are (CAPEX).

Q17b. This question asks you to state the upfront costs (CAPEX).

Note: the assumption is that the CAPEX occurs in the first year.

Q18. Risk of Failure

This question asks what the risk of failure is (the measure/bundle of measures will not meet objectives)? Low (0-30%), Mid (31%-60%) High (70%-100%).

This is an estimate expected benefits can be calculated. Type in a number between 0 and 100 and do not format into percentages e.g. 50.

Remember: Expected benefits = sum of (probability of outcomes) x (a measure/bundle of measures) x (a rate of being to meet objectives) x (a unit of benefits) x 0.95

This allows risk to be included within calculations.

Q19 & 20

These questions ask you when the environmental improvements will start and end. This is because sometimes it takes a while for the environment to respond to the actions we take.

The default position is 0 (start) and 40 (end), during a project life of 40 years, an agreed upon appraisal period by Environment Agency economists which is based on the estimated average return period for WFD projects.

If you don't use 40 years, make a note of why you chose an alternative. 100 years can be used for some groundwater measures.

Q21

Enter which year (from 0 to 2050) that the benefits begin to be accrued from. For example, if abstraction is only possible again after 15 years of the intervention, enter 15.

Enter 0 (year) if benefits begin to be accrued from the start of the project.

Sensitivity Analysis

The Groundwater valuation requires you to carry out manual sensitivity analysis

Sensitivity analysis is the process of evaluating how much the final result of the CA is dependent upon the different input values and assumptions.

If the NPV and benefit cost ratio change by a large amount after a small change in a key input parameter, the result is sensitive; if the change is small, it is robust.

To carry out the sensitivity analysis here, change the key inputs such as the freshwater provision values and quantities by sensible amounts and record the NPV and BCR each time.

If a range of values have been given, test the NPV and BCR after using other values given (e.g. if you previously used the central value, test it with the low and then the high values).

If a range has been given, test the output by changing the inputs by a reasonable amount, for example +/- 10% or +/- 50%.

You can use potential use values as part of your sensitivity analysis.

You can change the time period, the quantity of water, and any other input.

The conclusion of sensitivity analysis should inform the overall recommendation for the economic appraisal.

Audit & Assumptions log

You can use this log to note assumptions and workings out, for example any adjustments you make to economic inputs or information about testing alternative bundles of measures.

You can also copy and 'paste special' other info here as background for your appraisal, as you see fit.

Notes on assumptions or adjustments	Date	Name
On the GES rivers tab the costs in the one line that are carried forward to the key outputs tab are summed from the three lines for the 3 different costed aspects of the scheme. Note that costs also arise in year 20. Because these costs are delayed they have the effect of boosting the BCR compared to all costs occurring at year 1 because they do not impact the project for the whole duration (40 years) because the benefits are realised immediately but some of the costs are delayed. See the measures workbook for costs.	25/10/2019	Stuart McFadzean

