

**Collaborative Research Programme  
On River Basin Management Planning Economics**

**Guidance on the evidence required to justify  
disproportionate cost decisions under the  
Water Framework Directive**

Final Annex



Department of the  
**Environment**  
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The Collaborative Research Programme, under which this report has been produced, is jointly sponsored by Defra, Welsh Assembly Government, Scottish Executive, Department of Environment Northern Ireland, Environment Agency, Scottish Environment Protection Agency, Department of Business, Enterprise and Regulatory Reform, Scotland and Northern Ireland Forum for Environmental Research, UK Water Industry Research, the Joint Environmental Programme, UK Major Ports Group, British Ports Association, CC Water, Royal Society for the Protection of Birds, National Farmers' Union and Country Land and Business Association (the "Collaborative Partners"). The Collaborative Partners have made their best endeavours to ensure the accuracy of the information contained in this report. However, the Collaborative Partners cannot assume responsibility for the content of this report or for any opinions or statements of fact expressed therein or for any actions taken as a result of consulting this report. The report does not necessarily represent the viewpoint of any individual organisation.

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**Guidance on the evidence required  
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**FINAL ANNEX**

**May 2008**

This annex was originally delivered under contract from Jacobs to the CRP in March 2007. They have been updated to be consistent with the revised guidance document. They may alter following further discussion in the European Common Implementation Strategy for the WFD.

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## Abbreviations and acronyms

AMP	Asset Management Programme
AST	Appraisal Summary Table
AWB	Artificial Water Body
BAG	Benefit Assessment Guidance
CAPEX	Capital Expenditure
CBR	Cost Benefit Ratio
CEA	Cost Effectiveness Analysis
CRP	Collaborative Research Programme
CS	Consumer Surplus
DA	Distribution Analysis
DC	Disproportionate Cost (or Disproportionately Costly)
DCA	Disproportionate Cost Analysis
Defra	Department for Environment, Food and Rural Affairs
DoENI	Department of Environment for Northern Ireland
EA	Environment Agency
EAB	Equivalent Annual Benefit
EAC	Equivalent Annual Cost
EAV	Equivalent Annual Value
EEA	Economic Efficiency Analysis
EIG	Economic Interest Group
EU	European Union
FTE	Full Time Equivalent
GEP	Good Ecological Potential
GES	Good Ecological Status
GGCS	Good Groundwater Chemical Status
GGQS	Good Groundwater Quantitative Status
GSWCS	Good Surface Water Chemical Status
Ha	Hectare
HI	Historic Investment
HMWB	Heavily Modified Water Body
km	Kilometres
MEP	Moderate Ecological Potential
MES	Moderate Ecological Status
MGCS	Moderate Groundwater Chemical Status
MGQS	Moderate Groundwater Quantitative Status
MSWCS	Moderate Surface Water Chemical Status
NEAV	Net Equivalent Annual Value
NRCM	Non Reference Case Measures
NPV	Net Present Value
NUV	Non Use Value
NVA	Nitrate Vulnerable Area
OPEX	Operating Expenditure
PEP	Poor Ecological Potential
PES	Poor Ecological Status
PGCS	Poor Groundwater Chemical Status
PGQS	Poor Groundwater Quantitative Status
PHS	Priority Hazardous Substances
PoM	Programme of Measures
PPP	Polluter Pays Principle
PS	Priority Substances

PSA	Public Sector Agreement
PSG	Project Steering Group
PSWCS	Poor Surface Water Chemical Status
PV	Present Value (PVB and PVC for benefits and costs)
QE	Quality Element
RBC	River Basin Characterization
RBD	River Basin District
RBMP	River Basin Management Plan
RCM	Reference Case Measures
RE class	River Ecosystem Class
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SEPA	Scottish Environmental Protection Agency
SoS	Secretary of State
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
ToR	Terms of Reference
UK	United Kingdom
UKTAG	UK Technical Advisory Group
Vol	Value of Information
WAG	Welsh Assembly Government
WFD	Water Framework Directive
WTP	Willingness to Pay
WwTW	Waste water Treatment Works

### DCA in the WFD

Under the Water Framework Directive (WFD), the full range of measures required for each River Basin District (RBD) is termed a Programme of Measures (PoM). Each PoM will comprise a measure or combinations of measures, to tackle each problem associated with Water Bodies (WBs) at risk of failing to reach WFD objectives.

The Disproportionate Cost Analysis (DCA) process will help identify whether the overall costs of the measures to meet the proposed WFD environmental objectives are proportionate to the benefits. The output of the DCA process is the evidence required to make this decision, and if the costs of achieving the default objectives are disproportionate, to set alternative objectives. Decisions on whether measures are actually DC or not will be made by the Secretary of State (SoS), not on each individual case, but on a summary of cases within each RBD. Actual licensing decisions will be made later by the responsible agency on the basis of delivering the plan.

The WFD allows alternative objectives to be set when achieving default objectives for a water body are considered disproportionately costly or technically infeasible.

The WFD sets default objectives for water bodies and identifies situations in which alternative objectives can be used. The default objectives are:

- Non-deterioration;
- Status objectives;
- Progressive reduction of pollution from priority substances and priority hazardous substances (or prevention or limitation of the input of pollutants in ground waters);
- Protected area objectives; and
- Trend reversal objectives (for groundwater only)

Note that not all objectives apply to all water bodies. The situations in which default objectives apply is set out in Annex 6 of the Defra/WAG consultation on River Basin Planning Guidance<sup>1</sup>.

The alternative objectives are:

- An extended deadline;
- A less stringent (status) objective;
- Different objectives for heavily modified or artificial water bodies; and
- Different objectives where there are new modifications or new sustainable development activities.

Not all of the alternative objectives apply to each of the default objectives. The situations in which the alternative objectives apply are set out in Annex 6, 7 and 8 of the Defra/WAG River Basin Planning Guidance.

<sup>1</sup> Defra/WAG River Basin Planning Guidance  
<http://www.defra.gov.uk/environment/water/wfd/pdf/riverbasinguidance.pdf> (Annex 6, pg73)

The conditions under which an alternative objective may apply include:

- **HM & AWB designation** - Beneficial objectives cannot for reasons of technical feasibility or disproportionate cost reasonably be achieved by other means which are a significantly better environmental option.
- **Extension of deadline** – (a) The scale of the requirements can only be achieved in phases exceeding the timescale for reasons of technical feasibility, (b) Completing the improvements within the timescale is disproportionately costly, or (c) Natural conditions do not allow timely improvement in the status of the water body.
- **Less stringent (status) objective** – Water bodies are so affected by human activity, or their natural condition is such, that the achievement of the objectives would be infeasible or disproportionately costly, or b) the environmental and socio-economic needs served by such human activity cannot be achieved by other means which are a significantly better environmental option not entailing disproportionate cost.
- **New modifications/new sustainable development activities** – the beneficial objectives served by the modifications or alterations of the water body for reasons of technical feasibility or disproportionate cost cannot be achieved by other means which are a significantly better environmental option.

**This overall set of guidelines provide guidance on the evidence needed to clarify decisions on disproportionate cost under all the above circumstances with the exception of new modifications/new sustainable development activities.**

In many cases there will have been a Cost-Effectiveness Analysis (CEA) of alternative combinations of measures to meet the default objective prior to applying this guidance. This guidance therefore focuses on the assessment of benefits. In some circumstances, however, a CEA will not have been undertaken and so, to apply this guidance, both costs and benefits of the default and alternative objectives need to be identified.

## Definition of disproportionality

### *WATECO guidance*

The WATECO guidance<sup>2</sup> states that three very different approaches can be used to define what a disproportionate cost is. This choice determines the methodology to be adopted to justify derogation:

1. Costs are reputed to be disproportionate if the costs to be born by stakeholders exceeds their financial ability to pay; or
2. If the overall costs exceed the overall benefits for society as a whole (the State should only implement measures which lead to an improvement of social welfare); or
3. If the rate of return over public investment needed to finance the measures (given the maximum amount that can be reasonably paid by other actors) is lower than any other water restoration programme in the river basin district that can be financed given the limited financial resources (WATECO, 2003).

The WATECO guidance states that it is important that one of these approaches is selected as a reference justification of the derogation.

### *RPA's preliminary DCA methodology*

An outline generic methodology for assessing disproportionate costs was developed by RPA for Defra in 2005<sup>3</sup>. RPA concluded that the assessment of disproportionate costs is a policy issue informed by economic analysis. The study concluded that DCA should: be based on a comparison of the costs and benefits; take account of uncertainty and qualitative information; and be undertaken at a sector/activity level.

The methodology requires that disproportionate cost decisions should be supported by a range of information, including: the net present value of the Programme of Measures (together with benefit cost-ratios), economic viability assessment of the sector/operator, "polluter pays principle" (PPP) or fairness assessment and distributional assessment/incidence analysis.

Based on the above, the proposed "RPA approach" was to combine the following types of information:

- *net present value for the programme of measures (accompanied by benefit-cost ratios properly caveated);*
- *simplified form of economic viability assessment based on financial data for the company/sector to examine implications for the sector;*
- *details by sector of estimated present value costs (or equivalent annual values) and predicted contribution to total benefits based on their*

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<sup>2</sup> WATECO is a working group, whose members are economists, technical experts and stakeholders from European Union Member States and from a limited number of candidate countries to the European Union, that has developed a non-binding guidance on the economic elements of the WFD.

<sup>3</sup> Development of a Methodology to Determine the Cost-Effectiveness of Measures and Combinations of Measures for the Water Framework Directive (WFD) 2005 (RPA consortium: MWH, SISTech, ADAS)

- *contribution to reducing the risk of failure (providing an indication of adherence to the PPP); and*
- *a distributional analysis indicating the end incidence of costs and benefits.*

### **Approach used in this guidance**

The approach used in this guidance has been largely developed based on the above principles, particularly the proposed RPA approach. It has not explicitly considered the third approach proposed by WATECO (although the rate of return of public investments could be considered alongside other indicators if appropriate, including the return on other water restoration programme in the river basin district).

The approach used here provides for the assessment of the proportionality of costs with respect to two main types of **analysis** as follows:

1. **Economic efficiency analysis (EEA):** Is the measure or combination of measures an efficient use of scarce resources for society as a whole? This is measured principally through analysis of the costs and benefits at a local or national level, with the aim being to ensure that the measures selected are justifiable in terms of the overall net gain to society. Economic efficiency is assessed without reference to winners and losers.
2. **Distribution analysis (DA):** Does the combination of measures have any relevant consequences in terms of the distribution (or redistribution) of gains and losses? This involves developing an understanding of *who causes* the problem, *who pays* for its resolution and *who benefits* from the improvement. It therefore enables one to identify 'winners' and 'losers'.

A range of evidence can be advanced in support of disproportionate cost arguments from a distributional perspective. The evidence needed to support such arguments may differ according to whether a less stringent objective or a time extension is being considered<sup>4</sup>.

Under this analysis, there are several distinct but closely related issues including:

- **Any adverse consequences for vulnerable or disadvantaged social groups:** Does implementing Non-Reference Case Measures (NRCMs) lead to an adverse impact on particular groups or sectors for which there are government objectives or concerns (at a national or regional level)? For example, particular groups may include those classified by income level, gender, ethnic group, age, geographic location or disability. There may be groups within certain targeted areas or locations (e.g. areas that are the target of area based objectives, such as priority regeneration areas, neighbourhood renewal areas, disadvantaged areas in receipt of EU structural funding etc). There may also be Economic Interest Groups or sectors for which the government has specific concerns, such as the automotive industry. Evidence about the concern over these groups, locations or interests will be needed, together with evidence of the impact occurring on these groups.

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<sup>4</sup> Given distributional issues are likely to be resolvable over time either through spreading costs or developing mechanisms to share costs more appropriately.

- **The extent of any deviation from the Polluter Pays Principle (PPP):** This includes situations where the NRCMs cause or worsen non-conformance with PPP. The overall problem should be considered in terms of who is causing the impact, who is benefiting from the improvements and who is paying for the improvements.

Non-conformance would occur for example if one or more Economic Interest Groups / operators (or other particular groups of society) would incur more than their fair share of costs in relation to the extent that they are polluting. This might occur simply because a significant proportion of the pollution or risk is caused by one or more EIGs / operators that cannot be identified or no longer operate. This may relate to uncertainty regarding the source or because the source of pollution stemmed from historical activities. Again, this is a case of PPP worsening.

Non-conformance may also occur where historical investment has taken place such that the total costs of both the historic and proposed NRCM costs would result in an entity incurring a disproportionate share of total costs for meeting WFD objectives (i.e. there may be a lack of conformity with PPP because of historical investment made worse by delivering the objective using the proposed measures).

- **The affordability of the improvement for those who would have to pay taking into account the characteristics of the economic sector concerned:** The ability of polluters or risk owners to pay is a key factor in the assessment of disproportionate costs from a distributional perspective. For firms affordability of a measure means that an operator can pay for the measure without significant negative affects on its ability to continue in business over the long term (and without significant negative effects on the scale and scope of the business and its long term profitability). Specifically affordability can be defined as the ratio of annual costs (after pass through) to annual revenue. If the ratio increases from less than one to greater than one (i.e. costs exceed revenues) as a result of measures, and is sustained at that level then those measures are not affordable; the operator will go out of business. A supplementary indicator in this respect might be to look at profitability before and after measures. If the operator can only maintain the cost-revenue ratio at less than one, or maintain their profitability, by significantly reducing the scale or scope of their operations then this may also be deemed as unaffordable.

Unaffordable costs will mean that a firm will go out of business or have to alter the scale and scope of its activities in order to stay in business. In the long term such losses are likely to be compensated by an increase in the activity of other firms in other areas (perhaps outside the catchment or RBD under consideration), leading to no net loss for society as a whole. Any job losses would be expected to be transitory rather than permanent (at least outside regeneration or socially disadvantaged areas). As such, lack of affordability is likely to be an argument relevant to the setting of time extension rather than less stringent objectives. However this will depend upon the scale of the impact and the site specific circumstances. There may be situations where site specific concerns about affordability remain relevant to the setting of less stringent objectives.

It should be noted however that affordability needs to be seen in the context of the characteristics of the firm and the sector in which it operates. A firm that has failed to keep its environmental management approaches up to the level of industry good practice may well find the costs of measures unaffordable. But this would largely be attributable to the costs of the firm reaching a level of good practice rather than as costs of the measures themselves.

- **The scale of recent investment in environmental improvements:** Where a sector or firm has already been required to undertake significant environmental investment to meet an objective it may be regarded as disproportionate to that sector or firm to undertake further improvements in the short term. It may be difficult for such firms to finance such improvements and there is a risk of the creation of stranded assets. Over the long term this is unlikely to be such a problem and as such this argument is likely to be more appropriate to the setting of an extended deadline as opposed to a less stringent objective.

The above analyses and associated issues are assessed through gathering information in a series of Microsoft Excel Spreadsheets (**case study Spreadsheets**) that enable you to collate and present the relevant data required. The process of using these data Spreadsheets is described in detail in Annexes D-S.

Note that the method also allows you to describe the **environmental impacts** that will be achieved as a result of the measures. Although these may already be captured through the EEA and DA (e.g. in terms their economic value), displaying the environmental impacts themselves alongside other economic indicators may in some circumstances help in making DC decisions. For instance, it may also be relevant to consider the extent to which the environmental impacts themselves justify the costs (e.g. by comparing the length of river improved for a given cost). In some cases, this information may be available already as outputs from a CEA.

Note also that both the EEA and DA will not necessarily be relevant for all cases. Furthermore, the most economically efficient combination of measures may not be the most desirable from a distributional perspective and vice versa. The weighting of importance given to each of these analyses and related criteria is therefore a political decision. Similarly, many other political decisions will be faced when assessing whether distributional effects are adverse.

**NOTE: Who makes the final decision as to whether costs are disproportionate or not?**

This guidance assists users in identifying and collating the **evidence** required to support decisions on whether measures required to meet objectives set for water bodies through the River Basin Management Plan (RBMP) process are disproportionately costly or not. It is not intended to provide guidance on what these decisions should be. These will be made as part of the overall WFD implementation process and will involve the relevant Secretary of State (SoS).

## Key aspects of the methodology

### *It only applies to the marginal effects of the WFD*

Disproportionality is assessed with regard to the **marginal effects** of the WFD only. This means that the DCA process is not concerned with effects that would happen in the absence of the WFD. Since the WFD is partly to be implemented through existing legislation (e.g. the Directives listed in Annex VI of the WFD), this creates a challenge in terms of identifying what measures should be excluded. Measures to be excluded are termed **reference case measures (RCMs)**.

Some environmental changes that contribute towards meeting WFD objectives may be achieved through a combination of both RCMs and **non-reference case measures (NRCMs)**. In this situation, the DCA needs to carefully separate out effects attributed to each. In view of the complexities this involves, this aspect of the guidance represents probably the most challenging aspect of its application.

In some cases, even though all measures are RCMs, there may be **uncertainty** over whether they will be effective in achieving WFD objectives. When this happens, additional NRCMs may be proposed to address the potential shortfall and the user (or policy maker) may be interested in whether these are DC or not. The problem is that the NRCMs exert their effect on top of an uncertain baseline situation. To deal with this, the guidance allows the user to separate out RCM effects as normal but to examine the extent to which the level of uncertainty affects the DCA outcome.

### *It is applicable in default and alternative objective situations*

The guidance is designed for use when assessing whether the costs of achieving **default and/or alternative objectives** are DC or not. In the former situation, the guidance is applied to the most cost effective (or other preferred) combination of measures that will achieve the default objective in question (e.g. reach good ecological status).

If this combination is found to be DC, the guidance is also designed to allow you to collate evidence to support decisions on when an extended deadline (**time derogation**) might be appropriate<sup>5</sup>.

