

Integrated Appraisal of the Environment Agency's Water Quality Policies: Role of the FWR Manual: Executive Summary

This report presents the Environment Agency's draft integrated appraisal so as to set efficient Water Quality Objectives that can be increasingly tightened over time so as to achieve the long run target set in the EC's Water Quality Framework Directive of achieving good quality status of water bodies. At the same time, the Agency has to ensure that the objectives can be well achieved in practice so as to meet DETR's target (in the Comprehensive Spending Review) of raising compliance rates with these objectives.

This integrated appraisal framework comprises the following ten linked steps:

1. Set out the aims and objectives of the policy and identify the options.
2. Identify binding legal constraints from EC and DETR for the Agency (eg Habitats Directive, Water Quality Framework Directive) and extent of any discretion for the Agency (eg on timing). If there are binding legal constraints (from DETR or the EC) on the Agency, then the Agency can only use cost-effectiveness analysis to determine how to comply with these requirements at the least cost. The Agency would not apply economic appraisal or CBA to assess the benefits of complying.
3. Stakeholder analysis to identify the main impacts and aspects of concern to major stakeholders¹ affected by changes in water quality policies. This should include not only the main groups affected but also members of the public to ensure that the appraisal covers the concerns of all affected parties so as to enhance their participation and 'buy in' to the appraisal process and the ultimate decision supported by its findings.
4. Assess the technical feasibility and practicability of the options.
5. Broad brush approximate assessment of the costs and economic and social impacts of the options. This step should build on the technical analysis (in step 4).
6. Assessment of the environmental benefits. This should include the following linked steps:
 - A. Scientific assessment of the impacts in quantitative terms (eg numbers of cases of the impacts arising) and a qualitative description of their nature and significance. This should provide the fundamental basis for the monetary valuation of these

¹ The term stakeholder here is given to mean anyone with an interest in or who will be impacted by the benefits in question. It is partly used in order to avoid the term "the public" as this is considered to provide the impression of homogeneity amongst citizens, which has a detrimental effect when trying to characterise opinions and values. However, it is recognised that others have used the term "stakeholder" specifically to mean those people who represent certain groups with an organised interest in the decision (e.g. Royal Commission on Environmental Pollution (1998) Setting Environmental Standards). In this paper, it is intended to encompass a wider group.

impacts (in B and C below) which needs to allow for the prevailing uncertainties concerning the scientific assessment;

- B. Monetary valuation of those impacts, for which such valuations are considered valid and robust in terms of meeting criteria such as:
- The adequacy of the scientific and technical information (from (A)) and the links between the scientific assessments and the economic analysis;
 - the availability of data to derive a monetary valuation;
 - the adequacy of the economic valuation methods; and
 - the acceptability of the economic valuations to the stakeholders (from step 1) and decision-makers with whom these valuations need to be presented and discussed in the public consultation in Step 8 (see below).
- C. Quantitative information and a qualitative description of the nature and significance of the intangible environmental benefit categories for which robust monetary valuations are not feasible but which can nonetheless still be very important for the affected parties.
7. An overall assessment of the costs and environmental impacts of the options in terms of a partial CBA of costs of the options compared with the partial monetised benefits and with the nature and significance of the unquantifiable impacts identified and set out in qualitative terms. If the partial monetised benefits exceed the costs, then that indicates the preferred option. This analysis should seek better options, which achieve greater environmental benefits at a lower cost.
 8. A facilitated discussion with a stakeholder group of say 10 – 15 key affected parties to discuss and refine further the options. Where this group are unable to resolve conflicts about contentious options involving conflicting trade offs, then further in-depth analysis will be needed in the following two steps.
 9. Further scrutiny of the estimates of the costs and economic impacts of the options. In particular, this should check for double counting and over-estimation of the costs.
 10. The stakeholder group (in the facilitated discussion in Step 8) will inevitably be just a small group that may not represent well all the affected parties. Therefore it may be necessary to carry out a contingent ranking or rating survey of wider sample of the affected people. This should be carefully designed to give an empirical assessment of their views on either the outstanding trade offs for the contentious options or the relative importance of the non-monetisable benefits compared with the monetisable benefits and (refined) cost estimates for the contentious options. This should be used to help decision-making on these options.

Integrated Appraisal of the Environment Agency's Water Quality Policies: Role of the FWR Manual

Aim and Objectives of the Paper

This paper aims to set out a draft methodology for the Environment Agency's integrated appraisal of its decisions on Water Quality policies - as set out in Ashley Holt (WQ)'s presentation of the Agency's Water Quality Planning Process.