Discounting		3.50%		Cumulative Discount	Discounted values
Year	Year no.	Stream of values	Discount factors	factors	
				0	
N/A				-	
0	0	3.5%	1.0000	1	
1	1	3.5%	0.9662	1.9662	
2	2	3.5%	0.9335	2.8997	
3	3	3.5%	0.9019	3.8016	
4	4	3.5%	0.8714	4.6731	
5	5	3.5%	0.8420	5.5151	
6	6	3.5%	0.8135	6.3286	
7	7	3.5%	0.7860	7.1145	
8	8	3.5%	0.7594	7.8740	
9	9	3.5%	0.7337	8.6077	
10	10	3.5%	0.7089	9.3166	
11	11	3.5%	0.6849	10.0016	
12	12	3.5%	0.6618	10.6633	
13	13	3.5%	0.6394	11.3027	
14	14	3.5%	0.6178	11.9205	
15	15	3.5%	0.5969	12.5174	
16	16	3.5%	0.5767	13.0941	
17	17	3.5%	0.5572	13.6513	
18	18	3.5%	0.5384	14.1897	
19	19	3.5%	0.5202	14.7098	
20	20	3.5%	0.5026	15.2124	
21	21	3.5%	0.4856	15.6980	
22	22	3.5%	0.4692	16.1671	
23	23	3.5%	0.4533	16.6204	
24	24	3.5%	0.4380	17.0584	
25	25	3.5%	0.4231	17.4815	
26	26	3.5%	0.4088	17.8904	
27	27	3.5%	0.3950	18.2854	
28	28	3.5%	0.3817	18.6670	
29	29	3.5%	0.3687	19.0358	
30	30	3.5%	0.3563	19.3920	
31	31	3.0%	0.3459	19.7379	
32	32	3.0%	0.3358	20.0738	
33	33	3.0%	0.3260	20.3998	
34	34	3.0%	0.3165	20.7164	
35	35	3.0%	0.3073	21.0237	
36	36	3.0%	0.2984	21.3221	
37	37	3.0%	0.2897	21.6118	
38	38	3.0%	0.2812	21.8930	
39	39	3.0%	0.2731	22.1661	
40	40	3.0%	0.2651	22.4312	
41	41	3.0%	0.2574	22.6886	
42	42	3.0%	0.2499	22.9384	
43	43	3.0%	0.2426	23.1811	
44	44	3.0%	0.2355	23.4166	
45	45	3.0%	0.2287	23.6453	
46	46	3.0%	0.2220	23.8673	
47	47	3.0%	0.2156	24.0828	
48	48	3.0%	0.2093	24.2921	
49	49	3.0%	0.2032	24.4953	
50	50	3.0%	0.1973	24.6926	
51	51	3.0%	0.1915	24.8841	
52	52	3.0%	0.1859	25.0700	
53	53	3.0%	0.1805	25.2505	
54	54	3.0%	0.1753	25.4258	
55	55	3.0%	0.1702	25.5960	
56	56	3.0%	0.1652	25.7612	
57	57	3.0%	0.1604	25.9216	
58	58	3.0%	0.1557	26.0773	
59	59	3.0%	0.1512	26.2285	
60	60	3.0%	0.1468	26.3753	
61	61	3.0%	0.1425	26.5178	
62	62	3.0%	0.1384	26.6561	
63	63	3.0%	0.1343	26.7904	
64	64	3.0%	0.1304	26.9209	
65	65	3.0%	0.1266	27.0475	
66	66	3.0%	0.1229	27.1704	
67	67	3.0%	0.1193	27.2898	
68	68	3.0%	0.1159	27.4056	
69	69	3.0%	0.1125	27.5181	
70	70	3.0%	0.1092	27.6273	
71	71	3.0%	0.1060	27.7334	

72	72	3.0%	0.1029	27.8363
73	73	3.0%	0.1000	27.9363
74	74	3.0%	0.0970	28.0333
75	75	3.0%	0.0942	28.1275
76	76	2.5%	0.0919	28.2194
77	77	2.5%	0.0897	28.3091
78	78	2.5%	0.0875	28.3966
79	79	2.5%	0.0854	28.4820
80	80	2.5%	0.0833	28.5652
81	81	2.5%	0.0812	28.6465
82	82	2.5%	0.0793	28.7257
83	83	2.5%	0.0773	28.8031
84	84	2.5%	0.0754	28.8785
85	85	2.5%	0.0736	28.9521
86	86	2.5%	0.0718	29.0239
87	87	2.5%	0.0701	29.0940
88	88	2.5%	0.0683	29.1623
89	89	2.5%	0.0667	29.2290
90	90	2.5%	0.0651	29.2940
91	91	2.5%	0.0635	29.3575
92	92	2.5%	0.0619	29.4194
93	93	2.5%	0.0604	29.4798
94	94	2.5%	0.0589	29.5388
95	95	2.5%	0.0575	29.5962
96	96	2.5%	0.0561	29.6523
97	97	2.5%	0.0547	29.7071
98	98	2.5%	0.0534	29.7605
99	99	2.5%	0.0521	29.8125
100	100	2.5%	0.0508	29.8634
101	101	2.5%	0.0496	29.9129
102	102	2.5%	0.0484	29.9613
103	103	2.5%	0.0472	30.0085
104	104	2.5%	0.0460	30.0545
105	105	2.5%	0.0449	30.0995
106	106	2.5%	0.0438	30.1433
107	107	2.5%	0.0428	30.1860
108	108	2.5%	0.0417	30.2277
109	109	2.5%	0.0407	30.2684
110	110	2.5%	0.0397	30.3081
111	111	2.5%	0.0387	30.3469
112	112	2.5%	0.0378	30.3846
113	113	2.5%	0.0369	30.4215
114	114	2.5%	0.0360	30.4575
115	115	2.5%	0.0351	30.4926
116	116	2.5%	0.0342	30.5268
117	117	2.5%	0.0334	30.5602
118	118	2.5%	0.0326	30.5928
119	119	2.5%	0.0318	30.6246
120	120	2.5%	0.0310	30.6556
121	121	2.5%	0.0303	30.6858
122	122	2.5%	0.0295	30.7153
123	123	2.5%	0.0288	30.7441
124	124	2.5%	0.0281	30.7722
125	125	2.5%	0.0274	30.7997
126	126	2.0%	0.0269	30.8265
127	127	2.0%	0.0263	30.8529
128	128	2.0%	0.0258	30.8787
129	129	2.0%	0.0253	30.9040
130	130	2.0%	0.0248	30.9289
131	131	2.0%	0.0243	30.9532
132	132	2.0%	0.0239	30.9771
133	133	2.0%	0.0234	31.0005
134	134	2.0%	0.0229	31.0234
135	135	2.0%	0.0225	31.0459
136	136	2.0%	0.0220	31.0679
137	137	2.0%	0.0216	31.0895
138	138	2.0%	0.0212	31.1107
139	139	2.0%	0.0208	31.1315
140	140	2.0%	0.0204	31.1519
141	141	2.0%	0.0200	31.1718
142	142	2.0%	0.0196	31.1914
143	143	2.0%	0.0192	31.2106
144	144	2.0%	0.0188	31.2294
145	145	2.0%	0.0184	31.2479
146	146	2.0%	0.0181	31.2659
147	147	2.0%	0.0177	31.2837
148	148	2.0%	0.0174	31.3011
149	149	2.0%	0.0170	31.3181
150	150	2.0%	0.0167	31.3348