If a deadline extension doesn't apply, under the WFD (Article 4(5a)), less stringent environmental objective may be set when **human activity** or the **natural condition** of the water body is such that achievement of these objectives would be disproportionately expensive, as long as the environmental and socioeconomic "needs" served by such human activity cannot be achieved by "alternative means", which are a significantly better environmental option not entailing disproportionate costs. **The DCA process can be applied to the "alternative means"** in the same way as any other measure or combination of measures.

If there is no alternative means that is not DC, a **stringency derogation** can then be assumed to be appropriate. The guidance can then be applied in exactly the same way as when assessing whether the costs of achieving an alternative less stringent objective (e.g. reach moderate ecological status) are DC or not.

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<sup>5</sup> The potential for adopting a time derogation is assessed first as this is a temporary measure and can be re-examined at a later date. A stringency derogation on the other hand is permanent. This approach is in accordance with the precautionary principle.

If required, **multiple iterations** of the DCA can also be undertaken, each assessing a different combination of measures, in order to identify the most cost-effective combination which is not DC.

Note that the process of identifying alternative combinations of measures in stringency derogation situations is not dealt with in this guidance (this is covered under the respective sections of the CEA guidance).

### ***Types of impact considered in the DCA***

Table 1 defines the key categories of impact considered within the DCA guidance and associated analyses. The table also highlights which analyses the impacts are derived from and of relevance to. Some key points to note are:

1. The “**environmental impacts**” of the measures refer to the adverse and positive changes to the environment that may occur as a result of a measure or combination of measures. In the DCA, environmental impacts are described qualitatively for use as indicators alongside other financial and economic information when making DC decisions (they are not added together because they may already be captured through the EEA or DA in terms of their economic value). Overall, the WFD should have a positive net environmental impact. However, in some instances there may be adverse environmental impacts that should be considered (e.g. construction of new treatment plants etc).
2. Costs falling on the Economic Interest Group (EIG) that must implement WFD measures can be expressed in two ways: as “**financial costs**” and “**adjusted financial costs**”. Financial costs are effectively the price a business would actually pay (i.e. the market price). Adjusted financial costs are derived from financial costs by considering the effects of transfers (e.g. taxes and subsidies) and certain financial costs (e.g. depreciation). This distinction is retained in the guidance principally because the EEA in theory requires adjusted financial costs to be used, whilst the DA requires in some instances that both are used in order to highlight the flows of costs and benefits between different economic interest groups. Detailed guidance on how to convert financial to adjusted financial costs is outside the scope of this guidance<sup>6</sup>.
3. The “**economic costs**” of WFD measures are concerned with their true (i.e. full) costs to society. This is equal to the sum total of **adjusted financial costs** of measures plus the **water-related costs** and **non-water related costs**. It is only by including these “external costs” (so called because they are usually externalised in decision-making) that the true economic cost of measures can be obtained.
4. When expressing the economic efficiency of measures, other “**wider economic impacts**” must as a general rule be ignored since they are normally distributional and tend to cancel out from a societal perspective (the theory being that, for instance, job losses or reduced economic activity in one area are offset by increases in others). However, there are some exceptions, which are further outlined in Appendix D. Wider economic

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<sup>6</sup> Unless information is readily available on transfer costs or depreciation etc, it will be necessary to assume that adjusted financial costs and financial costs are the same. Therefore, costs should be measured as far as possible in financial or 'market prices', without adjustment for taxes, subsidies or non-financial costs. Where market prices are felt not to properly reflect the true economic costs, an adjustment may be necessary. Any adjustments will need to be made by an economist.

impacts are relevant to (and often extremely important in) distributional analysis.

5. The distinction between **water-related** and **non-water related benefits** is retained in the DCA as it is used in the CEA. This is because when determining the most cost effective combination of measures, the water related benefits must be excluded because they are already captured when achieving WFD objectives, but the non-water related benefits (and costs) are included. Some examples of water and non-water benefits are given below:

Water-related benefits:

- Enhanced recreation opportunities and enjoyment associated with improved water quality and ecology;
- Enhanced fishery production due to improved productivity and ecosystem function;
- Lower navigation costs due to improved water flow and depth; and
- Enhanced property (amenity) values associated with proximity to more attractive and pristine water bodies.

Non-water related benefits:

- Improved recreation opportunities in other parts of the catchment (e.g. a new woodland area) as a result of land use changes (e.g. measures involving planting of forests to reduce sediment loading into a river)
- Enhanced enjoyment of landscapes in a catchment as a result of changes in farming practices; and
- Reduced noise or disturbance to an area due to relocation of land-plant or other activities.

**Note: Key aspects to take care on related to impact definitions!**

- Take care over the terms **adjusted financial costs** and **economic costs**. The former refers to the financial costs of measures adjusted to reflect their actual costs to society (by taking into account transfer payments such as taxes and subsidies). However, the latter is the sum total of **adjusted financial cost** of measures plus the **water** and **non-water related costs**.
- Take care when assessing **benefits associated with wetlands**. Where meeting WFD objectives leads to the creation of new wetlands (e.g. through improved water quality/flow/availability), the benefits derived from or generated by the wetlands should be considered as **water-related**. However, if wetlands are created as a measure themselves (e.g. as part of a coastal realignment project or Sustainable Urban Drainage Scheme (SUDS)), then benefits should be considered as **non-water related**. Ultimately however, it does not matter which category they come in, as long as they are accounted for only once.
- When assessing water and non-water costs and benefits, they should only be considered in **directly affected markets** (i.e. one market removed). Thus if a measure occurs in market A then it would be relevant to look at effects in market B (one market removed) but not in market C (2 markets removed)<sup>7</sup>. It should be assumed that market prices in market C adequately reflect costs and benefits. This will ensure that relevant effects are taken into account and ensure consistency and therefore even handedness.

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<sup>7</sup> Market B effects should relate to clearly identifiable environmental impacts. For instance, examples of market B effects would include:

- impacts of increased energy use (carbon emissions) arising from pumping water from another location following ceasing a particular abstraction;
- the reduced availability of sludge as fertiliser for agricultural land following introduction of more stringent surface water nitrate standards.

However, in both of these cases, market C effects would relate to subsequent behavioural changes in consumers who are paying increased utility bills.

**Table 1 Summary of impact definitions used in DCA guidance methodology and associated analyses**

Category of impact	Adverse impact / cost definition	Positive impact / benefit definition	Used in collating and presenting evidence for which analyses (and issues)				
			Economic efficiency analysis	Distributional analysis			
				Adverse consequences for vulnerable groups	Deviation from PPP	Affordability	Recent investment
<b>Environmental impacts</b>	Adverse impacts on the environment as a result of implementing measures and/or achieving objectives (e.g. loss of habitat due to construction of a new sewage treatment plant)	Positive impacts on the environment as a result of implementing measures and/or achieving objectives (e.g. creation of new wetlands or increased populations of fish and birdlife)	✓	✓	✓	✓	✓
<b>Financial costs</b>	The direct market costs to an operator or sector of implementing WFD measures. These include recurring/non-recurring costs and are net of any cost savings.	Not considered	✓	✓	✗	✓	✓
<b>Adjusted financial costs</b>	Financial costs converted into economic costs (e.g., adjusted for transfers such as taxes, subsidies etc).	Not considered	✓	✗	✓	✗	✗
<b>Water-related environmental costs and benefits</b> (hereafter referred to as “water-related”). These are economic costs.	Costs arising as a result of achievement of WFD objectives (e.g. increased water clarity can actually lead to a decrease in recreational fishing opportunities). Note that these costs are likely to always be small compared to water-related benefits overall but they may be important to avoid overestimating the net benefits of the WFD overall.	Benefits arising as a result of achievement of WFD objectives (e.g. where changes in water body status lead to improved fishery productivity, recreational enjoyment and health etc). Water related benefits are not considered in the CEA since all measures are assumed to achieve the same objective.	✓	✓	✓	✗	✓
<b>Non-water related environmental costs and benefits</b> (hereafter referred to as “non-water related”). These are economic costs.	Costs arising as a result of implementation of a measure or achievement of WFD objectives that are not directly related to the water environment (e.g. increased waste and energy use due to new treatment processes, and increased noise, odour and congestion).	Benefits arising as a result of implementation of a measure that are not directly related to the water environment (e.g. decreased waste and energy use due to improved treatment processes, and reduced noise, odour and congestion).	✓	✓	✓	✗	✓
<b>Wider economic impacts</b>	Knock-on effects on other economic interest groups / operators as a result of increased costs (for WFD measures) or reduced revenues/incomes (as a result of measures and/or achieving WFD objectives). Example effects include: decreased expenditure and associated jobs in a local economy, “multiplier effects”, and reduced competition.	Knock-on effects on other economic interest groups / operators as a result of increased revenues/incomes (as a result of measures and/or achieving WFD objectives). Example effects would include: increased expenditure and multiplier effects, job creation, regeneration and enhanced competition.	✗	✓	✓	✓	✓
<b>Net wider economic impacts</b>	Net additional costs to society as a result of reduced productivity, bankruptcy, sunk investments, and unemployment costs.	Additional benefits to society as a result of net increased productivity from changes in expenditure, job patterns etc.	✓	✗	✗	✗	✗

### ***Key types of analysis in which these categories of impact are used***

As noted earlier, there are two types of analysis within which these impacts are assessed (and, where required, quantified and valued), namely:

- Economic Efficiency Analysis (EEA); and
- Distribution Analysis (DA)

Both are briefly outlined below and a more detailed explanation is given in Annex B. Each of the analyses requires different types of information which is collated and presented within the supporting evidence Spreadsheets (the series of purpose-designed MS Excel worksheets found in the file **Blank Spreadsheets.xls** that accompanies this document). Instruction on how to complete the Spreadsheets required for each of the analyses is explained further in Annexes F-R.

#### ***Economic Efficiency Analysis (EEA)***

EEA is used to test for economic efficiency alone and is not concerned with distributional effects. EEA examines and compares the full range of costs and benefits associated with both implementation of the measures and achievement of WFD objectives. It is thus effectively a “cost benefit analysis”.

EEA draws principally on information relating to **environmental impacts** (vital for assessment of water and non-water costs and benefits) and **economic costs and benefits**. It is not concerned with wider economic impacts (which are assessed in the distributional analysis).

#### ***Distribution Analysis (DA)***

DA is concerned with:

- Whether there is an adverse effect on particular groups or sectors for which there are government objectives and concerns;
- Who is causing the problem (i.e. the share of pollution or contribution to risk of failure of the WB)?;
- Who is paying to address the problem (i.e. the share of costs amongst economic interest groups and/or individual operators)?; and
- Who is benefiting from addressing the problem (i.e. the share of benefits)?

DA allows you to identify who the winners and losers are and to explore issues associated with fairness, equity and deviation from the PPP.

In terms of who pays the costs, DA examines the initial incidence (i.e. who pays directly for the measures), who pays indirectly (e.g. through changes in economic activity etc), as well as who ultimately pays (i.e. the end incidence of costs, much of the increase of which will be borne by the tax payer and/or consumer). This part of the analysis draws upon both **financial and economic cost** information.

Where a sector or firm is paying directly and/or indirectly, DA allows you to examine the **wider economic impacts** that might occur, both those that are adverse (e.g. reduced multiplier effects on expenditure, job losses and degeneration) and positive (e.g. increased multiplier effects on expenditure, job creation and regeneration). DA is therefore also concerned with affordability based on a range of financial viability indicators. **Financial costs** are also relevant to this analysis. A DA also takes into

account the scale of recent investment in environmental improvements by a sector or firm.

### ***Balancing the level of effort with the need for rigorous assessment***

The approach is **designed to be flexible** to enable you to apply it in cases of varying complexity and achieve a sufficiently rigorous result. The main guidance is focussed on completing the DCA using only the short (and sometime long) ASTs. This is critical to ensuring that decisions are made as efficiently as possible. The supporting evidence Spreadsheets outlined in this Annex may only rarely be needed. The guidelines apply to situations where single measures apply to a single water body through to complex combinations of measures over local to national scales in one or more water bodies.

The approach has been developed in such a way that the analysis can be terminated once the evidence is sufficiently clear to enable a disproportionate cost decision to be made. This is likely to be useful in parts of Scotland and Northern Ireland for instance, where the situation is on the whole simpler in terms of river basin problem solving than it is in England, and hence assessments are likely to be more clear-cut and require less evidence.

The guidance set out by WATECO in relation to the assessment of disproportionality varies depending on the nature of the derogation being sought. For time derogations, simple financial criteria may be sufficient to assess disproportionality as this is only a temporary measure. Over time, however, a more detailed assessment may have to be carried out involving more extensive identification and quantification of costs and benefits, including financial, economic, environmental and social costs and benefits. To set less stringent objectives and for the assessment of 'other means', a more fully quantified economic efficiency analysis (i.e. cost benefit analysis) may be appropriate (with previously non-valued impacts described in quantitative or monetary terms).

A key aspect which has been included in order to enable this is the incorporation of a method for screening decision situations according to the type (e.g. EEA or DA) and level of analysis (e.g. qualitative, quantitative or monetary) required. Specific guidance on how to identify when this may be required is provided in Annex C.

### ***Dealing with uncertainty***

Issues over uncertainty may affect a DCA in many ways. Table 2 highlights the main types of uncertainty that may be encountered in the DCA process and outlines how such uncertainties can be addressed. It is acknowledged that the manner in which uncertainty is dealt with is relatively simplistic, but it has to be in order to make the DCA methodology workable.

The approach also allows you to deal with uncertainty through **sensitivity analysis** when the benefits have been valued in monetary terms. This enables you to identify how changes in key assumptions and variables affect the outcome. This is dealt with only crudely by highlighting the low, best and high cost and benefit value estimates, as adjusted by the likelihood of achieving WFD objectives.

**Table 2 Aspects of the DCA affected by uncertainty encountered and ways in which this is addressed**

Aspect of DCA affected by uncertainty	How it is addressed
Need for a DCA at the screening stage	The user can answer a series of questions to establish whether a DCA is needed even if all measures are RCMs, on the grounds that uncertainty regarding their effectiveness may mean that they fall short of achieving their objectives (in this situation, additional NRCMs may be required to deal with shortfall and, if so, it is recommended that a DCA is undertaken focusing the new combination of measures that also includes these). Note that if some or all measures are NRCMs then a DCA is automatically required.
Extent of costs and benefits at the screening stage	Users should consider whether uncertainty is sufficient to require a DCA to be undertaken (e.g. for measures with significant costs and/or affordability issues but uncertain benefits).
Improvement in likelihood of achieving WFD objectives with and without measures	<p>This can be taken into account within the EEA (it is not considered within a DA) as follows:</p> <ul style="list-style-type: none"> <li>• You first indicate the uncertainty associated with each factor that is considered to affect the likelihood of achieving WFD objectives as a low, best-estimate or high score. Factors include: <ul style="list-style-type: none"> <li>- Current and target status for each water body;</li> <li>- Pressures affecting water bodies;</li> <li>- Effectiveness of measures (in terms of the gap addressed, itself a function of how each environmental parameter will be affected).</li> </ul> </li> <li>• These factors are then taken into account when estimating low, best and high estimates of the improvement in the likelihood of achieving WFD objectives both <u>with and without</u> measures. These estimates are expressed as % adjustments, which then automatically adjust the monetary value estimates (if used) in the EEA (qualitative and semi-quantitative information needs to be adjusted manually in accordance with these adjusted monetary values).</li> </ul>
Accuracy of costs and benefits	<p>This can be taken into account within the EEA (it is not considered within a DA) as follows:</p> <ul style="list-style-type: none"> <li>• By recording the costs of measures as low, best and high estimates;</li> <li>• Answering yes, no or maybe as to whether each of the context specific parameters affects benefits. These help you in defining which benefits are relevant and the level of uncertainty (see next bullet);</li> <li>• Recording the level of uncertainty of qualitative/semi-quantitative benefit significance estimates as a low, best or high score. These can be carried through to the AST (and are of particular relevance when a quantitative or monetary assessment is not undertaken). These scores are also taken into account when deciding whether to proceed onto more detailed analyses and in prioritising which benefits to quantify and/or monetise first if required.</li> <li>• If a monetary assessment is undertaken, monetised benefits can then be estimated in terms of low, best estimate and high values. The low benefit value estimate is then multiplied by the low likelihood of achieving WFD objectives (see above), the best by the best and high by the high respectively. These can then be carried through to the AST.</li> </ul>

Aspect of DCA affected by uncertainty	How it is addressed
Distribution of pollution, costs and benefits	<p>Uncertainty with regard to the DA, can be taken into account as follows:</p> <ul style="list-style-type: none"> <li>You can indicate the level of uncertainty over the extent to each Economic Interest Group (EIG) / operator is contributing to the risk of waterbody failure or pollution, the costs they will bear and the benefits they will derive by recording a low, medium or high score next to the summary description for each. If more detailed evidence is collected on wider economic impacts, you can also do the same for these.</li> <li>If more detailed evidence is collected to help assess affordability issues, you can record low, best estimate or high values for each of the parameters of relevance (e.g. profits, revenues, pass through etc). These are then taken into consideration when assessing impacts on businesses when paying for measures, which themselves are entered as low, best and high estimates (e.g. of job losses/gains, changes in expenditure etc). Note this information is not carried through automatically to the AST.</li> </ul>
Alternative objective setting	<p>This can be dealt with as follows:</p> <ul style="list-style-type: none"> <li>You can go through a series of questions to identify whether an extended deadline is potentially appropriate or not. This process errs on the side of caution by suggesting that, if there is uncertainty and significance of not doing so could be high, more evidence should be collected.</li> <li>As part of this process, you are advised under what circumstances it may be beneficial to seek an extended deadline in order to undertake further research to reduce uncertainty before making a decision or to make a decision now based on an inherently uncertain risk assessment (called “value of information” analysis).</li> </ul>

### ***Pre-requisites and data requirements for application of the guidance***

Pre-requisites for application of the guidelines include the following:

- **The identification of a combination of measures to which a DCA can be applied.** This may include one or more measures, depending on the type and scale of the problem in question. This may have been identified through a CEA or from another route (e.g. an agreed combination by a set of RBD stakeholders). The combination may also be either specific to an individual problem or water body, or applicable to a commonly occurring one (i.e. as will be identified by the EA's "common solutions to common problems" approach). The latter approach allows for an aggregated high-level analysis.
- **Identification that a DCA is required.** The DCA is an involved process that takes time and resources and should not be applied without first screening out those cases where it is not required. For example, a decision may be possible based on existing evidence (e.g. based on knowledge of the environmental improvements and costs, as could be obtained from a CEA or other source) and/or appropriate (e.g. the measures may be implemented anyway even without the WFD).
- **If after screening, a DCA analysis is deemed appropriate, information is needed to identify which measures should be considered as part of the baseline**
- **A DCA may require reasonably detailed information on the financial (and possibly adjusted financial costs) of measures.** It is assumed that in general this will be derived directly from the CEA analysis if undertaken. However, if a CEA has not been undertaken, this will be needed from other sources.
- **If an EEA is conducted, information on the environmental impacts of measures in terms of the gap addressed.** These will principally comprise improvements. However, there may be instances where some adverse impacts occur and need to be considered to identify the net effect. To describe these effects (critical for the DCA), you need information on relevant environmental parameters which are ideally cross-referenced with relevant standards - either UKTAG WFD standards, or if not relevant for a particular parameter, other types of standard (e.g. UK Environment Agency RE classes or equivalent). This process is described in Annex C and the standards are presented in Appendix B<sup>8</sup>.
- **An EEA will also require information on the existing reference case (or Business as Usual) environment** (i.e. in terms of how environmental parameters will change due to continuing trends in population, economy, technology and human behaviour), and an understanding of changes that may occur as a result of measures that will go ahead anyway (e.g. basic measures) or that have been undertaken in the past.
- **If an EEA is conducted, information on the water and non-water costs and benefits may be required.** Cost data can generally be at a "total cost" level (i.e. the total for the whole combination), however, it may sometimes be needed on a per measure basis (e.g. if the costs and benefits of the contribution of each economic interest group or related to each measure is to be evaluated). This analysis also requires a good understanding of how the

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<sup>8</sup> At the time of reporting, standards had been set only for selected parameters.

environmental impacts translate into benefits, at least in terms of potential magnitude or, in some case, in terms of monetary value.