The objectives of this paper are to show the various linked stages in this appraisal process and to show what specific information is needed at each stage and how it relates to other information from other appraisal techniques. In particular, the paper focuses on showing how the information from the Foundation for Water Research (FWR) manual could be used to aid and inform the determination and application of the Agency's decisions on water quality.

Scope of the Paper

The paper focuses on the Agency's determination and possibly upgrading of Water Quality Objectives (WQOs) and to a lesser extent on planning to reduce risk of non-compliance with the WQOs since the FWR is most likely to be applicable to the appraisals needed for these decisions. The paper does not consider the nationally consistent appraisals needed for the assessment of the environmental benefits of the various environmental improvement measures in the water industry's Asset Management Plans, which would be a separate process although it might yield the information that could input into the integrated appraisals.

Key Principles for an Integrated Appraisal

The key principles for an integrated appraisal are that:

- It must effectively link together the various appraisal techniques and processes;
- no single appraisal technique should be predominant;
- the appraisal must be able to be applied rigorously and consistently to various different schemes across the country while allowing appropriately for differences in their circumstances and the values placed by affected parties on the impacts;
- There must be rigorous specification of the costs and benefits covered so that no impact is omitted or inadequately covered while at the same time ensuring that there is clarity as to what is covered by each category and that there is no double counting.

The Proposed Integrated Appraisal Methodology

Figure 1 outlines the main stages involved in an integrated appraisal of the Agency's decisions on water quality programmes and policies and highlights the role of economic appraisal (including benefits assessment using the FWR manual) alongside the other techniques in such appraisals.

FIGURE 1: ROLE OF ECONOMIC APPRAISAL IN INTEGRATED OPTIONS APPRAISAL

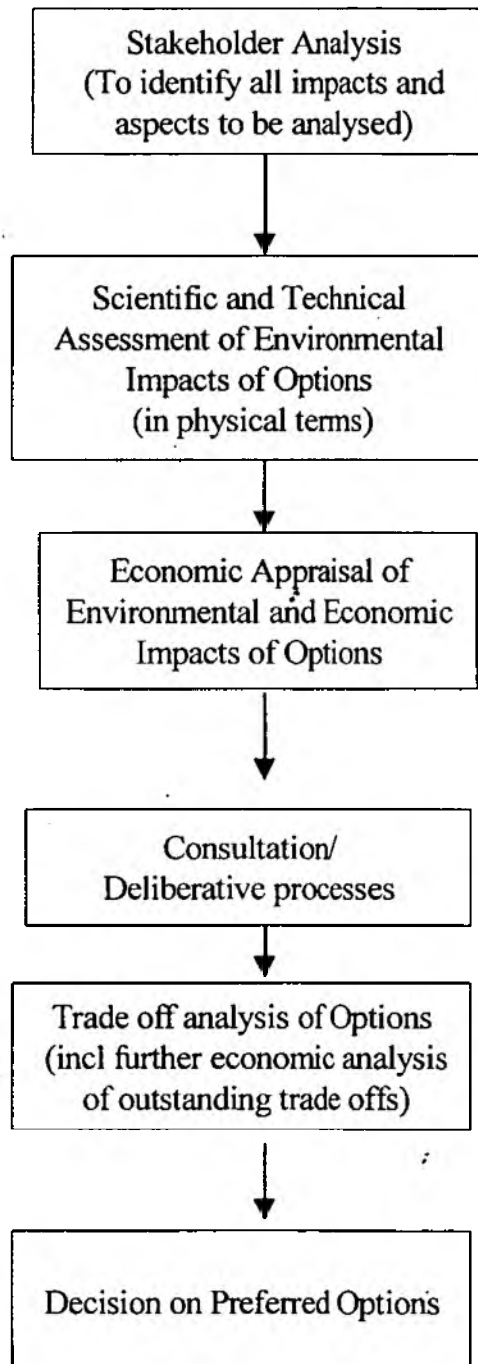


Table 1 provides further details on the main stages. It identifies in bold where the outputs from the FWR manual could fit into this process. Further information on specific stages and elements is presented below.

Scoping Analysis

1. Identify Aims and Objectives

This step should set out the aims and objectives of the policy and identify the options. If there is one clear-cut best option, then this should be selected and the Agency should use pro forma to explain reasons for this.