151	151	2.0%	0.0164	31.3512
152	152	2.0%	0.0161	31.3672
153	153	2.0%	0.0157	31.3830
154	154	2.0%	0.0154	31.3984
155	155	2.0%	0.0151	31.4136
156	156	2.0%	0.0148	31.4284
157	157	2.0%	0.0145	31.4429
158	158	2.0%	0.0143	31.4572
159	159	2.0%	0.0140	31.4712
160	160	2.0%	0.0137	31.4849
161	161	2.0%	0.0134	31.4983
162	162	2.0%	0.0132	31.5115
163	163	2.0%	0.0129	31.5244
164	164	2.0%	0.0127	31.5371
165	165	2.0%	0.0124	31.5495
166	166	2.0%	0.0122	31.5617
167	167	2.0%	0.0119	31.5736
168	168	2.0%	0.0117	31.5853
169	169	2.0%	0.0115	31.5968
170	170	2.0%	0.0112	31.6080
171	171	2.0%	0.0110	31.6190
172	172	2.0%	0.0108	31.6298
173	173	2.0%	0.0106	31.6404
174	174	2.0%	0.0104	31.6508
175	175	2.0%	0.0102	31.6610
176	176	2.0%	0.0100	31.6710
177	177	2.0%	0.0098	31.6808
178	178	2.0%	0.0096	31.6904
179	179	2.0%	0.0094	31.6998
180	180	2.0%	0.0092	31.7090

181	181	2.0%	0.0090	31.7180
182	182	2.0%	0.0089	31.7269
183	183	2.0%	0.0087	31.7356
184	184	2.0%	0.0085	31.7441
185	185	2.0%	0.0084	31.7525
186	186	2.0%	0.0082	31.7607
187	187	2.0%	0.0080	31.7687
188	188	2.0%	0.0079	31.7766
189	189	2.0%	0.0077	31.7843
190	190	2.0%	0.0076	31.7919
191	191	2.0%	0.0074	31.7993
192	192	2.0%	0.0073	31.8065
193	193	2.0%	0.0071	31.8137
194	194	2.0%	0.0070	31.8207
195	195	2.0%	0.0069	31.8275
196	196	2.0%	0.0067	31.8342
197	197	2.0%	0.0066	31.8408
198	198	2.0%	0.0065	31.8473
199	199	2.0%	0.0063	31.8536
200	200	2.0%	0.0062	31.8598

accessed Wed 05/07/2017

from: <https://www.ons.gov.uk/economy/grossdomesticproduct/gdp/datasets/ukquarterlynationalaccountsdatatables>

UK Quarterly Accounts Data Tables: Table O Selected Implied Deflators

	MNF2
	Gross domestic product at market prices
2016=100	
1998	71.232
1999	71.8518
2000	73.2998
2001	73.9757
2002	75.599
2003	77.4149
2004	79.3021
2005	81.4116
2006	83.8148
2007	85.9482
2008	88.393
2009	89.7324
2010	91.1153
2011	92.9489
2012	94.3762
2013	96.1747
2014	97.7573
2015	98.2971
2016	100

Rivers

VALUES INFLATED FROM 2012 to 2016 PRICES. THESE STILL REFLECT THE PREFERENCES OF THE POPULATION IN 2012 BUT ARE COMPARABLE TO COSTS IN 2016