- **If a DA is required, information is needed in order to assess the costs of implementing measures upon each sector.** This requires information on the distribution of costs per sector, potential of cost pass-through as well as information on the financial performance and viability indicators for each operator. Information on wider economic impacts such as revenues and jobs generated is also needed.

### **Additional supporting evidence Spreadsheets**

A series of additional Spreadsheets (“supporting evidence Spreadsheets”) has been developed (as Microsoft Excel worksheets, named: “**Blank Spreadsheets.xls**”) to help collate and present evidence in more complex and contentious cases. The Spreadsheets can be split into the following types:

1. **Spreadsheet for summarising the results of the screening questions: (screening Spreadsheet).**
2. **Spreadsheets for summarising data from the CEA or other source (1-4)** for collation, interpretation and presentation of the CEA outputs (or data from an alternative source if a CEA has not been undertaken). This includes a summary of the problem, water body and relevant measures, the costs of the measures, baseline environmental parameters and targets, and non-water environmental costs and benefits.
3. **Water-related benefit Spreadsheets: (5-6)** for identification and valuation of the welfare benefits and in rare cases, positive economic impacts (benefits) related to improvements or prevention of deterioration in the quality of the water environment as a result of implementing the measures.
4. **Distribution and affordability Spreadsheets: (7-9)** for identification of the distribution of financial costs and affordability amongst sectors and/or operators for the measures.
5. **Extension of deadline analysis Spreadsheets: (10-11)** for identification of whether an extended deadline is potentially relevant / appropriate and presentation of the results of the relevant quantitative analysis to justify extended deadline where appropriate.
6. **AST calculation Spreadsheets: (Short, Long, NRCM-EIG)** to help automatically calculate values for the ASTs drawing upon information in the other Spreadsheets.
7. **Additional tools: (A-D)** optional tools to help users: assess the present value and annualised values<sup>9</sup> of costs and benefits, aggregate benefits across multiple water bodies and assess the proportion of benefits by measure and by Economic Interest Group / operator.

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<sup>9</sup> When costs (or benefits) differ each year, annualised values represent the equivalent annual amount if the costs (or benefits) were the same in every year.

## **Resources required**

Table 3 describes the specific purpose of each Spreadsheet within the guidance. It also highlights the type of expertise required for each. The appraisal process is expected to be multi-disciplinary in nature, requiring inputs ranging from water quality interpretation to environmental impacts through to economic analysis. Data Spreadsheets also differ in their requirements in this regard, as well as their data requirements.

**Table 3 Description of the data Spreadsheets and expertise required to complete them**

Explanation of Spreadsheets				Required expertise to complete
Type	Reference	Name	Purpose	
Input record	Input record	Input record	To record the source and timing of inputs for each Spreadsheet	N.A. (is completed automatically from other Spreadsheets)
Screening stage	Screening	Screening questions	Screening questions to help identify whether a DCA analysis is required / appropriate or not and, if so, what types of analyses are required.	Ideally the lead-planner (or similar), since it requires a good overview of the appraisal aims and objectives and context.
Spreadsheets for summarising data from CEA (or other source)	1	Details of problem and measure(s)	Summarises the problem being assessed, helping you and decision makers to understand the appraisal context. This acts as a point of reference throughout the appraisal process.	Ideally the lead-planner (or similar), since it requires a good overview of the appraisal aims and objectives and context.
	2	Environmental impacts of measures	Describes the “gap” addressed in terms of the absolute changes that will occur to key environmental parameters as a result of implementing non-reference case measures (i.e. excluding the effects of reference case measures and background trends). This information is primarily useful when doing an EEA but may also be undertaken when doing a DA only (if more detailed information on the environmental changes is needed).	Could be completed by the lead-planner or water quality/ecology expert. Much of this information should come from the CEA, but a fair amount of interpretation may be required in order to understand how environmental changes may be of relevance to the benefit assessment.
	3a	Financial and adjusted financial costs of measure(s) - simple version	Summarises the total financial and adjusted financial cost of measures. It includes the bare minimum of information (summarised as totals only). This may be sufficient in cases where analysis focuses purely on economic efficiency criteria (i.e. EEA only cases).	Could be completed by the lead-planner or economist since, technically, all of this information should be in easy to use format from the CEA. The needs for input depends on whether a CEA has been done and in what level of detail, or if other information exists.
	3b	Financial and adjusted financial costs of measure(s) - detailed version	Shows a detailed breakdown of the financial and adjusted financial cost of each measure separately, describing the sector and location of the costs. This Spreadsheet is for use in cases requiring a DA, where the costs/benefits are required per measure and where you need to list out the individual costs per measure in order to generate a total cost (e.g. as would likely be the case when a CEA has not been conducted first).	
	4	Non-water environmental costs/benefits and water-related costs of measure(s)	Summarises other "external" impacts of the measures that are not captured in the costs in Spreadsheet 3a/3b.	Could be completed by the lead-planner or economist since, technically, all of this information should be in easy to use format from the CEA.

Explanation of Spreadsheets				Required expertise to complete
Type	Reference	Name	Purpose	
Water-related benefit Spreadsheets	5	Water-related benefits (qualitative/ semi quantitative)	Identifies which benefits are potentially affected by the measures; provides basic qualitative descriptions of these benefits where relevant; and indicates whether the benefit is likely to be of low, medium or high significance. It also allows you to indicate the time delay in achieving benefits and, if required as part of a DA, who derives them.	This Spreadsheets requires a combination of skills to complete. The work could be led by an environmental scientist / planner (since it requires a good understanding of how environmental changes will affect benefits), but with strong input by an environmental economist/economist.
	6	Water-related benefits (quantitative/ monetary)	Details the quantitative and/or monetary values of water-related welfare benefits of measures. This builds upon the results of Spreadsheet 5 for those cases where a quantitative approach is required.	Environmental economist/economist
Distribution and affordability Spreadsheets	7	Distribution of pollution, costs and benefits	Draws together information on a) who is causing the problem, (b) who is paying for addressing the problem and (c) who is benefiting from addressing the problem. The information collated and issues identified in this Spreadsheet determine the need to complete Spreadsheets 8 and 9.	Lead planner or environmental economist/economist (depending on complexity or analysis and availability of data).
	8	Wider economic impacts and competition assessment	Provides data to inform completion of Spreadsheet 7 if adverse or beneficial impacts are highlighted. Summarises the potential impacts to specific sectors and/or operators of implementing the measures in terms of either changes in expenditure or in the number of jobs (positive or negative). Qualitative, semi-quantitative, quantitative and monetary information can be entered in this Spreadsheet. The competition assessment identifies whether the measures are likely to impact upon the competitive nature of businesses.	Lead planner or environmental economist/economist. If complex, should be led by an economist.
	9	Affordability for industry	Provides data to inform to inform completion of Spreadsheet 8 and 7 in cases where significant adverse impacts on industry EIGs / operators are identified as likely in Spreadsheet 8. This Spreadsheet is likely to require obtaining data from industry stakeholders relating to business performance.	Lead planner with advice/assistance from economist or an economist, depending on complexity.
Extended deadline Spreadsheets	10	Potential for extended deadline	Lists questions to help you identify if an extended deadline is potentially relevant / appropriate.	Lead planner
	11	Extended deadline justification	Allows you to present the results of a quantitative analysis to explore whether an extended deadline is appropriate and present the results.	Lead planner
Additional tools	Tool A	Time-streams of costs & benefits (non-discounted)	To assist you with calculating the present value (PV) of costs for sheet 3b and benefits for sheet 6. Useful for assessing complex streams of costs and/or benefits, where the amount changes over time. Also calculates annualised values of costs and benefits.	Economist or lead planner with advice/assistance from economist.
	Tool B	Time-streams of costs and benefits (discounted - i.e. present values)		
	Tool C	Significance and values of benefits for multiple water bodies	To assist you in assessing water-related benefits for multiple water bodies (i.e. when using the "high-level" EEA approach).	
	Tool D	Proportion of water-related benefits attributed to each measure in a combination	To assist you allocate the proportion of water-related benefits to each measure in a combination of measures.	

## General instructions on completing the Spreadsheets

Blank Spreadsheets are provided in the Excel workbook: **Blank Spreadsheets.xls**. Spreadsheets are linked together by hyperlinks to allow quick navigation between them. The **Spreadsheet Guide** at the start of the workbook presents a summary of the Spreadsheets (similar to Table 3) outlining the purpose of each. It also provides a key for the **colouring system** used in the Spreadsheets (Table 5). Each Spreadsheet cell is coloured according to the source to be used for the data in that cell.

**Table 4 Key to the colour coding system in the Spreadsheets**

Grey	Titles & headings – do not type in these cells
White	Instruction cells - do not type in these cells
Light green	User should input information from the CEA / cost analysis / effectiveness analysis or other alternative source
Light yellow	User should input information from elsewhere
Bright yellow	User should only input information if answer to question above is "yes"
Light blue	User should select an entry from the dropdown menu
Pink	User should collect information from the sector/operator
Orange	User should not input data as cells are automatically linked to others in the worksheet

Light blue cells offer a choice from a **drop-down menu**. To select from these menus, first click on the cell itself, then click on the arrow to the right of the cell and then click on your choice.

On several occasions you will be asked to rate items using a **L/M/H scale**. This is a simple scale, chosen to make it easy to indicate the relative magnitude of the item. Simply enter "H" if the item is of high magnitude, "M" if it is of medium magnitude and "L" if it is of low magnitude. Appendix C provides tables to help determine the relative significance of costs and benefits.

Some data items in the Spreadsheets can be chosen by reference to the **database** that accompanies this guidance. This is particularly relevant for Spreadsheets 6 and 9. This database is **described in Appendix E**.

Cells at the bottom of each Spreadsheet are provided for the name and signature of the individuals that complete and check each Spreadsheet (to be signed and dated after printing by both).

### Purpose

This Spreadsheet can be used to help answer the following two steps (and present additional evidence):

- Step 1.5 (Question A): Is a DCA required?
- Step 1.6 (Question B): If a DCA is required, which analyses need to be undertaken?

### How to complete the screening questions

To answer each of these questions, you will first need to go through a longer list of more detailed questions (A1-A3 and B1-B10). Simply answer “Yes” or “No” to each of these questions in the **Screening Spreadsheet**. The answers to these questions determine which analyses (and hence which Spreadsheets) are required. Ultimately, both involve an element of subjectivity. This stage gives you flexibility to identify which considerations to take into account and on how to answer each. Guidance on this is provided below.

### Question A: (Step 1.5) Is a DCA required?

Start by answering Question A1. Depending on the answer, you may need to then answer subsequent questions. When all required detailed questions are finished, answer Question A. Guidance on answering is as follows:

#### A1) Is a DCA appropriate?

A DCA may not be appropriate for several reasons, including the following:

- As discussed in section B.2.2, because all proposed measures are reference case measures (RCM)s<sup>10</sup> and it is known, with a high degree of certainty that they will be effective (hence it is highly likely that WFD objectives will be met without the need for further NRCMs). However, even if all measures are RCMs, where there is uncertainty over their effectiveness, a DCA may be needed.

Table 5 below categorises cases into four types according to the type and effectiveness of measures and proposes the way forward for each.

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<sup>10</sup> This may happen if, for instance, measures are required under existing Directives listed in Annex VI or other supplementary measures that are already supported by agreed and funded programmes etc.

**Table 5 Types of cases according to the type and effectiveness of measures**

Type & effectiveness of measures	Proposed way forward	Example situations when this might occur
<p>1. All measures are RCMs.</p> <p>All are likely to be highly effective, with low uncertainty.</p>	<p><b>A DCA is not appropriate.</b></p> <p>The process stops at the screening stage.</p>	<p>Cases involving point source discharges and for which measures are needed under directives (e.g. UWWT, bathing waters etc.), where there is a clear link between stopping / reducing a discharge and a resultant environmental improvement.</p>
<p>2. All measures are RCMs.</p> <p>Their effectiveness is highly uncertain.</p>	<p>The proportionality of costs for the proposed measures are not relevant since they are all RCMs. However, since it is not certain that they will achieve WFD objectives, you may want to assess the merits of implementing an alternative, more effective combination of measures.</p> <p><b>A DCA is appropriate, but focussed on this alternative combination</b>, as this will now include NRCMs. Many assumptions are needed in order to separate out reference case / non-reference case effects. In particular, the uncertainty over the effectiveness of the RCMs should be explicitly described (in Spreadsheet 2), as this will affect the baseline position against which the NRCMs should be compared.</p>	<p>Cases involving diffuse pollution, alien species and cases driven by SAC/SPA objectives.</p>
<p>3. All measures are NRCMs.</p>	<p><b>A DCA is appropriate, focussing on the originally proposed measure or combination of measures.</b></p> <p>As above, many assumptions are needed.</p>	
<p>4. There is a mixture of reference case and non-reference case measures.</p>	<p><b>A DCA is appropriate, focussing on the originally proposed measure or combination of measures.</b></p> <p>As above, many assumptions are needed.</p>	<p>Likely to occur often, especially in more complex cases involving multiple water bodies / pressures.</p>

- If the measure or combination of measures is obviously technically infeasible (i.e. with a low level of uncertainty) a DCA is not appropriate. However, if there is some uncertainty or a possibility that, given sufficient resources, a technical solution may be feasible, then a DCA may be appropriate (though later screening questions may still imply that the measure or combination is DC on economic or distributional grounds).

Note that there may also be other reasons why a DCA is appropriate.

*If the answer is “yes” (a DCA is appropriate), proceed to Question A2;  
If the answer is “no” (a DCA is not appropriate), go back to the AST and fill in “DCA not needed” together with supporting justification.*

## **A2) Do you need to do a DCA to make a DC decision?**

*If the answer is “yes” (a DCA is needed to make a decision), you should insert the level of DCA needed (e.g. brief record or detailed) in the AST together with the appropriate justification.*

*If the answer is “no” (a DCA is not needed to make a decision), go to Question A3.*

## **A3) Are measures obviously not DC?**

If a case can be made that measures may be DC based on existing evidence, then they are probably “obviously DC” and only a brief record is required for the DCA. In making this decision care must be taken that everyone affected is represented in the process.

It is beyond the scope of this guidance to recommend when costs are disproportionate or not (this is a political decision that will be made by the relevant Secretary of State). However, examples of when measures may be obviously not DC include if:

- Where the same type of measures has been identified as obviously not DC in a very similar context;
- Where, based on existing evidence, benefits are known to exceed costs (e.g. if the benefits of improving a river are known to be £100-150,000 per km and the measures cost only £10,000 per km, then it is obviously not DC (though note that measures could still be DC for distributional reasons);
- Where a polluter did not know they can simultaneously avoid damaging the environment and save money, and the measures address this;
- Where a polluter has not yet tackled a pollution problem because of regulatory reasons and the measures remove this;
- Where measures are required to tackle accidental damage (or damage through ignorance) of a type that is normally generally well controlled and regulated;
- Where the incremental increase in cost required to reach WFD objectives is insignificant in relation to the cost required to reach another existing objective (e.g. this might occur if a plant has to pay £100,000 to meet IPPC requirements but only an additional £1,000 to meet the WFD objectives).

However, note that: an economically efficient combination of measures may still be DC due to unacceptable distributional effects. If adverse effects on affected parties can be mitigated through compensation payments, a DCA may still not be needed (though some form of analysis may be required to inform the design of a compensation package).

Assuming that all parties agree that the measures are worthwhile, examples of when a detailed DCA may not be required therefore include:

- Where no party that has not agreed is impacted (note that this is a complex issue since impacts can occur in a range of ways); and
- Where there is an effect on one party, but another party is willing to compensate the affected one completely (they may wish to do so for a range of reasons, including because of the positive benefits they receive).