2. Legal/Regulatory Review

Table 1 shows that the stage 1 scoping analysis should include a legal review to identify binding legal constraints upon the Agency arising from EC and DETR statutory requirements (eg Habitats Directive, Water Quality Framework Directive). This should also determine the extent to which the Agency has any discretion or degrees of freedom in complying with these requirements (eg on timing).

If there are binding legal constraints (from DETR or the EC) on the Agency, then the Agency can only use cost-effectiveness analysis to determine how to comply with these requirements at the least cost. The Agency would not apply economic appraisal or CBA to assess the benefits of complying - hence there would be no need for the Agency to apply the FWR manual in these cases.

3. Stakeholder Analysis

The scoping review in Stage 1 will include the Agency's regional Water Quality managers carrying out a stakeholder analysis to identify and scope fully the main impacts and aspects of concern to the major stakeholders² affected by changes in water quality policies and to clarify their key perspectives on these concerns.

This should be based initially on their own assessment of the stakeholders and the main issues and impacts of concern to them. The questions that might be included in this assessment include:

Stakeholders:

- Who will be affected by the impacts of changes in RQOs, positively/negatively?

² The term stakeholder here is given to mean anyone with an interest in or who will be impacted by the benefits in question. It is partly used in order to avoid the term "the public" as this is considered to provide the impression of homogeneity amongst citizens, which has a detrimental effect when trying to characterise opinions and values. However, it is recognised that others have used the term "stakeholder" specifically to mean those people who represent certain groups with an organised interest in the decision (e.g. Royal Commission on Environmental Pollution (1998) Setting Environmental Standards). In this paper, it is intended to encompass a wider group.

- Who will promote the process, provided they are involved?
- Who could obstruct the process if they are not involved?
- Who has been involved in the past – to what effect?
- Who had not been involved up to now – but should have been?
- Who is influential in the area, community or organisation?
- Consider relationships between groups/individuals

Issues

- What are the issues for each stakeholder?
- What is important to them and why?
- What has been stated publicly?
- What is the historical background to the situation?

Appraisal and Decision-making Process

- Are there appraisal processes already in place?
- How well are they working?
- How well are they perceived to be working?

This initial assessment will comprise the regional (or area) WQ manager's views possibly supplemented by bilateral discussions with key stakeholder groups. The aim should be to ensure that the study covers appropriately all the issues of concern to the stakeholders so that, when the review of the available information is presented to stakeholders in Stage 3, there can be an effective dialogue and no surprises such as the stakeholders raising other issues or perspectives or disputing the appraisal process.

Where the Agency's Water Quality Manager is uncertain about this, then it may also be necessary to hold a facilitated discussion with a small representative sample of stakeholders to clarify these matters. The WQ manager should provide the participants at this stakeholder discussion with information on:

- the options regarding river quality objectives for the river in question;
- the Agency's process for assessing and tackling these problems and the role of the stakeholder discussions and subsequent meeting and possibly also survey in assisting in this process.

Assessment of Environmental, Economic and Social Impacts of Options

Table 1 highlights (in bold) that the form and level of the appraisal depends on the options facing the Agency in the following way:

- If there is one clear cut best option, then the Agency selects this option and uses simple pro forma to explain the reasons for this. Such pro forma can be subsequently audited. Moreover, completing such pro forma can help identify any problems and residual risks with the initial option and highlight additional options that might need to be appraised.

- Where there is a confirmed non-compliance with an RQO, the Agency assesses the cost-effectiveness of options to determine how to comply at least cost.
- Where the Agency has discretion (eg over timing) and where it is seeking tighter RQOs (eg in setting a RQO or in reviewing a RQO), then it is necessary to assess costs and benefits of the options.
- If, after the analysis of the implications of the options and the stakeholder dialogue on these options, there remain contentious options with conflicting trade offs that stakeholder group dialogue cannot resolve, then further in-depth economic analysis is needed of these trade offs (see Stage 4).

4. Technical Assessment of Options

This includes techniques such as BAT reviews and technology feasibility studies to assess the technical feasibility and practicability of implementing the options.

5. Assessment of the Costs and Economic Impacts of the Options

This step should build on the technical analysis (in step 4) to provide broad brush approximate assessment of the costs and economic impacts of the options. This should include scrutiny of the cost estimates provided by industry and comparison with benchmark costs for similar operations. In addition, it should analyse the key determinants of the costs so as to seek options that could reduce these costs (eg by changing timing).