Catchment	Length (km)	National Water Environment Benefits Survey (NWEBS): Annual per component per km values, £s, 2016 prices, for rivers.								
		Bad to Poor			Poor to Mod			Mod to Good		
		Low	Central	High	Low	Central	High	Low	Central	High
Adur and Ouse	326.109	3385.61	4121.85	4858.08	3948.35	4807.81	5667.27	4630.74	5639.47	6648.20
Aire and Calder	956.015	3036.81	3704.11	4371.41	3526.54	4301.99	5077.43	4123.13	5030.22	5937.32
Alt or Crossens	148.113	3487.11	4252.57	5018.03	4072.42	4967.32	5862.22	4781.14	5832.60	6884.06
Arun and Western Streams	430.514	3638.39	4429.45	5220.50	4254.82	5180.99	6107.16	5000.18	6089.53	7178.88
Bristol Avon and North Somerset	1079.813	2536.45	3092.61	3648.77	2919.62	3559.86	4200.11	3391.27	4134.99	4878.72
Broadland Rivers	868.749	2299.29	2802.05	3304.81	2631.70	3206.99	3782.28	3043.86	3709.11	4374.36
Cam and Ely Ouse (including Sout	963.591	2303.92	2807.69	3311.46	2637.31	3213.83	3790.35	3050.63	3717.36	4384.09
Cherwell	380.853	2407.55	2929.96	3452.36	2762.26	3361.56	3960.87	3200.67	3895.03	4589.40
Colne	284.101	7071.58	8602.15	10132.72	8416.88	10243.03	12069.17	10017.24	12194.30	14371.35
Combined Essex	1017.803	3371.99	4108.38	4844.77	3932.24	4791.82	5651.41	4611.64	5620.47	6629.30
Conwy and Clwyd	438.233	2075.06	2532.02	2988.98	2360.66	2880.16	3399.67	2717.79	3315.58	3913.38
Cotswolds	628.523	2176.33	2648.76	3121.18	2481.93	3020.41	3558.90	2862.74	3483.60	4104.46
Cuckmere and Pevensey Levels	169.487	2663.04	3242.56	3822.09	3072.30	3741.07	4409.83	3574.67	4352.94	5131.21
Darent	59.338	7459.91	9074.42	10688.94	8887.69	10815.99	12744.28	10584.80	12885.30	15185.81
Derbyshire Derwent	374.212	3145.17	3836.21	4527.25	3657.91	4462.25	5266.58	4281.50	5223.50	6165.51
Derwent (Humber)	1063.019	1979.00	2414.54	2850.09	2244.04	2737.48	3230.92	2577.08	3143.37	3709.66
Derwent (NW)	492.532	1637.12	1997.54	2357.95	1829.49	2231.52	2633.54	2077.30	2533.12	2988.94
Don and Rother	756.865	3070.05	3744.63	4419.21	3566.83	4351.14	5135.45	4171.70	5089.50	6007.31

Sourced from 'values per km' dated 15/10/12

Catchment	Length (km)	National Water Environment Benefits Survey (NWEBS): Annual per component per km values, £s, 2012 prices, for rivers.								
		Bad to Poor			Poor to Mod			Mod to Good		
		Low	Central	High	Low	Central	High	Low	Central	High
Adur and Ouse	326.109	3195.21	3890.04	4584.87	3726.31	4537.43	5348.55	4370.32	5322.32	6274.31
Aire and Calder	956.015	2866.03	3495.80	4125.57	3328.21	4060.05	4791.89	3891.25	4747.33	5603.41
Alt or Crossens	148.113	3291.00	4013.41	4735.82	3843.39	4687.97	5532.54	4512.25	5504.58	6496.91
Arun and Western Streams	430.514	3433.78	4180.34	4926.91	4015.54	4889.62	5763.70	4718.98	5747.07	6775.16
Bristol Avon and North Somerset	1079.813	2393.81	2918.69	3443.57	2755.43	3359.66	3963.90	3200.55	3902.45	4604.35
Broadland Rivers	868.749	2169.98	2644.47	3118.96	2483.70	3026.63	3569.57	2872.68	3500.52	4128.35
Cam and Ely Ouse (including Sout	963.591	2174.35	2649.79	3125.23	2489.00	3033.09	3577.19	2879.06	3508.30	4137.54
Cherwell	380.853	2272.16	2765.18	3258.21	2606.91	3172.52	3738.12	3020.67	3675.98	4331.30
Colne	284.101	6673.89	8118.38	9562.88	7943.54	9666.98	11390.43	9453.89	11508.52	13563.14
Combined Essex	1017.803	3182.35	3877.33	4572.31	3711.09	4522.34	5333.58	4352.29	5304.39	6256.48
Conwy and Clwyd	438.233	1958.37	2389.63	2820.89	2227.90	2718.19	3208.48	2564.95	3129.12	3693.30
Cotswolds	628.523	2053.94	2499.80	2945.66	2342.35	2850.55	3358.75	2701.74	3287.69	3873.63
Cuckmere and Pevensey Levels	169.487	2513.27	3060.21	3607.14	2899.52	3530.68	4161.83	3373.64	4108.14	4842.64
Darent	59.338	7040.38	8564.10	10087.81	8387.87	10207.72	12027.57	9989.53	12160.66	14331.79
Derbyshire Derwent	374.212	2968.29	3620.47	4272.65	3452.20	4211.30	4970.40	4040.71	4929.74	5818.77
Derwent (Humber)	1063.019	1867.70	2278.75	2689.80	2117.84	2583.53	3049.22	2432.15	2966.59	3501.03
Derwent (NW)	492.532	1545.06	1885.20	2225.34	1726.60	2106.02	2485.44	1960.47	2390.66	2820.85
Don and Rother	756.865	2897.39	3534.04	4170.68	3366.24	4106.44	4846.64	3937.09	4803.28	5669.47