If everyone who is affected agrees on meeting the cost of the measures, and no other party is affected, then only a brief record for the DCA is needed.

### **Question B: (Step 1.6) What types of analyses are needed?**

Read through the text below and answer questions B1 to B10:

#### **B1) Are measures obviously DC?**

If a case can be made to support the fact that measures may be DC on the grounds of existing evidence, then they are probably “obviously DC” and only a brief DCA record is required.

It is beyond the scope of this guidance to recommend when costs are disproportionate or not (this is a political decision that will need to be made by the relevant Secretary of State). However, examples of when measures may be obviously DC include if:

- there are no benefits;
- there is only one beneficiary (e.g. a fish farm downstream of a discharge) and they are not willing to pay for the improvements
- previous investigations suggest benefits range between £20,000-110,000 per km of river improved and it costs £5m per km;
- there are a relatively large number of similar sites nearby that are already at high ecological status (since the potential for substantial marginal benefits from the measures at one further such site are low).

If this question cannot be answered with enough certainty, then it is recommended that you proceed to the next question.

*If the answer is “yes”, you do not need to do an EEA or DA but should go straight to Stage 3 (i.e. Step 3.1); or*

*If “no”, an EEA may not be needed - go to B2.*

#### **B2) Is it uncertain as to whether the total benefits of the measures significantly exceed the costs or vice versa?**

Generally, the answer to this will be “no” since if “yes”, the case is likely to have been screened out in questions 3 and 4. However, this may not always be the case.

*If the answer is “yes”, you should consider doing an EEA; or*

*If “no”, an EEA may not be needed and you should go to B3.*

#### **B3) Are many different types of benefit potentially likely to be generated?**

Many different types of benefits might occur in cases where there are many uses of the water body, such as a water body in a heavily populated area with many visitors and significant commercial use.

*If the answer is “yes”, the case is likely to be complex and an EEA is recommended to help explore the likely range and, if required, significance of benefits; or*

*If “no”, an EEA may not be needed and you should go to B4.*

**B4) Are any benefits potentially likely to be significant but associated with a high degree of uncertainty?**

This is less likely to be the case in situations where a very similar set of measures has been implemented previously in a similar water body, for example.

*If the answer is “yes”, an EEA is recommended as a means of assessing the implications of uncertainty on the DCA outcome, for instance, using sensitivity testing.*

*If “no”, an EEA may not be needed and you should go to B5.*

**B5) Are significant non-market or other difficult to value benefits likely to be generated?**

Where present, non-market or other difficult to value benefits can potentially make the DCA complex. Examples of when this might occur include:

- *Where there are significant impacts on high profile, unique and/or endangered habitats and species, particularly those close to areas of high population density. In this situation, non-use values may be significant. In some cases they could prove to be the largest category of value. Despite the emergence of new techniques, these values remain difficult to quantify with any certainty. Different users may have different attitudes towards the validity of including non-use values in the assessment.*
- *Where there is likely to be significant change in the quality or quantity of recreation or angling. Assessing recreational values involves investigating users’ willingness to pay (WTP) for their experiences. Whilst the techniques for doing this are now well established, the results often include a high degree of uncertainty and they may still sometimes be considered contentious.*

It is only possible to proceed without an EEA if these types of benefit are not likely to be significant. If they may be significant, or if you are unsure about their significance, then an EEA is recommended. You should also consider whether a DA is required.

In practice it may be difficult to judge when this may occur and require the collection of at least qualitative evidence.

*If the answer is “yes”, an EEA is recommended, potentially involving the quantification and/or monetisation of non-market benefits; and*

*If “no”, an EEA may not be needed and you should go to B6.*

**B6) Are certain groups of society or economic interest groups for which there are government objectives potentially likely to incur significantly increased costs, or other significant adverse impacts?**

This may be the case in situations where measures have been proposed that substantially increase the severity of existing restrictions on businesses (e.g. if a limit on the acceptable level of pollutants is lowered). It could also occur where a sector/operator is already taking steps to improve water quality, but where the proposed measures add new or altered conditions on the steps that they take, such as new or amended actions demanded from water companies.

Note that some particular groups of society or economic interest groups may be affected adversely as a result of costs being passed onto them (e.g. through water charges).

*If the answer is “yes” then a DA should be undertaken; or  
If “no” a DA may not be needed and you should go to B8.*

**B7) Are significant additional costs borne by sectors/operators that previously did not have to pay?**

This is likely to occur in situations where a new set of measures has been proposed, imposing entirely new restrictions on sectors or operators who have not previously taken any steps to improve water quality.

*If the answer is “yes”, you should consider doing a DA, particularly if specific groups may be affected; or*

*if “no”, a DA may not be needed and you should go to B8.*

**B8) Are any significant pressures the result of activities that cannot be associated with a particular polluter?**

For example, is there a current source of pollution that is difficult to identify or to attribute to a particular polluter? This might be the case for some types of diffuse pollution. The answer could also be yes when there is historical pollution which cannot be easily attributed to any current operator.

*If the answer is “yes” then a DA is recommended; or*

*If “no” a DA may not be needed and you should go to B9.*

**B9) Will the measures be paid for by different sectors, operators or individuals to those who caused the problems in the first place?**

Assessing this question will require consideration of (1) who caused the problems / pressures that are affecting the site and (2) who will end up paying for the proposed measures.

When considering who pays for the measures, it may be necessary to consider welfare impacts on the general public or sub-sections of it.

It will be clear in some cases that the same economic interest groups are causing the problems as those that are paying for the measures, in which case the answer here is no. In other cases it will be clearly a different group, or it will be unclear, in which case the answer here is yes.

*If the answer is “yes” then a DA is recommended; or*

*If “no” a DA may not be needed and you should go to B10.*

**B10) Are there concerns over the distribution of benefits with regard to the distribution of costs (e.g. geographically or between economic interest groups)?**

This question asks you to first assess the way in which the **benefits** of improving the ecological status are distributed between different economic interest groups, different geographic areas, different social/ethnic groups, different generations etc.

You will then need to assess the way in which the **costs** of implementing the measures are distributed between these same groups.

If the benefits are likely to accrue to different groups to the costs, in any of these respects, then the answer should be yes.

For example, if a measure such as a reduction in pollution is largely undertaken by operators in upstream locations, but the benefits of these measures are mostly realised in downstream areas (e.g. recreational activities on an estuary), then there may be concerns over the geographical distribution of costs versus benefits.

*If the answer is “yes” then a DA is recommended; or*

*If “no” a DA may not be needed.*

### **Next steps**

You now need to answer Question B:

#### **Question B: What types of analyses are required?**

Before answering this question, note:

- a) If screening suggests that both an EEA and a DA are required, in most circumstances it would be preferable to **start with the one with the strongest case and evidence available. However, if in doubt, start the DCA with the EEA.**
- b) If a particular analysis is not flagged up as potentially required at the screening stage, it does not mean it definitely is not required. You can still decide to expand the DCA to include other analyses at any point (e.g. if new information comes to light or stakeholders request it).
- c) Conversely, even if a certain type of analysis is flagged up as being required here, it will not always be necessary to carry it out. For example, if an EEA is started which then shows that the measures are DC, then there may be no need to subsequently carry out a DA.
- d) If a DA is done first which suggests a DC situation, an EEA must then be undertaken to show what the net welfare impact to society will be (to weigh up against the DA outcome).

**Having updated the AST with the answer, proceed to STAGE 2 in the summary guidance, and carry out the analyses required.**

## Purpose

Spreadsheet 1 can be used for presenting additional evidence regarding the problem and measures being assessed, thereby supporting completion of AST Steps 1.1, 1.2 and 1.4.

## How to complete Spreadsheet 1

If a CEA has been undertaken, most if not all of the information on this Spreadsheet can be sourced from it. If not, further research will be required to identify an appropriate combination of measures. The Spreadsheets can be used to either deal with single water bodies or a selection of water bodies with common problems.

### 1. Summary of problem (Rows 2-7)

- Enter a basic description of the case under appraisal, including details of the country, river basin district, brief description of problem, and:
- **Summary of objectives and improvements required to achieve this.** Note that here “objectives” refers to the relevant WFD objectives (e.g. progressive reduction of priority substances, trend reversal or achievement of a status objective) as opposed to the actual status objective itself (e.g. maintain GES or GGCS or achieve MEP etc). “Improvements needed to achieve this” refers to the ecological or other changes required and/or the negative impacts that need to be removed or prevented.

### 2. Details of water bodies at risk and pressures affecting them (Rows 9-16)

- Insert relevant details on the water bodies that are affected by this appraisal, giving each one a row of its own. If it is several water bodies all with a common solution, then say so under other comments.
- The **water body type** should be inserted, identifying the main category (i.e. river, lake, transitional water, coastal water and groundwater), followed by the sub category (detailed typology). More than one water body can be included here.
- The approximate **area** of lakes and estuaries affected, and **length** of rivers affected should be inserted. Note it is “affected” area or length as opposed to the whole water body area or length.
- The **“Status without meeting objectives (i.e. future status without implementing WFD measures, including effects of reference case measures)”** is the expected future status of the water bodies (e.g. Good Ecological Status or Moderate Chemical Potential<sup>11</sup>), once all reference case measures (RCMs) have been implemented. RCMs are measures implemented to meet the requirements of non-WFD legislative drivers (i.e. the requirements of other directives encompassed by the WFD and not

<sup>11</sup> When ecological status is Good or Moderate you should also check Annex V part 1.2 of the WFD for normative definitions of ecological status classifications.

the additional measures that the WFD requires). Answer this using the drop-down menu.

Sometimes these measures will completely address the gap for some parameters, whilst they may only partially address the gap for others. **Water bodies for which the gap is closed by the RCMs (with high certainty) can be omitted from sheet 2 and the overall analysis.** Where they only partially close the gap (or where there is uncertainty over the gap), the parameters still need to be included in sheet 2 under the “Environmental parameters of relevance to the benefit assessment”.

- **Determining the overall baseline status is potentially extremely complex and difficult to ascertain, but it is a critical stage in the appraisal. Spreadsheet 2 will help you to assess the baseline status in more detail – only a simple initial indication is required here.**
- Assessing the baseline in detail will involve determining the current “intensity” of the parameters (e.g. average Phosphate levels of 0.4mg/l) and then estimating what the parameter intensity will be assuming all the RCMs are undertaken. This step clearly needs a mix of ecology, chemistry and impact assessment skills. It will ultimately have to be achieved using expert judgement. See notes for Spreadsheet 2 for further clarification.
- The “**Status if objective met**” (i.e. target status objective) should be selected from the drop-down list. Note that the objective in this case refers to the proposed status objective for the WB (e.g. reach Good Ecological Status or maintain Moderate Chemical Potential) as opposed to the type of objective (e.g. progressive reduction or prevention of deterioration etc). You should refer to Annex V of the WFD for the normative definitions of good ecological status. The target objective should in the first instance be the default objective or the appropriate alternative objective, depending on the DCA being undertaken.
- **Linkages with other water bodies** are important where they influence the impacts of the measures or are influenced by the measures. Describe whether the water body is connected to other water bodies physically or in any other way, where they are relevant to achieving or benefiting from the objective.
- The **key pressures** affecting the different water bodies should be identified.
- The **level of uncertainty** related to current water body status (e.g. good or poor ecological potential), target water body objective status (e.g. maintain or achieve good ecological status) and pressures should also be classified as Low, Medium or High.

### **3. Details of measures considered in DCA (Rows 18-24)**

- **Column F:** Insert a brief **description of all the individual measures** that form the proposed combination of measures (the one that has resulted from the CEA as the most effective combination of measures). Adjust the number of rows as required, e.g. by inserting additional rows in the Spreadsheet, ensuring that the drop-down menus appear (you may need to merge to one cell if the new line arises as three cells, by dragging down on the corner of the correct formatted cell above using left hand click). Note also that you must then add in the same number of rows into sheet 3b, copying the formulas in the cells.

- **Column B:** Now go back and insert for each, the **Category of measure**, chosen from the drop-down list of 16 options.
- **Column E:** Indicate which **water bodies are affected**, referring back to the water bodies listed in rows 11-15.
- **Column H:** Indicate whether the measure is a Reference Case Measure (RCM) or a Non-Reference case measure (NRCM). If a measure is indicated as RCM, it then effectively becomes excluded from the DCA. It may be that all the reference case measures have already been removed from the list of measures to be assessed – if so, this should be explained in the description of the problem above.
- **Column I:** Insert your assessment of how much uncertainty there is regarding the effectiveness of each measure (Low, Medium or High uncertainty).
- **Column J:** Enter a justification for whether the measure is RCM or NRCM.

**Notes on high-level approach:**

When filling in Spreadsheet 1 for aggregate water bodies, under (2) (details of water bodies at risk and pressures affecting them-refer to description above) list the number of water bodies and the total length/area, accompanied by any clarifying comments in the provided cells. Objectives, pressures and measures should be filled in similarly to the detailed approach.

**Next steps**

Once you have completed this Spreadsheet, you should return to the summary guidance and a summary should be inserted into the AST.

### Purpose

Spreadsheet 2 assists with Step 1.3 by helping to define the “Gap” that is closed by the NRCMs in terms of the absolute changes expected in each key environmental parameter of interest. It does this in part by summarising the extent to which the NRCMs contribute to satisfaction of the objective through various environmental parameters. Furthermore, in order to assess the benefits it is first necessary to understand the type and extent of changes in the environment that will result from implementation of the measures.

At present, completion of the Spreadsheet requires drawing on WFD Annex V (quality elements and normative definitions of good ecological status) and on existing water body classification schemes. Where available, UKTAG guidance on standards should be used.

### How to complete Spreadsheet 2

Much of the information on this Spreadsheet should be sourced from the results of CEAs where conducted. However, there may be three different scenarios:

- i. Full CEA: Where the CEA has already excluded all the reference case measures, and has only identified the remaining outstanding gaps (The CEA information probably corresponds to the difference between statuses 3 and 4 below);
- ii. Partial CEA: Where the CEA excludes some or none of the Reference Case Measures, and the outstanding gap includes parameters dealt with by some or all of the Reference Case Measures (The CEA information may correspond to the difference between statuses 2 and 4 below);
- iii. No CEA: Where there are no agreed measures or gap analysis.

Care should be taken to ensure that you understand how the CEA deals with RCMs in your case, and that its outputs are used appropriately in Spreadsheet 2.

#### 1. *Water body status gap analysis (Rows 4-7)*

- First, identify the key quality element parameters that are affecting the quality and status of the water bodies, or are the ones at risk from deterioration (e.g. dissolved oxygen or nitrogen levels). Use the same specification for the parameters as those developed in the WFD classification system, which is based on the UKTAG standards. The WFD classification system was still in development at the time of writing, therefore temporary guidance for some types of parameters (and the different standards) can be found in **Appendix tables B1 to B4** for the main water body types. Appendix B.4 in particular highlights the relationship between existing standards guidance and the latest UKTAG standards guidance. In addition, Section 1.2 of Annex V of the WFD is a useful reference for what parameters to use.
- **Rows 2-11** ask about **four different potential statuses** that the water body could be in. These four statuses describe four different potential states of the water body, under different assumptions on whether the

RCMs & NRCMs are successful or not and whether future trends are included. They are:

- **Current status (i.e. status as it is today)**

Fill in the existing (i.e. current) status of relevant parameters.

- **Future status (2015) including effects of known background trends, and assuming no measures are implemented (or all measures are unsuccessful)**

If you expect the parameters to improve or worsen by 2015 as a result of background trends *even if no measures are implemented*, enter the expected value for these parameters in 2015.

It may be sufficient to simply state whether the WFD objective will be met or not. Insert “met”, “partially met” or “no change”.

- **Future status (2015) including effects of known background trends and assuming all RCMs are successful, but no NRCMs are implemented (or all NRCMs are unsuccessful)**

If there are RCMs that are expected to affect the value of the parameters in 2015, enter the expected parameter values in 2015 after allowing for the impact of RCMs (but not NRCMs). Assume that RCMs are definitely successful (i.e. ignore any uncertainty over the effectiveness of measures, as this is dealt with elsewhere).

In some cases, successful RCMs will result in the WFD objective being met, even without any NRCMs being implemented. In these cases status 3 will represent the status with WFD objectives, and this will be the same as status 4.

In other cases the RCMs will be aiming to reach a lower ecological standard than the NRCMs aim for, so status 3 will be lower than status 4.

Again, it may in some cases be sufficient to simply state whether the WFD objective will be met or not. Insert “met”, “partially met” or “no change”. In cases where there is high certainty that RCMs will be successful, any parameters which meet the WFD objectives in status 3 can be ignored from the rest of the assessment.

If there are no RCMs then simply copy in the values in status 2.

- **Future status (2015) assuming all RCMs & all NRCMs are successful. The WFD objectives are met (e.g. good ecological status).**

Enter the expected parameter values that will occur in 2015 if the WFD objectives are met (i.e. if the RCMs & NRCMs are successful. Ignore any uncertainty over the effectiveness of measures, as this is dealt with elsewhere).

If there are no NRCMs then simply copy in the values from status 3.

In cases where you are trying to maintain status (i.e. to prevent deterioration), the values in status 4 are likely to be the same as the values in status 1.

- For those parameters identified as still being relevant, first, where possible indicate the standard **unit of measurement** and the water body affected. For ecological parameters, refer to Section 1.2 of Annex V of the WFD.
- Then insert the details on the parameters for each set of columns where relevant.