6. Assessment of Environmental Benefits

The assessment of the environmental benefits should include the following building block information needed to derive (and explain) the valuations:

(A) From the scientific analysis:

- qualitative description of the nature and significance of the impacts;
- quantitative description of the level of the impacts (eg changes in agricultural outputs, number of beneficiaries such as visitor numbers etc)

This analysis could use the possible measures identified in use of the environmental capital approach for the NATA appraisal of the impacts of multi-modal transport strategies on services or attributes affected by water quality (eg volume and quality of abstracted water affected, use of the water, etc)

(B) From the economic analysis (including using the FWR manual):

- monetary valuation of the significance of the impacts (from A above)

The Environment Agency's approach to economic valuation is to assess all impacts encompassing all aspects and considerations regarding the options. This includes using monetary valuation of impacts where the valuations are valid and robust, and presenting information on non-monetisable impacts and aspects in a qualitative way.

Criteria for assessing the robustness of the available benefits estimates include:

- the extent and adequacy of the scientific and technical information (from (A)) and the links between the scientific assessments and the economic analysis;
- the availability of data to derive a monetary valuation;
- the adequacy of the economic valuation methods; and
- the acceptability of the economic valuations to stakeholders and decision-makers.

Table 1 and **Figure 1** highlight that the findings of the economic appraisal of the environmental, economic and social implications of the options (and in particular the valuations in the FWR manual) in Stage 2 need to input effectively into the Agency's discussions with stakeholders in Stage 3. The essential issue then is the last criteria of whether the stakeholders can readily comprehend and view as credible the benefits valuations in the FWR manual. Moreover, it means that the stakeholders should be provided with not only the summary information about on the impacts (including any credible monetary valuations) but also on the building block information outlined above explaining how they have been derived.

This will then yield an initial classification of economic benefits in terms of:

- Monetisable Benefits for which sufficiently robust monetary valuations are available;
- Non Monetisable Benefits for which the monetary valuations are not robust (eg impacts on natural habitats)

Monetisable Environmental Benefits

The appraisal should provide the FWR valuations for the monetisable environmental benefit categories, along with the building block information explaining how they were derived (see above).

It appears (from an initial examination) that this might include:

- impacts on marketable products such as water supply and abstractions for domestic, industrial or agricultural uses, impacts on agricultural outputs and commercial fisheries (eg shellfisheries);
- impacts on economic services (for which participants pay) such as fishing and other formal recreation (eg boating, canoeing, boating, water sports);
- impacts on property values alongside a high quality water body;
- impacts on leisure services for which participants do not directly pay such as informal recreation and bathing, although there may be limited data on the numbers of beneficiaries for the last category.

The Agency's review has highlighted the following limitations and problems regarding the application of the FWR manual for these categories above:

Structure and Modus Operandi of the manual

- The manual gives just single specific values which gives an inaccurate impression of precise accuracy that is not justified by the quality of the studies:
- Uncertainties regarding the valuations presented. There is a need for more and better valuation studies. Moreover there is a need to present ranges of valuations from the studies. This could be facilitated by the development, use and updating of an environmental valuation database, such as EVRI, to collate these valuations and also to show gaps in the available valuations.
- The methodology and calculations for some of the benefits categories (eg abstractions) are too complex and require a level of detail and accuracy that is not commensurate with the scale and importance of the benefits.
- Need to simplify considerably the manual to make it more useable.
- The manual does not refer to standard sources of data and information that could be used to derive the valuations (eg by Nix and Agro Business consultants with regard to angling and agriculture).

Valuations in the manual

- Underestimation of visitor numbers for informal recreation. There is a need to incorporate the latest developments in data and models (eg using GIS³ or EFE's SVET model);
- Difficulties with valuing water quality improvements within a river class.
- Underestimation of values for specific categories such as salmon fishing.
- Uncertainties as to what are covered by 'amenity' benefits.
- Problems with valuing and discounting future benefits.
- Determining the value of impacts on subsidised agricultural outputs

The economic appraisal and the consultation process need to be able to build on the scientific analysis of environmental impacts. Consequently the scientific analysis of the options at stage 2 need to be in terms of the incremental environmental impacts of options (not only whether achieve threshold levels above which impacts arise).

Similarly the economic valuations (in the FWR) need to allow appropriately for any scientific uncertainties surrounding the impacts. This also raises issues as to how to present any such scientific uncertainties to the focus or stakeholder group.

