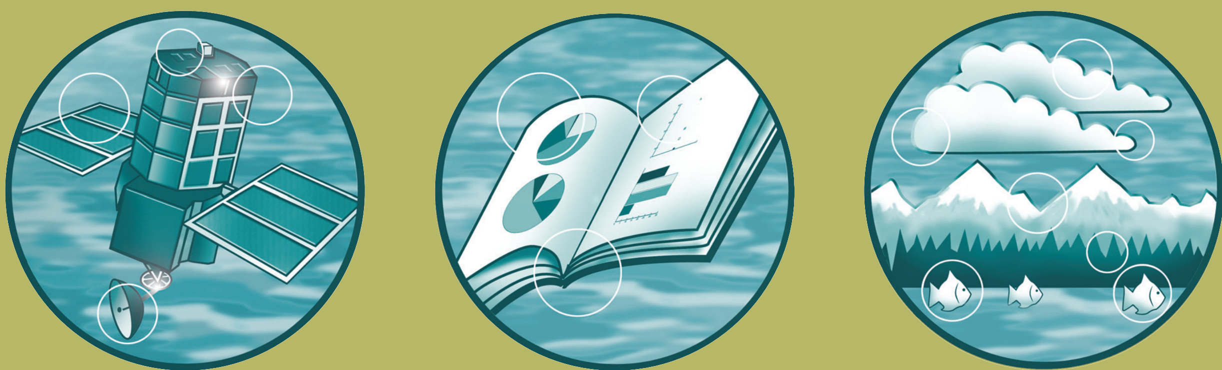
Joint Defra/EA Flood and Coastal Erosion Risk Management R&D Programme

The 'Sugden' Approach - Testing a Disaggregated Approach to Appraisal: Review of Recommendations

R&D Technical Report FD2018/TR2



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Joint Defra/EA Flood and Coastal Erosion Risk Management R&D Programme

The 'Sugden' Approach – Testing a Disaggregated Approach to Appraisal: Review of Recommendations

R&D Technical Report FD2018/TR2

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Statement of use: The report addresses how a disaggregated approach to benefits and costs, as suggested in Professor Robert Sugden's accompanying Reports (TR3 and TR4), can be introduced into Flood and Coastal Erosion Risk Management appraisal, and assesses the implications of the approach.

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Executive summary

This report is a response to Work Area A of Defra Contract FD2018: “Developing Flood and Costal Erosion Risk Management (FRM) Appraisal”, which examines and comments on the reports to Defra by Professor Sugden on “Developing a cost-benefit framework” for flood risk management and “Integrating cost-benefit analysis and multi-criteria analysis”.

Some of the Sugden proposals are for ways in which a new, “distributional accounting” approach to cost benefit analysis (CBA) might be developed, which would show more clearly than the current approach how the costs and benefits of proposed FRM schemes are distributed between stakeholders. Other Sugden proposals relate to more general principles, such as the definition of the appropriate benefit/cost ratio for presenting CBA, the choice of numeraire, where we endorse the use of market prices, and the role of multi-criteria analysis (MCA).

We are supportive of the Sugden recommendations, with additional observations and recommendations. These include recommendations on terminology, on the analytical procedures for the handing of private contributions and of equity between richer and poorer households, and on the structuring of a table of monetised costs and benefits and an appraisal summary table. Some of these recommendations depend upon assumptions about the fundamental objectives of the FRM programme, which we assume to be consistent with Treasury Green Book guidance.

We conclude that, given the sophistication of the data sets already available for FRM appraisal, and the fact that introducing distributional accounting and the other changes recommended would entail no significant new calculations, the extra ongoing costs of applying a distributional accounting approach and the other measures are unlikely to be material. This should however become clear in the case studies in Work Area B.

We note the high professional quality of the management of the work on MCA being led by the Environment Agency and the high quality of the economist support available in Defra and the Agency. However we suggest that the development of a technically sound, workable and authoritative set of procedures to integrate the CBA and other aspects of FRM appraisal, including the prospective OPM regime, will depend upon the MCA expertise in the EA and the economics expertise in Defra/EA working closely together and developing a good understanding of each other’s field of expertise, preferably with a strong Senior Civil Service lead.

We note the comparisons drawn by Defra and in the main Sugden report between FRM and Transport appraisal and the benefits, in Transport, of a single expert authority within government effectively controlling the technical aspects of appraisal methodology. We suggest that Defra might consider the relevance to FRM of this and other aspects of the Transport regime.