Once this is done, you need to link each parameter to an **equivalent WFD status** and/or **equivalent previous class** (e.g. RE class). This is partly because it is necessary to link the benefits to fairly obvious environmental changes, as captured by the different RE classes. To do this, first look at Appendix B.4 to see whether the parameter is covered by the existing UKTAG standards or not. If it is, then refer to the UKTAG (January 2006) Phase 1 UK environmental standards and conditions report to match up the correct status. Even if it is covered by the UKTAG (January 2006) Phase 1 report, it will only highlight whether the parameter is “Good” or “High” water body status. It does not cover lower standards. If it is not yet “good”, then look in the same table in Appendix B.4 to see if it is covered by existing standards. Likewise, if the parameter is not covered at all by the UKTAG (January 2006) Phase 1 report, refer to the same table in Appendix B.4. Appendix B.4 will direct you to which Table in Appendix B the previous existing guidelines are covered.

- Note that for the EEA benefit assessment, which is described later for Spreadsheet 6, there is some reliance on linking the benefits to changes in River Ecosystem Classes (RE classes) and other such systems, such as the Scottish river and lochs classification systems (as detailed in Appendix B). Until the UKTAG standards are available, there will need to be continued reliance on this approach.
- You also need to identify the geographic scale (i.e. whole or part of a lake) and certainty (confidence you have) of the existing condition. For example, if the parameter varies considerably seasonally, give it a low (L) certainty status, whereas if it is fairly constant give it a high (H).

**The Gap:** The Gap describes either the ecological improvements that we are trying to obtain (if the objective is to Achieve GES) or the degradations we are trying to avoid (if the objective is to Maintain GES).

The preferred ecological changes should be linked to a change of “class” wherever possible. In some cases a wide range of ecological parameters will change, but most of these would be captured within a class change of (say) RE class 3 to 2 or class B to A2.

- Enter notes into Row 10 to describe what has been entered into each status and why.

## 2. *Likelihood that measures achieve their objectives (Rows 13-18)*

- It is possible that the NRCMs may not be fully effective. This can be an important factor in deciding whether to proceed with the NRCMs.
- It is also possible that the RCMs may not be fully effective. This affects the baseline against which you will compare the NRCMs.
- **Row 14: % likelihood that RCMs will achieve their objectives**  
Enter a percentage to represent the level of confidence you have that RCMs will be successful in meeting their objectives (i.e. that Status 3, as described above, will be reached). For example, if you think it is 50:50 whether they will succeed or not, enter 50% here.

Note that the Spreadsheet assumes that if RCMs are unsuccessful then they will achieve nothing at all i.e. the water body remains in status 2.

The default value is 100% (i.e. the RCMs will definitely be successful). If there are no RCMs then enter 0%.

- **Row 15: % likelihood that NRCMs will achieve their objectives**  
Enter a percentage to represent the level of confidence you have that NRCMs will be successful in meeting their objectives (i.e. that Status 4 will be reached). For example, if you think it is 50:50 whether they will succeed or not, enter 50% here.

This assessment may be determined from information in the CEA or it may need to be based on expert judgement.

The default value is again 100%. If there are no NRCMs, enter 0%.

This value will also feed into Spreadsheet 6 of the EEA

- Insert any key data sources and assumptions made into **Row 17**.

## 3. *Proportion of benefits that apply to the EEA (Rows 20-23)*

**Note: Only complete Rows 20-23 if you are completing Spreadsheet 6 of the EEA.**

- Spreadsheet 6 is used to determine the benefits associated with implementing the NRCMs. However, as many items of benefit information will be available for specifically defined statuses (e.g. for "Moderate Ecological Status"), it asks for information in those terms.
- As a result, "**the change in status valued in Spreadsheet 6**" is defined as the difference between the "Lower Status" and the "Target Status". Note that this is NOT the same as "The Gap"<sup>12</sup>:
  - "**Lower status**" refers to the lower quality of the two ecological statuses that you will measure benefits at in Spreadsheet 6. Select this in row 21:  
The default is Poor Ecological Status. However, this will depend on the objective being set (e.g. if the objective is "Maintain Good Ecological Potential", the Lower Status might be "Poor Ecological

<sup>12</sup> As noted previously, the Gap describes either the ecological improvements that we are trying to obtain (if the objective is to Achieve GES) or the degradations we are trying to avoid (if the objective is to Maintain GES).

Potential).

It also depends on what the baseline status (the status that is expected after RCMs are implemented) is; you should choose the highest status that is nevertheless lower than the baseline status. For example, if you expect the baseline status to be above Moderate Ecological Status, then row 20 might read "Moderate Ecological Status" and measurements in Spreadsheet 6 should start from this point.

- "Target status" refers to the status with the objective met. This is based on the overall objective you selected in Spreadsheet 1 and will be the higher quality of the two ecological statuses that you will measure benefits at in Spreadsheet 6. This is the same as status 4 in Spreadsheet 2.
- **Row 22** will then be automatically filled with a description of the change in status to be valued in Spreadsheet 6.
- The benefits associated with the change in status defined above will subsequently need to be adjusted in order to find the benefits associated with implementing the NRCMs. They will be multiplied by:
  - the likelihood of NRCMs achieving their objectives (this was entered into row 15)
  - the % of the change in status addressed by NRCMs (this will be entered into Row 24 – see below)
- **Row 24: The proportion of the change in status valued in Spreadsheet 6 that would be closed by successful NRCMs**

The default is 100%. However, it will often be appropriate to enter a value less than 100% and on occasion the correct value may be greater than 100% (if you expect to overshoot the target objective).

First determine the baseline status; this is described in cell Y5. Note that this allows for the likelihood of RCMs being successful.

Figure 4 shows what the % in row 24 represents, based on the following example:

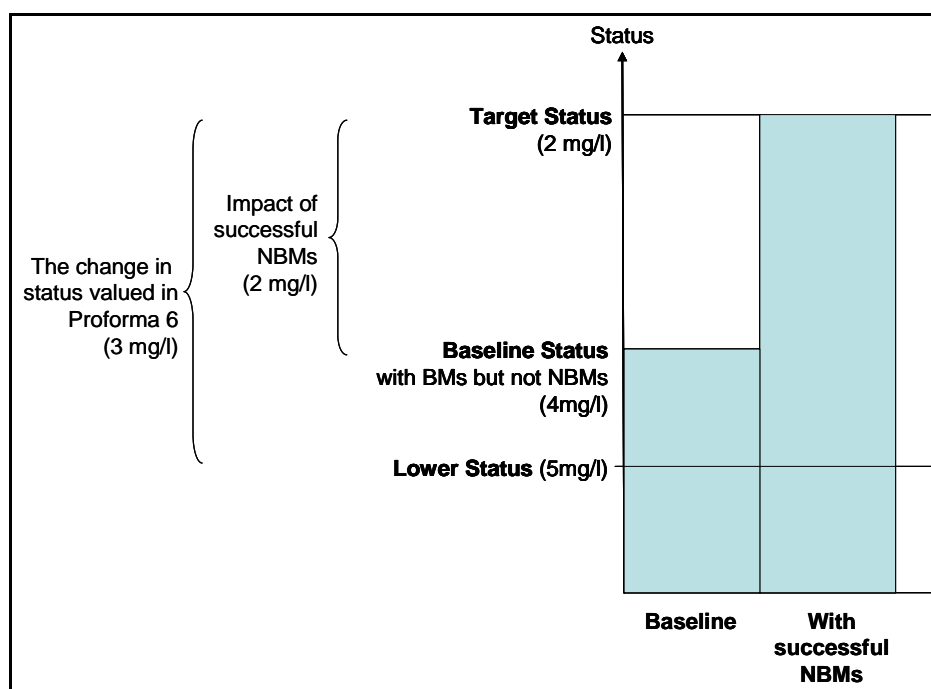
If Lower Status = Moderate Status = 5mg/l of a certain chemical, Target Status = GES = 2 mg/l, and the expected baseline status is 4mg/l, then:

- The change in status valued in Spreadsheet 6 is a movement from 5 mg/l to 2 mg/l;
- Successful NRCMs would take the concentration from 4mg/l to 2 mg/l;

The percentage that goes into Row 22 is:

$$(4 - 2) / (5 - 2) = 2 / 3 = 67\%.$$

**Figure 4: The proportion of the change in status valued in Spreadsheet 6 that would be closed by successful NRCMs**



**Note:** BM = RCM  
NBM = NRCM

- Note that in reality there will usually be several different parameters affected; you should choose a single % that applies to all parameters. This may be an average of the %s that would apply to each parameter individually.
- Note that this approach assumes that although the benefits are calculated in discrete changes (i.e. classes), for the purposes of the DCA it is assumed that the benefits can be interpolated between the classes (i.e. benefits are in fact continuous).
- An overshoot of the target objective could occur if you are assessing an "**alternative objective**" (e.g. if you first assessed the measures required to achieve GES, but discovered that these measures were DC; there may still be an improvement which is worth pursuing, and so you would then wish to test a reduced set of measures aiming at MES).

In reality the reduced set of measures you are testing may overshoot MES (so the water body ends up somewhere between MES & GES). In this case you would need to enter a % greater than 100%.

e.g. if Poor ES is 100mg/l, Moderate is 50mg/l, the baseline status is 100mg/l and the new set of NRCMs would reduce this to 30mg/l (overshooting the objective of Moderate): you would enter  $(100-30) / (100-50) = 70 / 50 = 140\%$ .

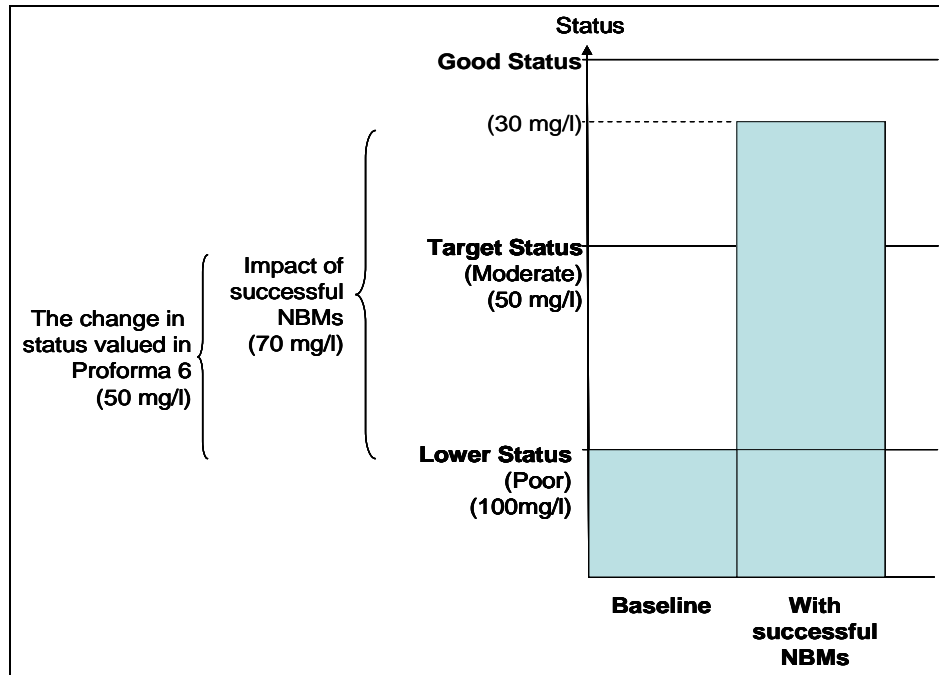
Figure 5 illustrates this example.

- You should insert a **best estimate** and **high and low estimates**; these allow you to take into account uncertainty over the state that the water body will be in after the RCMs are implemented (and therefore uncertainty over the amount of work that the NRCMs will have to do), through a simple sensitivity analysis. Note that *if RCMs are ineffective* then this would leave more work for the NRCMs to do, so this would

result in a *high* % being entered here – and vice versa.. This information is automatically used to adjust values in the AST.

- Insert any key data sources and assumptions made in **Row 25**.

**Figure 5: The proportion of the change in status valued in Spreadsheet 6 that would be closed by successful NRCMs: using an ALTERNATIVE OBJECTIVE**



**Note:** NBM = NRCM

**Notes on high-level approach:**

When filling in Spreadsheet 2 adopting a high-level approach, one will have to make an assumption as to an overall average value for each relevant environmental parameter affecting the water bodies.

**Next steps**

Once you have completed this Spreadsheet, you should return to the summary guidance and a summary should be inserted into the AST.

### Purpose

Spreadsheets 3a and 3b describe the cost of the measures, and can be used to help complete Step 2.1 and 2a.1. Only one of these Spreadsheets should be filled in, depending on the need:

- **3a** lists the total financial and economic cost of measures for EEA-related appraisals. It includes the bare minimum of information, summarised as totals only. 3a should be chosen if a summary of overall costs versus overall benefits will suffice, such as for an EEA analysis that focuses purely on economic efficiency criteria (though note that if the combination of measures is DC, you may need to consider them one by one in order to identify a revised combination).
- **3b** summarises the financial and economic cost of each measure separately, describing the sector and location of the costs. 3b can be used in cases where costs are needed on a per measure or Economic Interest Group basis, such as for distributional analysis (DA), or simply where measures need to initially be costed separately in order to obtain a total (e.g. in cases where there is no preceding CEA analysis to work with).

### How to complete Spreadsheet 3a

Most if not all of the information on this Spreadsheet should be sourced from the results of the CEA if done.

#### 1. *Standard assumptions (Rows 2-5)*

Only alter these assumptions if you have good reason for doing so. If you alter these in this Spreadsheet, ensure that you also alter them in Spreadsheet 3b.

#### 2. *Costs (Rows 8-13)*

- Enter the *total* costs found by the CEA, as *present values* (i.e. capital and operational costs summed over the length of their life, up to a maximum of 50 years and discounted to a present day value) not as annual costs.
- As explained earlier, for the purposes of this study, we will generally use financial costs for the adjusted financial costs.
- If details are known, to convert the financial values into adjusted financial costs, do the following: 1) exclude general taxation – this is a transfer to government/ taxpayers, 2) include subsidies (these are a cost to government/taxpayer, but not to the operator) and 3) exclude compensation payments (these are a cost to the operator but not a cost to society). It is recommended that you seek advice from an economist on this process.

## How to complete Spreadsheet 3b

Again, information on this Spreadsheet should be sourced from the results of the CEA. If relevant, the combination of measures inserted in Spreadsheet 1 will be transferred here automatically, but note that Reference Case Measures are not assessed further and should not be included in the costing!

### 1. *Standard assumptions (Rows 2-5)*

- See 3a. The Treasury declining discount rate (3.5% for 30 years then 3% to 75 years) is used to provide a set of annuity factors that cover different time periods and delays in costs being incurred. The Spreadsheet is set up for 50 years, and no changes are needed here.

### 2. *Financial costs (Rows 9-13)*

**Note that the full combination of measures is automatically transferred from Spreadsheet 1, but only NRCMs should be costed.**

- The measures are automatically pre-filled from the entries in sheet 1. Enter costs *for each measure*, as found by the CEA. Costs are split between non-recurring costs (e.g. one-off capital spending) and recurring costs (costs that incur every year e.g. salaries). Enter all costs as *present values* (not as annual costs). Tools A and B can be used to calculate present values (see Annexes Q-S “Additional Tools”).
- Also note down:
  - the **source** of the costs indicated (especially if this is not from the CEA)
  - the particular groups of society or **Economic Interest Group** that will incur costs (see Appendix H)
  - relevant comments related to the distribution of costs, for instance, based on income, gender, ethnic group, age, geographic location (e.g. inside/outside the relevant RBD) or disability (as recommended by the Treasury Green Book).

### 3. *Adjusted financial costs (Rows 19-23)*

Adjusted financial costs are derived from financial costs by considering the effects of transfers (e.g. taxes, compensation payments and subsidies), certain financial costs (e.g. depreciation), as well as cost savings. In consequence, the formulas in rows 19-23 will have to be adjusted according to the available data<sup>13</sup>.

#### **Notes on high-level approach:**

When filling in Spreadsheet 3 for a number of water bodies at an aggregated level, make sure to calculate costs for all of these and enter the total sum.

#### **Next steps**

Once you have completed this Spreadsheet, you should return to the summary guidance and follow instruction on what step to take next.

<sup>13</sup> Unless readily available information is available on transfer costs or depreciation etc, adjusted financial costs are generally assumed to be the same as financial costs. You should take this approach unless further guidance is provided on this.

### Purpose

This Spreadsheet can support AST Steps 2a.2, 2a.3 and 2a.4. It allows enhanced recording and evaluation of non-water related costs and benefits, water related costs and net wider economic impacts associated with NRCMs.

#### Note: The need for assessment of net costs and benefits

Note that assessment of costs and benefits should be on a “relative” basis not an “absolute” one. For instance, if a new forest area is created then the **impacts that would have occurred anyway** under the existing land use should be considered (i.e. you must consider the with WFD and without WFD scenarios). In this example, the forest will sequester more carbon than the agricultural land that was there previously, however, to get the net benefit, you must subtract (or take into account) the value of carbon that would have been sequestered by the agricultural land anyway to obtain the net impact.

### How to complete Spreadsheet 4

Spreadsheet 4 has been designed to accommodate information taken from the CEA in qualitative and/or quantitative terms. All of this cost information should be found in the CEA if one exists. However, if a quantitative or monetary analysis is needed but a CEA has not been undertaken, further effort will be required to obtain cost information.

#### 1. Non-water related benefits (Rows 2-9)

- Describe and evaluate any *positive* net side-effects of the measures, excluding those benefits that derive from improvements in the water body’s ecosystem.

For example, if the measures include establishing a new forest to reduce soil erosion into a lake, then any net welfare gains derived from the forest itself (recreational values etc.) relative to the former land use should be described and assessed in here.

#### 2. Non-water related costs (Rows 11-18)

- Similarly to above, describe and evaluate any *negative* net side-effects of the measures, excluding those related to changes in the water body’s ecosystem.

For example, if the forest in the example above would result in a loss of agricultural land, then assess the welfare implications of this here. However, one needs to be careful with respect to double-counting. For example, the cost of purchasing agricultural land is tied to the economic value of that land and should, therefore, be captured in the cost of the measure.