Dorset	889.536	2120.45	2585.13	3049.80	2415.20	2944.15	3473.11	2783.14	3392.39	4001.65	2001.20	2439.75	2878.29	2279.38	2778.58	3277.78	2626.62	3201.61	3776.61
Douglas	220.214	3823.72	4662.88	5502.04	4480.53	5465.12	6449.70	5273.12	6432.96	7592.80	3608.68	4400.65	5192.62	4228.56	5157.77	6086.98	4976.57	6071.18	7165.79
Dove	371.736	3021.45	3685.39	4349.33	3507.92	4279.27	5050.63	4100.68	5002.83	5904.98	2851.53	3478.13	4104.73	3310.64	4038.61	4766.59	3870.07	4721.48	5572.89
East Devon	1047.098	1892.08	2306.93	2721.77	2138.33	2606.64	3074.95	2449.37	2985.34	3521.32	1785.68	2177.19	2568.70	2018.07	2460.05	2902.02	2311.62	2817.45	3323.28
East Hampshire	166.132	2943.89	3584.33	4224.77	3412.82	4155.70	4898.59	3985.16	4853.00	5720.85	2778.34	3382.76	3987.18	3220.89	3921.99	4623.10	3761.04	4580.08	5399.12
East Suffolk	471.907	2310.10	2815.21	3320.33	2644.80	3222.95	3801.11	3059.65	3728.36	4397.07	2180.18	2656.89	3133.60	2496.06	3041.70	3587.34	2887.58	3518.69	4149.79
Eden and Esk	1481.615	1574.79	1921.51	2268.23	1753.91	2139.29	2524.66	1986.19	2421.89	2857.59	1486.22	1813.45	2140.67	1655.28	2018.98	2382.68	1874.49	2285.69	2696.89
Esk and Coast	290.567	1833.62	2237.31	2641.00	2067.78	2522.46	2977.14	2364.60	2884.05	3403.50	1730.50	2111.49	2492.48	1951.49	2380.60	2809.72	2231.62	2721.86	3212.10
Hampshire Avon	565.533	2392.23	2916.20	3440.18	2744.70	3345.81	3946.93	3180.34	3876.81	4573.27	2257.69	2752.20	3246.71	2590.34	3157.65	3724.96	3001.49	3658.78	4316.08
Hull and East Riding	559.011	2162.12	2637.79	3113.45	2466.06	3008.32	3550.58	2844.73	3470.01	4095.30	2040.53	2489.44	2938.36	2327.37	2839.14	3350.90	2684.74	3274.87	3864.99
Idle and Torne	527.936	2755.07	3360.65	3966.23	3184.96	3885.30	4585.64	3711.36	4527.68	5344.01	2600.13	3171.65	3743.17	3005.84	3666.80	4327.75	3502.64	4273.05	5043.47
Irwell	351.377	3691.04	4501.14	5311.25	4319.66	5268.89	6218.13	5079.19	6196.31	7313.43	3483.46	4248.01	5012.56	4076.73	4972.58	5868.43	4793.54	5847.84	6902.13
Isle of Wight	139.466	2784.09	3389.87	3995.66	3219.07	3919.79	4620.50	3751.60	4568.48	5385.36	2627.52	3199.23	3770.95	3038.04	3699.35	4360.65	3540.62	4311.56	5082.50
Kenmet and Pang	369.581	2540.40	3091.52	3642.64	2923.32	3557.57	4319.82	3394.82	4131.42	4868.02	2397.53	2917.66	3437.78	2758.92	3357.50	3956.08	3203.91	3899.08	4594.25
Kent or Leven	499.803	1712.97	2089.98	2467.00	1921.44	2343.68	2765.91	2188.15	2668.39	3148.63	1616.63	1922.45	2328.26	1813.39	2211.87	2610.36	2065.09	2518.32	2971.56
Loddon	211.029	3658.10	4450.82	5243.54	4278.41	5206.66	6134.91	5028.37	6120.28	7212.19	3452.37	4700.51	4948.65	4037.80	4913.85	5789.90	4745.58	5776.09	6806.59
London	316.38	7585.58	9227.25	10869.93	9040.05	11001.40	12962.74	10768.46	13108.91	15449.37	7158.98	8708.33	10257.68	8531.65	10382.70	12233.74	10162.86	12371.70	14580.53