We suggest that there may be scope for useful work on the review of aspects of valuation in FRM Cost benefit analysis, notably in relation to land values. There may also be value in comparing the typical costs of FRM appraisal with those of other capital intensive public service programmes. More urgently, we encourage work to facilitate the integration of CBA and MCA and the registering of Defra/EA Outcome Measures, and establishing their roles in the hierarchy of decision making.

Contents

1. Introduction

This is a response to Work Area A of Defra Contract FD2018: “Developing Flood and Costal Erosion Risk Management Appraisal”. The relevant extracts from the Project Specification are attached as Appendix A.

The Project Specification explains that its aim is **“***to evaluate … and where appropriate, develop proposals for an improved appraisal framework for flood risk and coastal management that provides greater transparency in establishing the costs and benefits of investment options. … The key aim … is to investigate the feasibility of the Sugden-WTP approach***.”**

The coverage of Work Area A below follows the headings in the Specification, addressing first the general implications and then, in turn, each of the listed specific implications, followed by a concluding overview.

The Specification for Work Area A suggests the work is likely to include liaison with the Middlesex Flood Hazard Research Centre (FHRC), which owns and manages the property dataset, including flood damage costs, used by Defra and the Environment Agency (EA). In the event little liaison was needed for this Work Area. However useful contact was made at a Workshop on 4 November 2005 and a meeting at the FHRC on 9 February, and through the provision of documentation, and we are grateful to the Centre for their advice.

Before turning to the implications of the recommendations in Professor Sugden’s two papers we note that these cover a number of largely independent issues. Their main focus is on moving from a presentation of aggregate costs and benefits to a “distributional accounting” presentation showing in more detail where the costs and benefits would fall. However other issues, such as the choice of numeraire, the definition of the benefit/cost ratio and the relative roles of CBA and MCA are separate and self-standing. It is our view sensible to consider these issues in parallel. However the term “Sugden approach” is sometimes used to describe those papers’ recommendations on disaggregation and sometimes to describe all their recommendations. We suggest below an unambiguous terminology.

We are most grateful for substantial discussions and email exchanges with several Defra and EA officials, including comments by economists on a first draft of this note, and for further advice from Professor Sugden.

2. General Implications

The Specification invites us, under General Implications, to explore how a "Sugden" approach would compare in general terms with current procedures.

To address these issues we first consider a range of fundamental concerns, which we set out in the Section immediately below, under the heading of "Setting the scene". This is followed by Sections on a range of specific "general issues", namely the choice of benefit/cost ratio, the handling of impacts on land use and land values, and the potential costs of adopting the substance of the Sugden recommendations.

Throughout we seek technical rigour, but subject to proportionality – looking in particular for clarity and simplicity, where this can be achieved with no material loss of quality in the information provided for decision making.

2.1 Setting the scene

2.1.1 The aims of transparency and the essence of "the 'Sugden' approach"

The Specification explains that the summary aim of the project is to examine, and where appropriate develop, proposals for an improved appraisal framework for flood risk and coastal management that "provides greater transparency in establishing the costs and benefits on investment options".

We have discussed the underlying reasons for seeking greater transparency and understand that these are partly to improve accountability, but mainly to improve the handling of a range of issues relating to fairness and intimately associated questions of funding.

The essence of "the 'Sugden' approach" is presentation. It is about presenting the output of cost benefit analysis (of factors that can be monetised), and any subsequent appraisal summary table (covering also factors that cannot be monetised), in ways that provide for decision makers and other stakeholders information, not provided by the current, aggregated CBA format, relevant to a range of specific issues, such as private sector contributions and equity.

Looking anew at presentation leads inevitably to some consequential issues, including the identification of new factors for explicit examination and where possible valuation. However "the 'Sugden' approach" is not itself a new approach to valuation, except insofar as it stresses the normal, albeit crucial criterion that CBA valuations should be based on the willingness to pay of those affected.

Such a review also leads to some consequential questions on issues such as underlying objectives and sometimes methods of valuation, some of which may turn out to be central to how the analytical information should be presented.

We have heard very few potential reservations about changes on the lines recommended by Sugden. There is the obvious concern about cost, but as we explain below this seems unlikely to be material. Another concern is that disaggregation can be carried too far. In particular it has been explained to us the sometimes differences between the benefits that proposed scheme would give to different sets of households are not given prominence, because this would hinder rather than promote informed debate. However the Sugden recommendations do not include any proposals for disaggregation within households and nor do we suggest this.