For wider economic impacts, unless it can be established that they are additional, it should be assumed they are distributional impacts only.

### **3. Water related costs (or disbenefits) (Rows 19-26)**

**Note:** Only fill these rows in once you have fully considered water related impacts from a benefits perspective (and potentially completed Spreadsheet 5 and/or sheet 6).

- This should record any water related environmental costs. This may be the case where there is a ban or restriction on recreational activities in order to meet the environmental objective, For example, if angling numbers are reduced due to a ban in angling competitions as a measure to combat invasive zebra mussels there will be a reduction in angler benefits.

### **4. Net wider economic impacts (Rows 29-36)**

**Note:** Only fill these rows in if you have had advice from an economist.

- This should record details relating to any net wider economic impacts. This may only include net economic efficiency impacts from loss of productivity, bankruptcy, sunk investment costs and unemployment.
- You should also consider completing Spreadsheets 8 and 9 to help determine the extent of business affordability issues and see Appendices D and F for further advice.

#### **Notes on high-level approach:**

Similarly to Spreadsheet 3, when adopting a high-level approach, ensure that the total impact or value for of each parameter for all water bodies is entered.

#### **Next steps**

Once you have completed this Spreadsheet, you should return to the main guidance and follow instruction on what step to take next.

### Purpose

This Spreadsheet can be used to help document and evaluate the nature and extent of **water-related benefits using qualitative and/or quantitative information**, thereby supporting AST Step 2a.3.

Water-related benefits (i.e. benefits that are generated through changes in water quality, flow or other quality elements) could be generated either directly as a result of the NRCMs themselves (e.g. through flow augmentation or emission treatments) or indirectly (e.g. creation of a wetland which leads to increases in fishery productivity).

The magnitude of **water related benefits** is assessed in terms of how they affect human welfare (they are hence part of a type of benefits called “welfare benefits” or “welfare values” if expressed as monetary values). These benefits are of relevance in an EEA since they are required when assessing the overall economic efficiency of the proposed measure or combination of measures.

For the above, this Spreadsheet enables you to provide basic **qualitative descriptions** of these benefits where relevant; and indicate whether the benefit is likely to be of **low, medium or high significance**. Relevant quantitative information can also be inserted.

This Spreadsheet asks you about the benefits of implementing the NRCMs specifically. Benefits from implementing RCMs are part of the baseline and should not be included here. In other words it asks you about the benefits obtained from closing “**The Gap**”, as described in column Y of Spreadsheet 2.

Recall that NRCMs can be beneficial in one or both of the following ways:

- *Through aiming for higher ecological objectives; and/or*
- *Through increasing the likelihood of achieving a given ecological objective.*

You should bear in mind both of these mechanisms when deciding upon the magnitude of the benefits.

### How to complete Spreadsheet 5

This Spreadsheet can only be filled out after Step 1.3 has been undertaken (which described the anticipated changes in the environment).

#### 1. List of benefit types (Columns A-C)

- These columns simply list the possible benefits that may be relevant, which includes 24 types of welfare benefit. For further information on the benefit types see **Appendix C1** for the “List of Benefits” and also **the database**.

#### 2. Would closing the Gap potentially affect this benefit? (Column D)

- Enter “Y” if this type of benefit may *potentially* be affected by the ecological changes described in AST Step 1.3 (or Spreadsheet 2).

For example, if the ecological changes would affect any commercial fisheries operating in this ecosystem, then answer “Y”, whether or not there are actually any commercial fisheries in the water body under consideration. This step is a quick way of screening out benefits that are not relevant for a given type of impact. Note that answering “Y” does *not* necessarily imply that this benefit type is relevant for this appraisal.

If you are unsure, enter “Maybe”.

### 3. **Actual relevance to this appraisal (Columns E-F)**

- Proceed to columns E & F for all benefit types with either “Y” or “Maybe” in column D. Column E asks a series of questions, which indicate whether the benefit type is actually relevant to this appraisal (are the relevant activities/uses actually present? would the ecological changes in Spreadsheet 2 affect these activities/uses?). Answer these questions in column F.

### 4. **Details of relevant benefit types (Columns G-O)**

- Proceed to columns G-O for all benefit types with a “yes” in column F:
  - **Column G:** Enter your justification for the “yes” in column F by providing readily available information on type, extent of use and how affected, including quantitative information. You should consider the actual context of the water body in question here when assessing the likely relevance of answers (e.g. what type of water is this and what effect would a change in water quality or flow have on its human uses?).
  - **Column H:** Enter a concise descriptive summary of benefits that would highlight / explain the relative significance of each. This is **OPTIONAL** as it can simply be done in the AST Box 2a instead. Refer also to Table 2 which lists potential indicators in the main guidelines.
  - **Column I:** Assess the likely relative significance of each benefit type (High, Medium or Low). The significance should be based on the guidance in Appendix C.3. It should also take account of access (i.e. if none of the waterbody is actually open to use, there are no recreational benefits, regardless of the quality change).

Recall that you are estimating the benefits that would be obtained from closing “**The Gap**”, as described in column Y of Spreadsheet 2. As outlined in Spreadsheet 2, NRCMs can be beneficial in one or both of the following ways:

- *Through aiming for higher ecological objectives; and/or*
- *Through increasing the likelihood of achieving a given ecological objective.*

You should bear in mind both of these mechanisms when deciding upon the magnitude of the benefits.

- **Column J:** Indicate the degree of confidence you have in this assessment (by recording a low/medium/high level of uncertainty).
- **Column K:** Where this is relevant, you may want to list the specific measure(s) that these benefits are associated with. If there is more than one relevant measure then describe the extent of effect from each one.

- **Column L:** Enter the delay in years after which a benefit will reach maximum. For example, if a groundwater improvement measure is implemented that will not have full effects for 10 years, insert 10. This is carried forward to Spreadsheet 6 which, if filled in, then automatically calculates benefits assuming that benefits accrue evenly over time (i.e. straight line increase) from nothing to 100% over ten years.
- **Column M:** Here you can describe uncertainty over the estimated time delay after which benefits will reach their full effect. For example some measures improving water quality may not give rise to noticeable improvements for recreation for several years, especially if they relate to groundwater pollution.
- **Column N:** Make other notes as required to help clarify any assumptions.
- **Column O:** If doing a DA, identify the Economic Interest Groups / operators affected.

#### **Notes on high level approach:**

When filling in Spreadsheet 5 for a number of water bodies at an aggregated level, you can use Tool C to help collate and display information if needed on a water body level. This should help capture relevant information and thus make the overall assessment more accountable. The information could be simply in terms of levels of significance or alternative qualitative or quantified data. See notes in Annex R on how to complete Tool C.

#### **Next steps**

You should return to the main guidance and follow instructions on what step to take next.

The guidance describes how you need to determine whether a DC decision can now be made based on qualitative evidence alone, or whether further quantitative and/or monetary evidence may be needed. The effort applied to obtaining further evidence should be proportionate to the outcomes at stake and the time available.

### Purpose

Spreadsheet 6 can be used to help collate and evaluate water-related welfare benefits in terms of monetary values, thereby supporting AST Step 2a.3. It can build upon the qualitative and quantitative information recorded in AST Step 2a.3 or the results of Spreadsheet 5 if used. Note that those benefits identified as significant in Spreadsheet 5 (if used) are automatically brought forward into Spreadsheet 6.

Note that Present Value and Equivalent Annual Value Benefits are calculated automatically in the “short AST calcs” and “long AST calcs” Spreadsheets. Data from these can be inserted into the ASTs as appropriate.

### How to complete Spreadsheet 6

Before completing Spreadsheet 6, note that:

- The Spreadsheet can be used to do a quantitative assessment alone, or for a full monetary assessment. For a **quantitative only assessment**, follow the instructions below, but only insert data in columns I-U for those rows marked with a Q in column F. For a **monetary assessment**, follow the instructions below.
- The aim should be to minimise the amount of inputs/time required wherever possible. For instance, when doing a monetary assessment, first quantify and monetise benefit types of **high significance**. Then check to see if benefits are already greater than costs by a sufficient margin. If they are, then the measures may not be DC and there may be no need to collect any further evidence. If costs are still higher than benefits, then continue completing Spreadsheet 6 for benefits of **medium significance** and finally of **low significance**, after each occasion checking again to see if the total benefits outweigh costs by a sufficient margin or not. Within this process, priority should also be given to assessing benefit types listed as being of low uncertainty.
- Data should only be entered in Spreadsheet 6 for benefit types with a L, M or H significance entry in column D (no data is required for benefit types where column D is blank as the benefit is not relevant to the DCA).
- Spreadsheet 6 is used to determine the benefits associated with **implementing the NRCMs**. However, as many items of benefit information will be available for specifically defined statuses (e.g. for “Moderate Ecological Status”), it asks for information in those terms.
- As a result, **“the change in status valued in Spreadsheet 6”** is defined as the difference between the “Lower Status” and the “Target Status”. Note that this is NOT the same as “The Gap” described in Spreadsheet 2:
  - **“Lower status”** refers to the lower quality of the two ecological statuses that you will measure benefits at in Spreadsheet 6. This is selected in Spreadsheet 2.
  - **“Target status”** refers to the status with the objective met. This is based on the overall objective you selected in Spreadsheet 1 and will

be the higher quality of the two ecological statuses that you will measure benefits at in Spreadsheet 6.

- **Row 1** will be automatically filled with a description of the change in status to be valued in your case (based on your entries into Spreadsheets 1 & 2).
- **Appendix D** provides more detailed guidance on how to obtain the data required for this Spreadsheet.

**The columns in Spreadsheet 6 are as follows:**

**1. List of benefit types and their significance (Columns A-E)**

- The same benefits types are shown as in Spreadsheet 5. The qualitative indication of the benefit's significance and the uncertainty linked to it is automatically filled in from Spreadsheet 5.

**2. Quantification of benefits (Columns F-L)**

- **Columns F-H** describe the data requirements needed for the benefit assessment; these inform you what to enter into columns K to M.
- **Column I** indicates whether sources of the information required may be available in the database.
- **Column J:** Document the source of the quantitative data you use for each item. In many cases the information source will come from the database. Other sources could include reports, web sites, personal communication etc.
- **Columns K-M:** Enter data into the cells in these columns based on the following principles:

**Low/Best-Estimate/High:** Having three columns allows scope to examine the sensitivity of results to different assumptions. In the Best Estimate column enter the most realistic assumptions. In the Low column, enter assumptions that will lead to the lowest benefit estimates. In the High column, enter those that will lead to the highest benefit estimates. If you wish, the latter two columns could be based on a simple multiplier of the best-estimate column (e.g. 50% and 200% of the medium value for the low and high respectively).

**Data sources:** Information on the quantities and prices can be obtained either from the database or from other sources. **Appendix D** gives more detail on where to source data from. The description of the benefit types (Appendix C1) may also be of assistance in understanding what is required.

**Units:** Care should be taken to ensure that data is entered in the correct units, as indicated in column H.

**Statuses:** Remember to enter values *as would apply in either the Lower Status or the Target Status*, as prompted. Note that the Lower Status is not necessarily the same as the current status of the water body; indeed, it could be either a better or a worse state than is presently the case. For example, if the Lower Status is "Poor Ecological Status"; for the "Average annual output in Lower status (kg/yr)" of "Commercial fishery products", you would need to predict *how much output would be produced if the water body were in Poor Ecological Status*.

- Note that for **water related benefits**, the data requirements generally break down into quantity related data (e.g. kg of product and numbers of

people) and value related data (e.g. market price of products and willingness to pay values of visitors and non-users). The quantity data cells in column F are highlighted with a Q (for quantity method) and the value data cells are highlighted using M (for monetary method). In most cases, there is only one quantity method and one monetary method. The only exception is for informal recreation benefits where there are two alternative methods of calculation to choose from depending largely on data availability. This is further explained in **Appendix D**.

### **3. Values for the benefits (Columns N-S)**

- These columns are the results of the quantification process; calculated from the data entered in columns K-M.

### **4. Other details (Columns T-W)**

- **Column T:** This column automatically indicates the time delay in years that the benefits are likely to arise, as estimated in Spreadsheet 5. This is then carried forward to the AST which automatically calculates a modified total benefit for the years in which the benefits accrue (up to a maximum of 50 years). Note that the discount factor adjustment used in the AST assumes a straight-line accumulation of benefits of time).
- **Column U:** Indicate the level of uncertainty that is related to the statement in the previous column.
- **Column V:** Enter any additional comments as required
- **Column U: If doing a distribution analysis,** then you may use this column to help identify and record the Economic Interest Groups that benefit.

**The benefit types in Spreadsheet 6 are as follows. Further explanation for calculating them can be found in Appendix D.**

### **5. Product related benefits**

- These benefits are quantified by multiplying the change in annual output of a given product by the price of one unit of that output. Adjustments are made if the ecological changes result in changes in either the price of the product or the cost of producing the product.
- Note that **output without the objective being met** refers to either i) the output in the current ecological situation (if the objective is to Achieve GES or equivalent) or ii) the output in the situation we are trying to avoid (if the objective is to Maintain GES or equivalent). Similarly, **output with the objective being met** is the output with GES or equivalent having been achieved, or the output with GES or equivalent being maintained.
- Note that the product value of angling can be included in recreational/subsistence fishery products, but that the enjoyment value should be recorded in the angling rows below.

### **6. Visit related benefits**

- These benefits are quantified by finding the change in consumer surplus if the ecological changes occur. These can occur in two ways, which are additive:
  - i) **changes in the number of people visiting:** the welfare benefit is the *change in the number of visitors* multiplied by the *total consumer surplus (CS) per visitor (for the target status)*. This is effectively the

amount of money people are willing to pay over and above what they have to pay, and reflects the overall enjoyment they gain from visiting the site.

The number of new visitors to the site needs to be estimated, based on discussion with experts.

Allowance is made for the fact that some of this change will be absorbed by displacement (e.g. where the extra visitors have moved from other sites within the area, so they are not genuinely “new visitors”). Insert an estimate of the percentage displacement. In absence of other information, use a default value of 50% assuming two other nearby sites. Factors to consider include how many other similar sites there are. The more there are the higher the percentage displacement used.

ii) **changes in the consumer surplus (willingness to pay) per visit:** the welfare benefit is the increase in CS (or willingness to pay for maintaining/improving the status) per visitor, multiplied by the total number of existing visitors.

- **Note:** Under **informal recreation**, there are two valuation options. **Please only complete one of these two options:**
  - i. Enter the number of visits and the value of visits *per individual, or*
  - ii. Enter the number of households, visits per household and the value of visits *per household.*

## **7. Other quantified items**

Other items have calculations that are specific to them:

- **Navigation:** Calculate time savings and reductions in accidents. It may be that you need to consider disruption to activities and changes in types of navigation that can be undertaken. If so, insert relevant quantified and monetary information.
- **Amenity:** This relates to the aggregate change in property values.
- **Flood & storm protection:** Calculate the value of reduced flood frequencies. Only a crude valuation approach is adopted here. If this issue is critical, then reference should be made to the various Defra Project Appraisal Guidance documents. This is more likely to be a cost of taking down a structure (hence assessed in the CEA) than a benefit.
- **Carbon sequestration:** Multiply the area of wetland created by the value of the carbon sequestration per unit area.

## **8. Benefits that should not or cannot not be monetised**

- Some of the other indirect benefits should not be monetised because they are the processes by which the other monetised benefits are delivered (i.e. water regulation; sustaining of wetlands; water purification; nutrient cycling; fish nursery/feeding function and habitat refuge / biodiversity support). For instance, where measures are likely to give rise to increased fish catches because improved water quality leads to increased provision of aquatic/wetland habitat for fish spawning, the relevant economic measure is fishery productivity. Where this can be calculated in monetary terms, a value can be entered into the fishery

productivity valuation. Where they cannot be monetised, an indication of the significance of this ecosystem services can be recorded separately. The key issue is not to record the benefit twice (i.e. avoid double counting).

### 9. Non-use values

- The general presumption is NOT to value non-use values unless an economist is involved and great care is taken to select an appropriate value for the benefit transfer. See the additional guidance on this in **Appendix D**.
- If it is to be valued, the general principle is to first calculate the size of the affected population (how many people live within a certain distance of the water body) and then to enter the increase in non-use values (measured through WTP). These items are multiplied together to give the total increase in welfare. Items such as “Increase in non-use WTP” and “Distance assumed relevant” can be obtained from the Benefits Assessment Guidance (BAG) / the database. This currently assumes that there are some transferable values for the waterbody type in question, which is not always true. Selection of the most appropriate one is needed, with justification given in the notes section (either column I or U).
- You are given two valuation options (M1 and M2); **only complete one of these two options** (as further explained in Appendix D). Either:
  - Enter a single value for “Increase in non-use WTP”; or
  - Enter a series of values for “Increase in non-use WTP”, showing how the value declines as distance from the water body increases. This approach is potentially more accurate, but is more complex and more data-intensive.

#### **Note: Use the Benefits Database and BAG data with care!**

An economist must be involved if non-use values are to be monetised. There are a lot of caveats attached to the assumptions in BAG, such as the distance bands used for aggregating values being rather arbitrary, based on 1 or 2 studies. Additional studies to enhance the confidence in non-use values are recommended elsewhere in this study.

#### **Notes on high-level approach:**

There are two possible approaches:

##### Aggregate values approach

This approach involves calculating aggregate values in Tool C across multiple common water bodies with common problems for each benefit. The aggregate values would then be pasted back into Spreadsheet 6 (by pasting over the formulas in column R, and for one off values, column O). Note that Tool C has been designed to accommodate best estimates only.

The process of aggregating values can be done at a range of levels of detail depending on the nature of the DCA, time and resource constraints, and accuracy/robustness requirements. Two possible options are given below:

1. A crude approach would be to generate ball-park estimates based on a large number of assumptions. To do this, refer to the types of data required to assess the value of each benefit from Column H, but calculate values outside of the Spreadsheets for each water body and then enter final aggregate totals into Tool C.
2. However, if a greater level of accuracy/robustness is needed, or if simply the complexity of the situation warrants it, conceivably Spreadsheet 6 could be copied into another separate workbook, once per water body, and values calculated individually for each before being aggregated back into Tool C.