We suggest that phase 2 of the proposed consultancy project should include the following tasks:

- Review all the benefits categories in the FWR to assess first whether these cover all the aspects of concern to stakeholders and then to categorise them into monetisable and non-monetisable benefits in the light of the criteria given above. This review should be carried out by someone other than FWR.
- Synthesise the reviews of users of the FWR manual to elaborate on the above list

³ See, for example, Bateman, I (1999). *Use of GIS for Benefits Transfer and using Distance Decay Functions to Estimate Participation Rates*, in Fisher JCD (ed) *Proceeding of Seminar on Review of Databases and Latest State of the Art on Valuation of Environmental Benefits: Volume II - Papers and Proceeding*. Environment Agency, National Centre for Risk Analysis and Options Appraisal Report No 5.

- of the limitations of the manual;
- Address these limitations and determine how they could be overcome.

Non Monetisable Environmental Benefits

This includes important intangible benefit categories for which the monetary valuations are not robust (eg impacts on natural habitats). It is necessary to specify these intangible impacts clearly and precisely and in terms that the stakeholders can relate to rather than to use the general and vague term 'non-use' values. This category should also include specific aspects identified from the stakeholder analysis in Stage 1 that are not (adequately) covered in the available monetary valuations

Contingent valuation survey techniques have been used to assess individuals' valuations for such intangible benefits. Whilst this approach has achieved some success, it has also been the subject of significant criticism and debate. In particular the technique is vulnerable to the following criticisms:

- The respondents are unable or unwilling to value such intangible benefits in monetary terms, especially where they do not know about the benefits in question;
- Individuals object to being asked directly to value the intangible benefits in monetary terms;
- Their perceived willingness to pay may be influenced by the respondent's level of knowledge of the issue in question;

Consequently, we suggest that stage 2 should report the qualitative and qualitative findings of the scientific analysis (A) regarding these impacts so that the stakeholder group and then the Agency's decision-makers can ascertain their significance.

7. Overall Assessment of the Economic, Social and Environmental Impacts of the Options

The overall assessment should collate the scientific and economic appraisal of the impacts of the options in terms of a partial CBA of costs of the options compared with the partial monetised benefits and with the nature and significance of the unquantifiable impacts identified and set out in qualitative terms. If the partial monetised benefits exceed the costs, then that indicates the preferred option.

This analysis should seek better options, which achieve greater monetised and non-monetised environmental benefits and lower costs. But it is likely that there will remain outstanding options with conflicting costs and benefits, which would be discussed in the public consultation in the next stage 3.

8 Facilitated Discussion

Stage 3 comprises a facilitated discussion with a stakeholder group of 10-15 people to get their views on the significance of the impacts of the options so as to refine the options and to feed in their views into the decision-making process. Where appropriate and possible, this group discussion should be linked closely with those

being carried out for LEAPs. It might be necessary to have a wider consultation and information provision for a larger public depending on the significance of the impacts.

This group discussion is different and separate from that for the discussion of the MAT analysis of the numerous and various environmental improvement schemes in the AMP process since the purpose of this appraisal and discussion is different. The discussion of this integrated appraisal relates to the impacts of the options for one specific river rather than the assessment in the MAT of just the environmental benefits of numerous schemes to determine their environmental ranking.

Further In-Depth Analysis of Trade Offs

Where the stakeholder group are unable to resolve conflicts about contentious options involving conflicting trade offs, then further in-depth analysis of the environmental, economic and social impacts of these outstanding options will be needed.

9. Scrutiny of Estimates of Costs and Economic Impacts of Options

Table 1 shows that this stage will include scrutiny to check for any double counting and possible overestimation of the costs and economic impacts of the options. In addition, it will cover assessment of the local community impacts and impacts on sustainability indicators.

10. Contingent Ranking or Rating Survey

The stakeholder group (in the facilitated discussion in Stage 3) will inevitably be just a small group that may not represent well all the affected parties. Therefore it may be necessary to survey the views of a wider sample of the affected people. Key issues here are:

- The feasibility and merits of carrying out a contingent ranking or rating (CR) survey on the trade offs for the options facing decision-makers.
- Whether it would be possible to identify the key attributes behind the findings in the CR analysis and whether secondary source data are available on these attributes to enable transfer of the findings to other cases? Or once we get down to these contentious cases are we outside the remit of benefits transfer and need specific surveys and investigations of a hopefully small number of outstanding individual cases?

We suggest that these issues should be addressed in phase 3 of the proposed consultancy study.