A final, perhaps more serious reservation is that improvement in the transparency of the CBA process may further increase the weight given in decision making to factors that can be monetised at the expense of those that cannot. This has substance, but the response would seem to be to improve the overall decision making process rather than to restrict the improvement of parts of it.

2.1.2 The analogy with Transport

The Defra foreword to the main Sugden report[1] explains that that report **"***investigates the feasibility of changing the appraisal framework for flood and coastal defence (FCD) projects from the traditional 'calculus of social costs and benefits' (SCB), as currently used by Defra, to the 'calculus of willingness to pay', as now used by the Department for Transport.***"** Professor Sugden subsequently explains that **"***the Department for Transport… changed its appraisal framework … following the recommendations of my report of January 1999 …The current study [for Defra] uses the same principles as that report .***"**

We believe these principles to be a sound basis for assessing and where appropriate developing proposals for an improved appraisal framework for Flood Risk Management (FRM).[2] The potential for drawing on the development procedures used in Transport appear to us to extend widely across and beyond the scope of the main Sugden report.

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1 "Developing a cost–benefit framework for the appraisal of flood and coastal defence projects", Report to Department of Environment, Food and Rural Affairs, by Professor Robert Sugden, 29 July 2005. This is described in this current report as the "main Sugden report" to distinguish it from Professor Sugden's parallel "MCA report" to Defra on: "Integrating cost-benefit analysis and multi-criteria analysis of flood and coastal defence projects", 17 April 2005.

2 We find that the acronyms FCD (flood and coastal defence), FCERM (flood and coastal erosion risk management) and FRM (flood risk management) are used interchangeably, with different areas of administration having their favourites. We adopt FRM, as this reflects better than FCD the holistic approach of current policy, and it is shorter than FCERM.

For at least two decades the Transport Department, in its various clothes, has been the lead department in the use and development of cost-benefit analysis (CBA) in project and programme appraisal of public spending in the UK[3]; but flood and coastal protection has long been the next most conspicuous user of such techniques. These two policy fields have important differences. The high concentration of benefits, in typical FRM schemes, on individual, identifiable beneficiaries presents political and administrative challenges that are mirrored, but much weaker in Transport, where the benefits are usually much more widely and anonymously spread. FRM is largely spared the cross-modal problems of transport. The Highways programme is several times bigger even than the FRM programme, and schemes are generally more similar. The principal data sets are, of course, quite different. However from analytical, institutional and political perspectives the two fields, especially with respect to Highways, have a very great deal in common.

We believe that the appraisal procedures and the ways in which they are developed in DfT, viewed in the round, provide a good template, which offers to appraisal in FRM a range of useful procedural and technical models. We draw on Transport practice, where appropriate, in support of suggested changes.

2.1.3 Cost benefit analysis

2.1.3.1 The coverage of cost benefit analysis

A contrast between the social and physical sciences is the widespread absence in the social sciences of precise and universal definitions of basic concepts. The term cost benefit analysis is a victim of this looseness. There is no universally recognised convention for what is within and what is outside the cost benefit analysis (CBA) of a policy, programme, or project.

CBA is taken by some enthusiasts, and in some textbooks, to mean converting everything that matters to a monetary value and calculating “the answer”, but rarely if ever is that realistic. To some pragmatists it means the comparison of everything that can be sensibly expressed in monetary terms, as one input among others to decision making. To other pragmatists it means the whole, or nearly the whole of such a process, *including* the presentation and assessment of those elements that cannot sensibly be monetised.[4]

3 Overseas Development is the other main UK government centre for CBA in public policy, but addressing generally different issues, with limited overlap with the needs of domestic policy.

4 The Treasury Green Book definition ambiguously straddles these last two definitions. CBA is defined as “Analysis which quantifies in monetary terms as many of the costs and benefits of a proposal as feasible, including items for which the market does not provide a satisfactory measure of economic value”. The Defra Guidance in PAG 3 (Section 1) is similarly ambivalent, perhaps leaning towards the fourth definition: “It should be emphasised that the aim of benefit–cost analysis is to provide a transparent and inclusive approach to decision making which, as far as possible, takes all relevant factors into account. Some impacts cannot easily be valued in money terms, but this should not exclude them from the decision making process”. Sometimes “cost-benefit analysis” is used literally, and confusingly, to describe any comparison of costs and benefits, but we have not come across this usage in FRM.

This report adopts the former position, as in Transport, that CBA is one input among others to decision making. The wider decision making process, apart from the CBA element, is for the most part beyond our terms of reference. We do however turn to it below in discussing multi-criteria analysis.