However, clearly in complex situations the second options may take too long. The best approach may be somewhere in between these two options.

After pasting the aggregate best-estimate values into Spreadsheet 6, the low and high estimates could then be developed based on % adjustments of the best-estimate (this would also require overwriting the formulas in columns Q and S, and for one off values, N and P).

#### Aggregate quantitative data approach

The alternative is to develop aggregate estimates of the data needed to calculate the values in Spreadsheet 6 (these are listed in column H). For example, if there were 30 water bodies, estimates for the number of informal visitors (row 34) or angling visits for each water body may be needed in order to develop an overall total number of visits to insert in sheet 6.

This approach would have several advantages: calculations would be easier and possibly more accurate, no formulas have to be deleted etc. It would also mean that Tool C wouldn't be required, though the assumptions and calculations may need to be provided anyway.

Disadvantages are that it is more prescriptive as regards the required evidence (which could take too much time), though there is still scope for ball-park estimation of each parameter for all water bodies anyway.

Note that care must also be taken with this approach. For instance, visitor numbers are additive, but aggregate WTP values would need to be an average value that is multiplied by the total visitor number. For non-use values, the total number of households in the region could be inserted, and an average willingness to pay value for all the river improvements in the region could be included.

Care is also needed in selection of a suitable aggregated (or regional) willingness to pay value. For instance, if the value used relates to an individual water body only it can be multiplied by the number affected in the region. However, if it already relates to multiple water bodies it cannot be treated this way and may need to be adjusted based on the number of water bodies in each case (for example, for the River Mimram<sup>14</sup>, the WTP value was for improvements for all rivers affected by low flow problems in the Thames region). Note that values may also need to be adjusted based on the differing environmental goods and services or improvements to which they relate (part of the benefit transfer process).

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<sup>14</sup> JacobsGIBB Ltd. (2002). River Mimram public preferences study. Report produced for the UK Environment Agency, January 2002.

## Next steps

Use the relevant Equivalent Annual Value / Present Value of Benefits calculated in the “Short AST calcs” and “Long AST calcs” Spreadsheets to update the Short or Long AST, as appropriate.

You should then return to the main guidance and follow instructions on what step to take next. However, note that the guidance below describes how a DC decision may be judged based on the evidence presented so far. Some key considerations are as follows:

### Are measures DC?

**As noted earlier, it is beyond the scope of this guidance to recommend when costs might be disproportionate or not.** This is a subjective political decision. However, some potential considerations are:

The **cost benefit ratio** is a key indicator in the EEA analysis. If the value of the ratio is greater than one, benefits exceed costs, and if the value of the ratio is less than one, costs exceed benefits. A cost benefit ratio equal to one implies that costs and benefits are equal.

Note that the cost benefit ratio only considers monetised costs and benefits. The value of non-monetised costs and benefits should also be considered. In some cases these values may alter the outcome of the decision implied by the cost benefit ratio. If this is the case, a clear justification of why the non-monetised costs and benefits alter the decision should be documented (in Box 2 of the Appraisal Summary Table).

An additional indicator is the **Net Equivalent Annual Value** (NEAV). The NEAV represents the equivalent annual amount of cost (or benefit) that occurs as a result of implementing the proposed NRCMs.

**Other factors** may also be relevant including, for instance, the type and significance of environmental improvements gained or indicators such as the extent of improvements per unit cost (e.g. km of river improved per £1000 etc).

**Purpose**

Spreadsheet 7 can be used to help present evidence on and evaluate a range of distributional issues that may be of relevance to the DCA, in support of Step 2b.1 to 2b.4. It is concerned with who is causing the problem, who will pay<sup>15</sup> to address it and who will benefit from addressing it. It is NOT concerned with economic efficiency. However, it may help identify certain situations where wider economic impacts affect net economic efficiency. If this is the case, see Appendices D and F for further details and consult an economist.

Key distributional issues include:

- Any adverse consequences for vulnerable or disadvantaged social groups or sectors for which there are government objectives or concerns;
- The extent of any deviation from the Polluter Pays Principle (PPP):
- The affordability of the improvement for those who would have to pay, taking into account the characteristics of the economic sector concerned; and
- The scale of recent investment in environmental improvements already made by those who would have to pay

Where competition is affected, which may affect any of the above, use Spreadsheet 8 to undertake a competition assessment filter test.

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<sup>15</sup> Note that in this context “paying” might imply bearing financial costs or other incurring types of impact, e.g. losses of welfare through changes in consumer surplus (e.g. water and non-water costs) or job losses and reduced income etc (i.e. wider economic impacts).

## How to complete Spreadsheet 7

As in all other components of the DCA, this Spreadsheet should be completed based on the marginal effects of the WFD. Start with point one below:

### 1. ***Economic interest groups (EIG) / operators and comments relevant to distribution (columns A and B)***

- Enter the relevant “parties” in column A (insert/delete rows if necessary), but particularly focus on particular groups which have government objectives or concerns. Include **all** that:
  - contribute to the risk by either polluting or by not taking preventative action (e.g. local authority not addressing the risk of the introduction of an invasive species to a water body);
  - incur costs (e.g. by paying directly for measures, or indirectly via cost pass-through or tax increases, or by incurring wider economic impacts such as changes in expenditure-related income and/or changes in the number of jobs);
  - derive benefits from the improvements (e.g. water-related, such as enhanced recreation opportunities and enjoyment associated with improved water quality and ecology, non-water-related, such as improved recreation opportunities in other parts of the catchment as a result of land use changes, or wider positive economic impacts, such as the creation of jobs).

Parties should typically be described at the level of economic interest group (see Appendix H) or individual operator level as appropriate, though in theory the Spreadsheet will work equally well for parties described at any level.

- In column B, next to each economic interest group/operator insert any comments that are relevant to distribution, such as; the geographical location, the timing of positive / negative economic impacts, historical investment, income/disadvantaged status, deprived areas<sup>16</sup>, or whether the group is the target of any policy objectives, etc.

### 2. ***Contribution towards risk of failure to achieve WFD objectives (columns C and D)***

- **Brief summary of contribution to risk and significance (column C):** Insert information on the type of contribution of every EIG/ operator to the problem as well as the extent, using quantitative data where available (e.g. historical polluter, responsible for 30% of the risk). Note that the information inserted in column C is new and cannot be sourced from any of the previous steps of the DCA (but should come out of the CEA if undertaken)
- **Level of uncertainty regarding contribution to risk (column D):** Insert an estimate of low, moderate or high accordingly, with reference to the statements in column C.

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<sup>16</sup> See: <http://www.communities.gov.uk/communities/neighbourhoodrenewal/deprivation/deprivation07/>  
<http://new.wales.gov.uk/topics/statistics/theme/wimd2005/?lang=en>  
<http://www.scottishexecutive.gov.uk/Topics/Statistics/SIMD/Overview>

### 3. *Extent to which “paying” for risk being addressed (columns E-J)*

- **Share of costs of measures (columns E-F):** These columns present which EIGs/Operators pay for costs, described below. Note that these are not additive, but rather two different ways of looking at the cost allocation.
  - i. **Directly (column E):** This column captures the initial incidence of costs, i.e. it highlights which Economic Interest Groups / operators directly pay for the costs and to what extent. You should insert quantitative costs data (see Spreadsheet 3b) that will consist of the **adjusted financial cost** of measures (i.e. taking transfers, taxes, etc into account) but before pass-through.
  - ii. **Ultimately (column F):** This column indicates the end incidence of costs (i.e. after cost pass-through has been taken into account). You should explain the route through which the cost is transferred to the ultimately paying Economic Interest Group (i.e. through tax increases), using quantitative data where available.
- **Share of external costs (columns G-H):** External costs are environmental costs that may be related to measures and/or achieving objectives. These columns present the allocation of costs to each EIG/operator based on the distinction between water-related and non-water-related costs and draw upon the information in Spreadsheet 4.
- **Adverse wider economic impacts (column I):** If possible based on existing data, indicate any adverse wider economic impacts that an EIG/operator may incur, either directly (e.g. increased expenditure, reduced revenues, etc) or indirectly, in the area of operation (e.g. job losses, degeneration, etc).

However, if completing this Spreadsheet is not possible based on existing data or there is a lot of uncertainty surrounding these values, it is recommended that a more detailed analysis is performed using Spreadsheet 8 (which examines the range of ways in which economic impacts can arise and a competition assessment). The results of Spreadsheet 8 should then be entered back into Spreadsheet 7.

- **Level of uncertainty regarding extent / significance of costs / adverse impacts (column J):** Insert the level of uncertainty over the comments on all types of cost recorded in the columns E-I. This can be based on new or existing information (e.g. see Spreadsheets 3b, 4).

### 4. *Extent to which “benefiting” from risk being addressed (columns K-N)*

- **Water-related benefits (column K):** Insert any water related benefits per EIG/ operator (see Spreadsheet 5).
- **Non-water-related benefits (column L):** Insert any non-water related benefits per EIG/ operator (see Spreadsheet 4).
- **Positive wider economic impacts (column M):** Indicate any positive wider economic impacts that the EIG/ operator might receive either directly (e.g. reduced expenditure, increased revenues, etc) or indirectly, in the area of operation (e.g. jobs creation, regeneration, etc). This

should be filled in based on new data. However, as in the case of adverse wider economic impacts, if there is a lot of uncertainty surrounding these values you can move on to a more detailed analysis in Spreadsheet 8 (see below).

- **Level of uncertainty regarding extent / significance of benefits / positive impacts (column N):** Insert the level of uncertainty over the comments on all types of benefits recorded in the columns K-M. This can be based on new or existing information (e.g. see Spreadsheet 5).

#### **Notes on high-level approach:**

You should fill this Spreadsheet in based on the aggregate effects across all water bodies considered. Key considerations include:

1. Although the Economic Interest Groups / operators polluting, paying for and/or benefiting from improvements are likely to be similar in many cases across water bodies with common problems and solutions, this may not always be the case.
2. All potentially significant types of group / operator should be considered, including any that for instance, may only be relevant in one or a few water bodies. However, it may be appropriate to only summarise the most significant (e.g. those where PPP non-conformance is an issue or those that pay the largest share of costs or derive the largest share of benefit).
2. When considering the costs and benefits of measures, many assumptions will need to be made, details of which should be summarised at the bottom of the Spreadsheet.

Note again that all cost and benefit data should relate to non-reference case measures only (i.e. to ensure that only the marginal effects of the WFD are captured).

#### **Next steps**

After Spreadsheet 7 is completed to the extent that a DC decision can be made, you should return to the main guidance and fill the details into AST Box 2b.1 to 2b.4 as appropriate. Then follow instructions on what step to take next.

Note that the main guidance describes how you now need to determine whether a DC decision can be made based on the evidence presented so far or whether further evidence on wider economic impacts should be collected.

One approach that may help in making this decision is to begin identifying key issues by categorising each of the EIGs / operators into one of seven categories as shown in Table 6.

**Table 6 Categories of economic interest groups / operators with reference to compliance with the Polluter Pays Principle (PPP)**

Category of Economic Interest Group / Operator	Contributing to pollution / risk	Paying costs	Deriving Benefits
1	✓	X	X
2	X	✓	X
3	X	X	✓
4	✓	✓	X
5	X	✓	✓
6	✓	X	✓
7	✓	✓	✓

This process helps to identify whether any EIGs / operators might be associated with any of the key issues discussed in the previous section. For instance, it will be very obvious where a polluter falls into category 1 or 6 that they are not paying their fair share of costs (i.e. a deviation from the PPP). Similarly, those under category 2 are clearly paying more than their fair share (though this situation may not arise if a CEA has been undertaken first).

However, note that this approach is only a starting point as it will not assist in determining all of the issues where the relative share of pollution, costs and benefits is needed (e.g. 4, 5 and 7). This must be done by examining the quantitative and/or monetary data if available.

**Purpose**

Spreadsheet 8 can be used to record and assess the likely distribution of **wider economic impacts** per Economic Interest Group / operator in more detail (8a), and if “**competition**” is likely to be affected (8b). It is mainly used if more detailed information is needed to complete columns I and M in Spreadsheet 7 (i.e. positive and adverse wider economic impacts). Note that Spreadsheet 7 (and AST Box 2b) should be updated based on the outcome of completing Spreadsheet 8.

As noted in Table 1 of Annex B, wider economic impacts are generally measured through **changes in expenditure** in the local economy and the **number of jobs**. A range of other related effects are important but are considered to be captured under these parameters, for instance the opening or closure of businesses / operators (captured under jobs).

Changes in expenditure and jobs are considered to occur as a result of three main **causal factors**:

1. Increases or decreases in costs incurred by EIGs / operators;
2. Increases or decreases in revenues (i.e. incomes) of EIGs / operators; and
3. Associated regeneration or degeneration (i.e. the development or closure of areas of residential/industrial/commercial property).

**Note that this type of wider economic impact assessment should generally only be undertaken when it is likely that:**

- i) particular groups / sectors of society that the government has objectives or concerns for are likely to be affected; or**
- ii) significant transitional or regional impacts are caused** (e.g. if a large industry will close down in an isolated area and/or there is likely to be prolonged local unemployment). Generally speaking, effects on jobs or foreign trade are not normally relevant, since displaced workers will usually find other jobs.

Table 7 below explains how and when each of the causal factors could typically occur. Note that all three can generate positive and/or adverse impacts and can potentially arise as a result of the **implementation of measures** and/or **achieving WFD objectives**.

**Table 6 Types of wider economic impact, their causes and examples of when they might occur**

<b>Impact<sup>1</sup></b>	<b>Cause of impact on expenditure and/or jobs</b>	<b>Explanation of how impacts occur</b>	<b>Examples situations in which impacts might occur</b>
Adverse (i.e. reduced expenditure and/or job losses)	Increased capital / operating costs	Increased costs can reduce business viability, lead to job losses and reduced expenditure in the local economy. If expenditure goes down so does income for dependent businesses leading to further adverse secondary impacts.	Increased operating costs for a port which needs to pay for more expensive land based treatment of dredge spoil or capital costs for a water company that needs to install a new treatment plant.
	Reduced incomes / revenues	Reduced income for a business can reduce its viability, lead to job losses and reduced expenditure in the local economy. If expenditure goes down so do incomes for dependent businesses leading to further adverse secondary impacts.	Reduced income of a farmer that was required to lower livestock densities on his/her land or a maintenance contractor working on a coast defence scheme that is removed, or reduced income for a hotels/retail outlets through restriction of visitor access, permitted activities or sales of certain products.
	Associated degeneration (i.e. closure of areas of residential/industrial/commercial property)	Reduced investment in (expenditure on) in private/commercial property is an adverse economic impact itself, but also leads to reduced income and adverse secondary impacts for other dependent businesses.	Closure of a large manufacturing plant (and consequent job losses) that can no longer discharge into a water body because treatment is not technically feasible or affordable.
Positive (i.e. increased expenditure and/or job creation)	Reduced capital / operating costs	Reduced costs can enhance business viability, lead to job creation and increased expenditure in the local economy. If expenditure goes up so does income for dependent businesses leading to further positive secondary impacts	A water company incurring lower treatment costs due to reduction of nitrates in a river by other parties.
	Increased incomes / revenues	Increased income for a business can enhance its viability, lead to job creation and increased expenditure in the local economy. If expenditure goes up so does income for dependent businesses leading to further positive secondary impacts.	Increased income for a construction or contracting firm work on measures such as SUDS, farm silage storage, forestry expansion schemes, or increased income for a hotels/retail outlets through enhancement of water quality, wildlife populations or access facilities.
	Associated regeneration (i.e. opening new areas of residential/industrial/commercial property)	Increased investment in (expenditure on) in private/commercial property is a positive economic impact itself, but also leads to increased income and positive secondary impacts for other dependent businesses.	Development of water-front housing, shops and restaurants adjacent to improved urban water body.

*Note 1: These are the cause of the impact - the impacts themselves are measured in terms of reduced expenditure and/or jobs.*

## Competition Assessment

In addition, it is possible that competition may be significantly affected as a result of direct or indirect consequences of implementing NRCMs. If this is considered a possibility, then a competition filter assessment should be undertaken, by answering the Competition Filter Assessment questions in Spreadsheet 8b.

### How to complete Spreadsheet 8a - Effect on employment, incomes and product use:

#### 1. *Economic Interest Groups / operators affected (Column C)*

- Enter the name of any Economic Interest Groups / operators that are potentially affected (positively or adversely) as a result of one or more of the three causal factors. Add rows if needed to allow all EIGs / operators to be listed under relevant causal factors. Identify particular groups of society affected too.

#### 2. *Details of likely impacts per Economic Interest Group / operator (Columns E-Q)*

- **Column D:** Enter a concise descriptive summary of the impacts that will potentially affect the EIGs / operators noted in 1 above.

Note that in some cases, more evidence may be needed to do this. Where impacts are likely to arise as a result of **increased WFD-related costs**, a more detailed analysis of affordability is recommended using Spreadsheet 9, after which Spreadsheet 7 (and potentially 8) can be updated.

Where impacts arise as a result of **reduced revenues or degeneration**, a separate analysis of these impacts should be carried out externally to these Spreadsheets and the results summarised here in Spreadsheet 8. Some extreme cases may require sophisticated methods such as input-output tables, farm models or a general equilibrium model.