Loughor to Taf	988.449	1856.60	2264.48	2762.57	2095.79	2557.00	3018.22	2398.49	2925.84	3453.19	1752.19	2138.24	2524.29	1977.93	2413.20	2848.48	2263.60	2761.30	3258.99
Lower Grimsby and Ancholme	333.456	2264.48	2762.57	3260.66	2590.16	3159.70	3729.25	2994.32	3652.59	4310.86	2137.13	2607.21	3077.29	2444.49	2982.01	3519.53	2825.93	3447.18	4068.42
Lower Trent and Erewash	840.589	2737.41	3339.11	3940.82	3163.54	3859.17	4554.80	3685.53	4496.17	5306.80	2583.46	3511.33	3719.19	2985.63	3642.14	4298.64	3478.27	4243.11	5008.36
Lune	613.096	1834.53	2238.17	2641.80	2068.83	2523.45	2978.07	2365.82	2885.20	3404.58	1731.36	2112.30	2493.23	1952.48	2381.53	2810.59	2232.77	2722.94	3213.11
Maidenhead to Sunbury	181.073	6807.53	8631.03	9754.52	8096.75	9853.44	11610.13	9631.33	11724.44	13817.56	6424.69	7815.32	9205.95	7641.41	9299.30	10957.20	9089.68	11065.08	13040.48
Medway	554.098	4991.32	6072.22	7153.13	5894.79	7173.74	8452.68	6976.90	8492.64	10008.38	4710.61	5730.73	6750.85	5563.28	6770.30	7977.32	6584.53	8015.03	9445.53
Mersey Estuary	257.149	3784.45	4615.02	5445.58	4432.92	5170.04	6215.72	6362.92	7510.12	8813.22	3571.62	4355.48	5139.33	4183.62	5102.96	6022.30	4922.40	6005.08	7087.76
Middle Dee	265.735	2634.46	3213.13	3791.81	3038.64	3706.26	4373.88	3534.91	4311.70	5088.49	2486.30	3032.43	3578.57	2867.75	3497.83	4127.90	3336.11	4069.22	4802.33
Mole	202.108	6629.62	8064.66	9499.70	7881.05	9509.94	11800.83	9371.31	11407.86	13444.42	6256.78	7611.12	8965.45	7437.84	9051.57	10665.30	8844.28	10766.31	12688.33
Nene	618.483	2468.60	3008.23	3547.87	2836.97	3457.13	4077.29	3291.30	4010.78	4730.26	2329.77	2839.06	3348.34	2677.42	3262.70	3847.99	3106.21	3785.22	4464.24
New Forest	234.027	2880.73	3507.46	4134.20	3336.23	4062.45	4778.66	3892.83	4740.53	5588.23	2178.72	3310.21	3901.70	3148.61	3833.98	4519.36	3673.91	4473.93	5273.96
North Cornwall, Seaton, Looe anc	597.797	1832.59	2234.45	2636.31	2066.20	2518.71	2971.23	2362.41	2879.30	3396.18	1729.53	2108.79	2488.05	1950.00	2377.07	2804.13	2229.56	2717.37	3205.19
North Devon	996.519	1738.59	2119.93	2516.22	1925.22	2379.78	2807.33	2225.02	2711.74	3198.46	1640.81	2000.71	2360.61	1842.43	2245.94	2649.46	2099.89	2559.24	3018.58
North Kent	19.827	4174.70	5079.09	5983.48	4904.73	5968.88	7033.02	5783.40	7039.54	8295.68	3939.92	4793.45	5646.98	4628.90	5633.20	6637.49	5458.15	6643.65	7829.14
North Norfolk	82.855	2044.51	2491.78	2939.05	2322.80	2830.57	3338.33	2671.48	3255.13	3838.77	1929.53	2531.65	2773.76	2192.17	2671.38	3150.59	2512.24	3072.07	3622.89
North West Norfolk	219.232	2004.71	2443.31	2881.91	2274.55	2771.76	3268.98	2613.31	3184.21	3755.11	1891.97	2305.90	2719.84	2146.63	2615.88	3085.14	2466.34	3005.14	3543.93
North West Wales	1133.344	1640.22	2001.83	2363.44	1833.45	2236.93	2640.41	2082.24	2539.82	2997.40	1547.97	1889.25	2230.52	1730.34	2111.13	2491.92	1965.14	2396.98	2828.83