Table 1: Stages in the Agency's Integrated Appraisal of Water Quality Policies

Stage/Element	Appraisal method	Issues
Scoping analysis		
Identification of problem, its main causes and facets, the main options and the key issues. This includes the following elements: 1: Set out aims and objective of policy Identify options	Risk Assessment and Scientific assessment of level, nature and causes of environmental impacts	
2: Identify binding legal constraints from EC and DETR for the Agency (eg Habitats Directive, Water Quality Framework Directive) and extent of any discretion for the Agency (eg on timing)	Legal/regulatory review If binding legal constraint => use cost-effectiveness not CBA (so no need for FWR manual)	Extent of discretion and degrees of freedom for the Agency that is given by the legal and policy statements (eg by EC/DETR)
3: Stakeholder analysis to identify main impacts, concerns and issues and aspects to be analysed	Initial (internal) assessment by Agency manager Possibly supplemented by initial facilitated group discussions	Where uncertainty if able to capture all concerns so that stakeholders will respond appropriately and 'buy in' to discussion of information on these concerns in Stage 3.
Analysis of implications of options - If >1 option with differing impacts		
4 Technical feasibility and practicability	BAT reviews and technology feasibility studies	
Where confirmed non-compliance with standard, then assess cost-effectiveness of options to comply at least cost		
5a: Assess costs and economic impacts of options (eg to appraise options regarding timing)	Broad brush cost assessments (for WQOs); detailed cost assessments for individual discharge consents	
5b: Social impacts of options (including equity impacts on particular groups and impacts on rural communities)		Need careful specification of social and economic impact categories

Stage/Element	Appraisal method	Issues
<p>Where discretion (eg over timing) and where seeking tighter WQOs => carry out next steps to assess not only the costs (above) but also the benefits of options</p>	<p>Scientific analysis of environmental impacts FWR use values (in both quantitative and monetary terms), including building block info in FWR/MAT explaining estimation of the values and the estimates of beneficiaries</p>	<p>Need to ensure that scientific analysis of impacts can input into FWR valuations</p> <p>Limitations of FWR valuations (including uncertainties about participation rates for recreation)</p>
<p>6 Assess readily quantifiable and monetisable environmental impacts (eg impacts on marketable outputs, uses of water (eg for recreation) - see text for criteria for appraising robustness of valuations</p> <p>Identify nature, scale and significance of intangible impacts that are less readily monetised (eg intangible impacts on human welfare (eg health, amenity), and ecological (non-use) impacts</p>	<p>Scientific analysis of environmental impacts</p> <p>Apply FWR non-use values IF (AND ONLY IF) they meet the criteria, esp if they could be considered credible by the stakeholder groups (for discussion in stage 3); Plus building block info in FWR/MAT on intangible impacts and estimates of the beneficiaries</p>	<p>How link scientific and economic appraisal of ecological impacts?</p> <p>How report scientific uncertainties about ecological impacts in a form that stakeholder groups can relate to?</p>
<p>7. Overall assessment of the economic, social and environmental impacts of the options</p>	<p>Partial CBA of costs vs partial monetised benefits with unquantifiable impacts identified and set out in qualitative terms. If partial quantified benefits exceed costs => preferred option</p>	<p>How to present intangible impacts?</p>

Stage/Element	Appraisal method	Issues
<p>8: Facilitated Discussion Discussion on implications of options (from previous analyses) to get views on the significance of the impacts of the options so as to refine the options and to feed in their views into the decision-making process</p>	<p>Some form of facilitated discussions (eg with 10-15 stakeholders) ; Possibly with a wider consultation involving a large public.</p>	<p>What information (in what form) does the group need from the preceding analyses in Stage 2 to inform their discussions?</p>
<p>In-depth Trade off Analysis - If still contentious options with conflicting trade offs that facilitated discussions cannot resolve</p>		
<p>9: More in-depth analysis of environmental and economic and social implications of options</p>	<p>Scrutiny of estimates on costs, economic impacts, local community impacts and sustainability indicators</p>	<p>Check for double counting and over-estimation of costs</p>
<p>10: Assess views of wide sample of affected people on trade offs for outstanding options => determine decision on WQO</p>	<p>Use CR surveys on views on conflicting trade offs for outstanding options to inform Agency's decisions on these options</p>	<p>?Merits and feasibility of using Contingent Ranking (CR) surveys focused on conflicting trade offs facing Agency?</p>