- **Column E:** This is one of the most important columns. Note here how any disadvantaged group or community may be affected. This should include those with government objectives or concerns, such as those living in designated regeneration areas or deprived areas (e.g. within the bottom 20% of the index of multiple deprivation or equivalent), the old, poor, disabled, women, ethnic minorities etc.
- **Both direct effects** (e.g. employees) and indirect effects (e.g. supplier employees and users of products affected) should be considered.
- **Column F:** Indicate the likely relative significance of impact using a Low/Medium/High score. In particular, this should consider the extent to which disadvantaged people are affected. Note that Spreadsheet 9 can be used to help assess and document relevant business affordability issues.
- **Column G:** Indicate the degree of confidence you have in this assessment (by recording a low/medium/high level of uncertainty).
- **Columns H-J:** Enter the low, best and high estimates for the expected change in number of jobs, positive or negative, should this occur. Note that Spreadsheet 9 can be used to help assess and document relevant business affordability issues.

- **Columns K-M:** Enter the estimated magnitude of the change in expenditure in local economy, should this occur (indicate whether low/best estimate/high). Note that Spreadsheet 9 can be used to help assess and document relevant business affordability issues.
- **Column N:** Indicate whether the expected impact (positive or negative) is associated with one or more particular measures. This is optional and will only be relevant in some circumstances.
- **Column O:** Enter the delay in years after which impact will reach maximum.
- **Column P:** Here you can describe uncertainty over time delay.
- **Column Q:** Make other notes as required to help clarify any assumptions.

#### **How to complete Spreadsheet 8b – Competition Filter Assessment:**

- **Column C:** Insert ‘yes’ or ‘no’ in response to each of the questions.
- **Column D:** If considered appropriate, provide brief supporting details to each question.

Once you have finished, if the answer is ‘yes’ to one of the questions, then a more detailed competition assessment may be warranted. If this is the case, follow the guidance in the Office for Fair Trading (2007) Guidelines for Competition Assessment<sup>17</sup> and consult an economist. If it is possible to predict the potential impacts on any EIG or operator, then insert any relevant details in Spreadsheet 8a.

#### **Next steps**

After Spreadsheet 8a and b have been filled in to the extent considered necessary, this information should be used to update or complete Spreadsheet 7 and then AST Box 2b as appropriate.

After this you should return to the main guidance and follow instructions on what step to take next. The guidance describes how you now need to determine whether a DC decision can be made based on the evidence presented so far or whether further evidence on affordability to industry should be collected. Some key considerations are as follows:

#### **Are measures DC or not, or is more evidence on affordability to industry needed?**

Costs could be disproportionate or not for similar reasons as highlighted in Annex J.

Where there are issues of affordability to businesses, further assessment and evidence may be needed to assess the adverse wider economic impacts. Under such circumstances, a more detailed analysis of affordability can be undertaken using Spreadsheet 9, after which Spreadsheet 7 (and potentially 8) should be updated.

<sup>17</sup> Completing Competition Assessment in Impact Assessments – Guideline for policy makers  
[http://www.offt.gov.uk/advice\\_and\\_resources/resource\\_base/guidelines/](http://www.offt.gov.uk/advice_and_resources/resource_base/guidelines/)

### Purpose

Spreadsheet 9 is available for use to assess and document business affordability issues quantitatively to help feed into the **wider economic impact assessment** Spreadsheets 7 and 8 (and hence AST Box 2b).

**Note that this Spreadsheet is only required where detailed quantitative/monetary information is necessary to assess the affordability (in extremely rare cases). Where an assessment can be done more intuitively or qualitatively then Spreadsheet 8 should suffice.**

The process compares key financial data (e.g. company turnover, gross profit and net profit levels) and estimated costs of measures to determine whether the resultant increased costs to the company is 'affordable' and what the effects might be (e.g. job losses, reduced business viability, reduction in expenditures in the local economy etc). **If undertaken, this analysis should be undertaken by, or overseen by an economist. Further details and explanations can be found in Appendix F.**

This Spreadsheet should only be used if Spreadsheets 7 or 8 highlight that significant adverse impacts may result from increased costs affecting businesses, and that these warrant further collection of evidence. Like Spreadsheet 8, information collected in it is used to complete and support information in Spreadsheet 7.

The guidance does not explicitly describe the evidence needed on impacts to industry arising from **reduced revenues or degeneration** (the other two causal factors considered to lead to wider economic impacts)<sup>18</sup>.

This Spreadsheet is concerned with **financial costs** only (not adjusted financial costs or other costs of relevance to efficiency analysis). It requires you to obtain company/business specific financial data from the stakeholders themselves<sup>19</sup>. In the absence of such information, 'typical' figures or averages for the sector could be used, but they will be less reliable than company specific data.

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<sup>18</sup> Where more evidence is needed in this regard, a separate analysis should be carried out externally to these Spreadsheets and the results summarised back in Spreadsheet 8. Some cases may require more sophisticated methods such as input-output tables, farm models or a general equilibrium model.

<sup>19</sup> Note that it is assumed that issues concerning affordability have arisen due to explicit concerns expressed by stakeholders.

**Note: Dealing with situations where data required is commercially confidential!**

Where an operator faces an obligation to invest in a NRCM, it will be in their interests to provide information concerning potential affordability. They should be requested to provide whatever information they can in support of their case that is inserted here, or that can be provided in a statement to support the accompanying AST.

Should the information not be sufficient, it may be that a confidential statement is requested by the SoS to help in his assessment of the DC decision.

Note that you will need also to consider what aspects of a private sector company's operations are relevant to the DCA. Some of the companies that will be affected are likely to have operations on more than one site. In these cases, it may be best to assume that the site is a single 'business unit' or part of a 'business unit' which has its own targets in terms of turnover and profitability (consultation with the stakeholder should confirm which is the most appropriate). In other cases, a measure may affect only one of several production activities (e.g. one aspect of a farm's mix of activities). Here it may be appropriate to consider production activity on its own and then in the light of its contribution to the overall viability of the farm.

The issue of the water utilities is more complex as individual sites will not operate as 'business' or production units in the same manner. These companies may treat operations over a large number of sites as a 'unit'; furthermore, the concepts of turnover and profits have less relevance due to the framework under which they are regulated. For these companies, it may be more important to examine how a measure will impact on opex (operating expenditure) and capex (capital expenditure) separately. Changes in opex will have a greater impact on their operating profits and cash flows than will changes in capex. In the latter case, impacts on leverage (levels of and returns to borrowing) and gearing may be important. (See Appendix F for details on terminology)

These forms of analyses are not really relevant to measures that would need to be implemented by public sector bodies. In these cases, it would be more appropriate to consider the costs of the proposed measures in the context of the body's annual average opex and capex.

## How to complete Spreadsheet 9

### 1. Economic Interest Groups / operators affected (Column A)

- Enter the name of any economic interest groups / operators that are expected to incur additional costs. Add new groups of rows if needed to allow all relevant EIGs / operators to be listed (i.e. copy rows 20-27 and paste in below retaining formulas).

### 2. Quantification of data related to affordability (Columns B-F)

- **Column B** highlights the data requirements needed for the impact assessment which are the basis for filling in columns D-F. A brief outline on each is given below:

- **Equivalent annual costs (EAC) of measures:** this information should be taken from Spreadsheet 3a/3b, and converting from Present Values if necessary. Note it is beyond the scope of this guidance to provide instructions on how to do this, though see the Glossary for brief definitions.

**Typical cost pass-through:** indicate the % of costs incurred that could be passed on to other economic interest groups. Where available, an accompanying indication of any price elasticity of demand relevant to the goods or services of concern should be described in the notes section at the bottom of the Spreadsheet. Those stakeholders who would be affected by any increase in price should also be identified; for example, is it another industry sector, professional users of a good, the public sector, retailers, or the end consumer.

Pass through can be gauged by talking to the sectors themselves, although some additional advice is also given in **Appendix F**. Note also that a preliminary assessment of cost pass through should also have been developed as part of the CEA and this should be referred to here.

- **Actual EAC incurred by EIG / operator after cost pass-through:** calculation automatically based on EAC and % cost pass-through. This reflects the net increase in costs incurred.
- **Typical annual pre-tax profits and annual revenues:** These should be expressed in terms of a range, for example, £10 million +/- 10% over the last five years. In completing this information you should indicate whether you are reporting gross or net profits; net profits would be preferable to gross profits.
- **Ratio of EAC after pass through to annual pre-tax profits and revenues:** This is calculated automatically based on % cost pass-through to profit/revenue figures.

Where the ratio of the costs after pass through to net profits is high, then it may not be possible for the company to absorb these; this is because the return on its investment may become too low for it to remain viable or financially worthwhile. The ratio of EAC to pre-tax profit levels is most relevant in situations where demand is elastic and compliance costs have to be absorbed by industry.

The likely ratio to annual revenues provides an alternative indicator of the degree to which a company may be able to absorb a change in costs, by indicating its magnitude in relation to the overall value of the production activities of concern. The ratio is most relevant in situations where demand is inelastic and price increases can be passed on to customers.

Both ratios should be considered. Making a judgement on the ratio of EAC to turnover alone can be misleading as a company with a high turnover may also make very low net profits, and vice versa. For these reasons, there may be value in comparing information for a single company or business unit with sector averages. This can help indicate whether a company is performing well or not in comparison to its competitors, which should also indicate the degree to which it can absorb costs and remain competitive.

- **Other factors affecting affordability:** Describe anything else that might be relevant in assessing the impact on this economic interest group (e.g. scale of recent investment in environmental improvements, demand growth rates for the sector; dynamics in terms of product development and product life-cycles; information on relative competitiveness of the sector, nationally and internationally; gearing; leverage position, ability to shift into alternative incomes/enterprises etc).

- **Column C** indicates sources of information used to collect the evidence.
- **Columns K-M:** Enter data into the cells in these columns based on the following principles:

**Low/Best-Estimate/High:** Having three columns allows scope to examine the sensitivity of results to different assumptions. In the Best Estimate column enter the most realistic assumptions. In the Low column, enter assumptions that will lead to the lowest impact estimates. In the High column, enter those that will lead to the highest impact estimates. The latter two columns could be based on a simple multiplier of the medium column (e.g. 50% and 200% of the medium value for the low and high respectively).

**Data sources:** It is expected that most of this information will need to be collected in consultation with the industry bodies themselves. **Appendix F** gives more detail on where to source data from.

**Units:** Care should be taken to ensure that data is entered in the correct units, as indicated in column B.

- **Column G** allows you to summarize the likely effects on affordability and business viability as a result of the quantities in columns D to F.
- **Columns H-J and K-M** allow you to estimate, respectively, the number of job losses and the reduction in expenditure by EIG / operator in local economy as a result of the information entered in column G. Job losses should be expressed as Full Time Equivalent (FTE) positions.
- **Column N** is used to record any other impacts, including for instance: closure of companies or site operations, effects on gearing and competitiveness etc. It might also be important to note the relative

importance of the sector/operators impacted, if any. Appendix F provides further advice on issues to consider.

**Note: other additional analyses may be required**

Note that in some instances further analysis may be required in order to identify likely affordability and impacts. These should be recorded outside of the Spreadsheets and referenced in the notes at the bottom of the relevant Spreadsheet. Examples of additional analyses include:

- **Cash flow analysis.** Where the ratios of EA costs to turnover and to net profits suggest that a proposed measure may create financial difficulties for a company, it may be worthwhile to prepare a more detailed cash flow analysis of the impacts of the proposed measure. This would then allow examination of changes in net profit margins, which will enable a more informed assessment of the implications.
- **Contribution analysis.** Where a particular business unit or production activity (i.e. a single product line) would be affected by the measure, then a contribution analysis may be appropriate. Where a measure would affect the viability of a good or service (or business unit) that has a high contribution margin compared to other company products, then this suggests that the increase in costs could make the continued operation of the company as whole unviable.

- **Column O** summarises other relevant comments/information (e.g. related to benefit significance estimates, assumptions, uncertainty and distribution).

**Outputs & next steps**

After completing Spreadsheet 9, you should use this information to update or complete Spreadsheet 8 and then 7. After this you should return to the main guidance and complete AST Box 2b. Then follow instructions there as to what step to take next.

**Purpose**

Spreadsheet 10 can be used to help assess whether an extended deadline is appropriate and provide supporting documented evidence for Step 3.1 of the AST. Note that potentially valid arguments for an extended deadline are set out in the main guidance.

**How to complete Spreadsheet 10**

Start by answering question 1 in column D. Now complete the remaining questions according to the instructions in columns E and F, which may or may not suggest you complete Spreadsheet 11.

**Next steps**

After completing Spreadsheet 10 (and 11), return to the main guidance and follow instructions on what steps to take next.

**Purpose**

Spreadsheet 11 allows you to present the results of a qualitative, quantitative or monetary analysis to explore whether an extended deadline is appropriate and to what planning cycle year.

**How to complete Spreadsheet 11**

Complete the relevant cost and benefit columns for each year in turn, inserting a conclusion as to whether the costs are likely to outweigh the benefits or not. Note that very few cases will allow a monetary assessment of benefits (other than as cost savings). The value of benefits forgone is likely to only be worth valuing where reasonably robust non-use values are used.

The precise nature of the assessment may vary from one situation to another, so there is flexibility in terms of how the columns are filled in.

It should be made clear how costs for achieving the NRCMs change over the years if that is the case.

There may be situations where delaying measures has a less severe distributional impact (cost) upon particular groups which could be used to argue for a deadline extension.

**Next steps**

You should now return to the main guidance and follow instructions on what steps to take next.

### Purpose

There are three AST Calculation Spreadsheets as follows:

**Short AST Calcs:** This Spreadsheet automatically calculates relevant 'total' PVCs, PVBs (and their Equivalent Annual Values), NPVs, Net Equivalent Annual Values (NEAVs) and CBRs using any cost and benefit Spreadsheets that have been filled in. PVCs and PVBs are converted automatically into their Equivalent Annual Values. These values and the relevant CBR can be inserted into the Short AST.

**Long AST Calcs:** This Spreadsheet automatically calculates individual PVCs and PVBs and their EAVs using any cost and benefit Spreadsheets that have been filled in. These calculations take into account the quantitative assessments of uncertainty, thereby generating high estimate, best estimate and low estimate values. These values can be inserted in, or used to inform, the Long AST.

**NRCM – EIG Calcs:** This Spreadsheet can be used to calculate PVCs, EACs, PVBs, EABs, NPVs, NEAVs and CBRs associated with specific NRCMs, EIGs or operators. Measures and their associated costs and benefits need to be inserted where appropriate, drawing upon data from relevant Spreadsheets (where filled in). Note that Tool D can be used to assist with this.

**Purpose**

These Spreadsheet Tools have been included to assist with calculating the present value (PV) of costs and benefits where needed. This tool will be useful **for assessing complex streams of costs and/or benefits, where the amount changes over time.**

**How to use Tools A & B**

You input the projected costs / benefits in each year into Tool A.. Tool B then automatically calculates the discounted value of these payments . You should not enter anything into Tool B. Additional columns should be copied into both Tool A and B as appropriate if further calculations are needed.

**Next steps**

Tool B shows the PV and Equivalent Annual Values of the cost and benefit streams. Results can be directly entered into Spreadsheet or ASTs as appropriate.

## Annex Q Tool C: Significance and values of benefits for multiple water bodies

### Purpose

This Spreadsheet Tool can be used to help assess the significance and/or value of benefits for multiple water bodies with common problems when a high-level DCA approach is used.

### How to use tool C

The purpose of the tool is twofold and it can be used to help when:

- (a) developing significance estimates for each benefit across aggregate water bodies for use in Spreadsheet 5 (**use rows 2-27**)
- (b) aggregating benefit values across multiple water bodies for use in Spreadsheet 6 (**use rows 29-54**)

Also see the notes on the high-level approach under Spreadsheets 5 and 6 when assessing whether to use Tool C.

In both cases, the following apply:

- **Benefit type (columns A-C)**  
A list of the benefit types as they have appeared in the previous Spreadsheets.
- **Significance / value of benefit per water body (columns D-H)**  
Enter an estimate of significance or value of the benefit listed in the previous columns (as appropriate) for every water body (columns should be added depending on the number of water bodies assessed).
- **Overall significance / value for all water bodies (column I)**  
Indicate the overall level of significance or total value of a specific benefit across water bodies (L/M/H). For significance estimates, this must be a subjective answer based on your judgement, whereas for values, this is done automatically
- **Level of uncertainty in significance / value estimate (column J)**  
You should record the level of uncertainty attributed to the statement in the previous column.

### Next steps

This Spreadsheet summarises the aggregate significance and/or value of benefits across multiple water bodies. The results should be entered used to update Spreadsheet 5 (significance estimates) and / or Spreadsheet 6 (value estimates).

**Purpose**

This Spreadsheet Tool can be used if there is a need to apportion benefits by NRCM, economic interest group, or operator. It links directly with Spreadsheet 'NRCM-EIG Calcs'.

**How to use tool D**

This Spreadsheet is divided in two parts:

**1. Value of benefits generated by measure (Rows 29-33)**

- **Column A, rows 29-33:** Enter the measure reference number (see Spreadsheet 1). Add/delete rows as necessary.
- **Column B&C, rows 29-33:** Enter the EIG/operator paying for the measure (see Spreadsheet 3b)
- **Column D, rows 29-33:** These cells are filled in automatically based on the inputs in the second part of tool D (see details below).

**2. Percentage of benefits generated by measure (Rows 4-27)**

- **Columns A-C, rows 4-27:** A list of benefit types, as they have appeared in the previous Spreadsheets.
- **Column D, rows 4-27:** The PV in monetary terms is transferred from Spreadsheet 6 for every benefit type.
- **Columns E-I, rows 4-27:** Insert the proportion of benefits generated by each measure. Again, add or delete columns depending on the number of measures considered.
- **Column J, rows 4-27:** Calculates the total percentage of benefits generated by each measure (this serves as a useful check, it should add up to 100%).
- **Column K, rows 4-27:** Indicate the level of uncertainty surrounding the percentage estimates.

**Outputs & next steps**

Results from Tool D automatically update Spreadsheet 'NRCM-EIG Calcs'. This information can then be used in an AST where the assessment is being done for the measure, EIG or operator.