Northumberland Rivers	901.237	2044.04	2494.72	2945.39	2323.10	2834.94	3346.77	2672.57	3261.07	3849.56	1929.09	2354.42	2779.75	2192.46	2675.51	3158.55	2522.27	3077.67	3633.07
Ogmore to Tawe	540.984	2370.33	2892.04	3413.74	2718.65	3316.93	3915.22	3149.34	3842.34	4535.34	2237.03	2729.39	3221.76	2565.75	3130.39	3695.03	2972.23	3626.25	4280.28
Old Bedford including the Middle	138.219	2245.71	2736.80	3227.89	2566.74	3127.83	3688.92	2965.55	3613.64	4261.73	2119.42	2582.89	3046.36	2422.39	2951.93	3481.46	2798.77	3410.41	4022.05
Ribble	702.824	2878.19	3510.33	4142.47	3334.17	4066.84	4799.52	3891.18	4746.59	5602.00	2716.33	3312.92	3909.51	3146.66	3838.13	4529.60	3672.35	4479.65	5286.95
Roding, Beam and Ingrebourne	161.842	7049.56	8755.37	10101.18	8390.19	10210.54	12070.89	9985.06	12155.12	14325.17	6653.11	8093.11	9533.11	7918.34	9636.32	11354.30	9423.52	11471.54	13519.55
Rother	361.952	2873.73	3498.95	4124.17	3327.75	4052.12	4776.49	3882.61	4728.08	5573.55	2712.12	3302.18	3892.24	3140.61	3824.24	4507.87	3664.26	4462.18	5260.10
Severn Uplands	923.08	1686.96	2057.52	2428.07	1889.70	2304.09	2718.48	2149.70	2620.49	3091.27	1592.09	1941.81	2291.52	1783.43	2174.51	2565.60	2028.81	2473.11	2917.42
Severn Vale	550.132	2263.23	2759.69	3256.15	2588.37	3155.97	3723.57	2991.94	3647.88	4303.82	2135.95	2604.49	3073.03	2442.80	2978.48	3514.16	2823.68	3442.73	4061.78
Shropshire Middle Severn	322.893	2358.46	2875.73	3393.00	2703.83	3296.75	3889.67	3131.13	3817.67	4504.20	2225.83	2714.01	3202.19	2551.77	3111.35	3670.92	2955.04	3602.97	4250.90
Soar	548.65	2930.31	3574.28	4218.24	3397.41	4144.47	4891.53	3967.47	4840.25	5713.03	2765.51	3373.27	3981.02	3206.35	3911.39	4616.44	3744.35	4568.05	5391.74
South and West Somerset	1112.655	2127.97	2594.29	3060.60	2424.31	2955.26	3486.21	2794.12	3405.79	4017.46	2008.30	2448.39	2888.48	2287.98	2789.06	3290.15	2636.99	3214.26	3791.53
South Devon	686.724	2004.33	2443.67	2883.00	2274.41	2772.53	3270.65	2613.42	3185.41	3757.41	1891.61	2308.24	2720.87	2146.51	2616.61	3086.72	2466.45	3006.27	3546.10
South East Valleys	500.129	2537.09	3093.39	3649.69	2920.40	3560.81	4201.22	3382.20	4136.13	4880.06	2394.41	2919.42	3444.43	2756.16	3360.55	3964.95	3201.43	3903.52	4605.62
South Essex	47.417	6878.88	8489.42	9999.95	8304.50	10106.26	11908.02	9881.76	12029.35	14176.94	6586.40	8011.99	9437.57	7837.47	9537.90	11238.34	9326.03	11352.84	13799.65
South West Lakes	439.23	1673.01	2041.28	2409.54	1873.00	2284.58	2696.17	2129.74	2597.12	3064.49	1578.92	1926.48	2274.04	1767.66	2156.10	2544.54	2009.97	2451.06	2892.15
South West Wales	1073.999	1622.90	1980.71	2338.53	1812.45	2211.31	2610.18	2056.93	2508.93	2960.92	1531.63	1869.32	2207.01	1710.52	2086.95	2463.39	1941.25	2367.83	2794.41
Staffordshire Trent Valley	425.476	3111.16	3794.75	4478.34	3616.68	4411.95	5207.22	4231.79	5162.84	6093.89	2926.20	3581.34	4226.49	3413.29	4163.83	4914.38	3993.81	4872.50	5751.18

Wye	1556.074	1815.75	2214.44	2613.14	2045.84	2494.47	2943.11	2337.93	2850.09	3362.26
Wyre	229.776	2588.67	3157.42	3726.17	2983.15	3638.69	4294.23	3468.03	4230.23	4992.42

1713.64	2089.91	2466.18	1930.79	2354.19	2777.59	2206.45	2689.81	3173.17
2443.09	2979.86	3516.62	2815.39	3434.06	4052.73	3273.00	3992.33	4711.65

Coastal, Lake or Transitional

Sourced from 'Unit Values (all wb). PM' dated 1/8/12

	National Water Environment Benefits Survey (NWEBS): Annual per component per km2 values, £s, 2016 prices, for coastal, lakes and transitional waters								
	Bad to Poor			Poor to Mod			Mod to Good		
	Low	Central	High	Low	Central	High	Low	Central	High
Anglian	823.69	1003.82	1183.95	941.36	1147.14	1352.92	1087.55	1325.22	1562.90
Dee	836.56	1020.42	1204.27	957.18	1167.48	1377.78	1106.80	1349.92	1593.04
Humber	1011.97	1234.40	1456.83	1169.87	1427.11	1684.35	1363.22	1663.06	1962.91
North West	1088.76	1327.86	1566.96	1262.95	1540.48	1818.01	1475.41	1799.77	2124.14
Northumbria	828.57	1011.18	1193.79	947.59	1156.37	1365.14	1095.33	1336.60	1577.86
Severn	834.97	1018.13	1201.29	955.18	1164.64	1374.10	1104.33	1346.44	1588.55
Solway Tweed	589.26	718.99	848.71	657.36	801.79	946.23	745.37	908.89	1072.42
South East	999.24	1216.68	1434.12	1154.05	1405.25	1656.46	1343.82	1636.41	1929.00
South West	733.70	894.53	1055.35	832.38	1014.67	1196.97	956.27	1165.57	1374.86
Thames	1494.79	1818.64	2142.48	1754.74	2135.45	2516.17	2067.86	2516.98	2966.10
Western Wales	647.29	789.95	932.60	727.79	887.95	1048.12	830.34	1012.87	1195.40
E&W	926.08	1128.81	1331.55	1065.60	1298.89	1532.18	1237.41	1508.32	1779.24

Coastal, Lake or Transitional

Sourced from 'Unit Values (all wb). PM' dated 1/8/12

	National Water Environment Benefits Survey (NWEBS): Annual per component per km2 values, £s, 2012 prices, for coastal, lakes and transitional waters								
	Bad to Poor			Poor to Mod			Mod to Good		
	Low	Central	High	Low	Central	High	Low	Central	High
Anglian	777.37	947.37	1117.36	888.42	1082.63	1276.84	1026.39	1250.70	1475.00
Dee	789.52	963.03	1136.55	903.35	1101.83	1300.30	1044.56	1274.01	1503.45
Humber	955.05	1164.98	1374.90	1104.08	1346.85	1589.62	1286.55	1569.53	1852.52
North West	1027.53	1253.18	1478.84	1191.92	1453.84	1715.76	1392.43	1698.56	2004.68
Northumbria	781.97	954.31	1126.65	894.30	1091.33	1288.37	1033.73	1261.43	1489.13
Severn	788.02	960.87	1133.73	901.46	1099.14	1296.82	1042.22	1270.72	1499.21
Solway Twee	556.12	678.55	800.98	620.39	756.70	893.01	703.45	857.78	1012.10
South East	943.05	1148.25	1353.46	1089.15	1326.23	1563.30	1268.25	1544.38	1820.52
South West	692.44	844.22	996.00	785.56	957.61	1129.66	902.49	1100.02	1297.54
Thames	1410.73	1716.36	2021.99	1656.06	2015.36	2374.66	1951.57	2375.43	2799.29
Western Wal	610.89	745.52	880.15	686.86	838.02	989.17	783.65	955.91	1128.17
E&W	874.00	1065.33	1256.66	1005.67	1225.84	1446.01	1167.82	1423.50	1679.18

These values represent incremental changes per each of the six equally weighted ecosystem components which the respondents of the Nera 2007 questionnaire were asked to consider when making their assessments. (Tamar Consulting, 2012)

- 1) Fish
- 2) Other animals such as invertebrates
- 3) Plant communities
- 4) The clarity of water
- 5) The condition of the river channel and flow of water
- 6) The safety of the water for recreational contact