It is common ground in economics, and crucial, that valuations in CBA are empirically based, on the quantitative preferences - i.e. the willingness-to-pay (WTP) - of those affected. Valuations are thus independent of the personal or institutional preferences of the decision makers. This a great strength of CBA relative to procedures that operate by organising the preferences of decision makers, and/or the qualitative preferences of other groups. It also CBA's main limitation, because it is rarely if ever feasible to derive willingness-to-pay valuations for all the material costs and benefits underlying a practical decision of any substance.

Less firmly established is the breadth of preferences that should be incorporated in a CBA, and how they should be incorporated. This applies notably to distributional impacts, given that individual (or household) willingness-to-pay will often be correlated with income.

2.1.3.2 CBA and income distribution

To some the dependence of willingness-to-pay valuations on income presents no problem. This after all is how markets work. Richer individuals or households will tend to buy more and better quality travel services (and for that matter education and health services). In any case they pay more taxes. It might be argued that it is for other government policies, notably the tax and benefits system, to redistribute income as appropriate.

However in practice, in several UK public policy areas, it has long been conventional for CBA to build in a distributional adjustment, often by assuming that certain benefits provide the same marginal "utility" or social benefit to people regardless of income. This position is taken for example with regard to risks of death or injury from say transport accidents. It is current convention to use values that are the average of the individual WTP values derived from empirical research. The rationale is that, to reflect public preferences, government activities to protect people from such risks should apply equally across the nation to all individuals or households at risk and should not favour the rich over the poor. The same rationale applies to the use of the QALY (quality adjusted life-year) in the analysis of health impacts. The QALY is not at present valued in monetary terms, but it is applied equally to all regardless of income.

Another approach favoured by some economists is to accept that income distribution should be reflected in specific appraisals (and not just left to other policies), but nonetheless to keep to income-specific WTP figures (rather than averaging them) and then apply any income adjustment as a separate stage.[5]

[5] This also proposed (although not mandated) in the current edition of the Treasury Green Book (paragraphs 2.9 and 5.33 to 5.41) although the simpler procedure of assuming

This would be an appropriate procedure if the marginal utility of the benefit in question could not be assumed to be the same for the rich and the poor. However for some benefits (such as a reduction in risk of being killed) the assumption of income-independence seems currently uncontroversial. This may be less so for other impacts, such as leisure time, and there is a case for more research in such cases.

However the application of a quantitative adjustment to income-dependent WTP values is not entirely straightforward. It needs an understanding of the concept of the "income-elasticity of the marginal utility of consumption", which is not universal even among economists, and it needs a value for this elasticity, for which the empirical evidence, from numerous studies by many methods, all of which are problematic, is variable (although the value currently favoured in UK government is below what most international experts would suggest).[6] If and when the marginal utility of the benefit in question can be assumed to be the same for the rich and the poor the simple approach of assuming a common monetary value is markedly less complicated and prone to confusion than a two-stage process. It is also more accurate, because it eliminates the need for any assumption about the elasticity of marginal utility.

2.1.3.3 CBA and economic, environmental and social impact

Confusion can arise from the adjective 'economic'. Across most of central government, as in the current project specification, it is usual and helpful to describe the appraisal dimensions of a proposal in terms of 'economic', 'environmental' and 'social' costs and benefits.[7] However CBA, on any of its definitions, is not specifically about 'economic' impacts, and it can be unhelpful to described it as "economic assessment". CBA extends to impacts that can sensibly be valued in monetary terms, which may include some environmental impacts and some social impacts and may exclude some potential economic impacts. CBA is about social costs and benefits.[8]

One potential aid to integrating CBA more fully into the decision making process, and perhaps helping its wider acceptance, could be to unhitch it from the "economics" heading in Defra's guidance.[9] This might be achieved by framing the guidance in terms of documentary components of advice to decision makers (e.g. CBA, environmental assessment, appraisal summary table), with

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constant marginal utility, described in the previous paragraph, remains by far the most common approach in practice.

6 This is summarised in Spackman, M J (2004), "Time discounting and the cost of capital in government", Fiscal Studies vol. 25, no. 4, pp. 467–518, (p496).

7 Although we note that Defra/EA sometimes add 'technical' as a fourth heading.

8 This is what economists usually call "welfare", or in many technical contexts "utility", although the term "happiness" is now increasingly used within the discipline as an objective for public policy.

9 As for example in that published on the web on "Capital Grant Allocations for Flood and Coastal Erosion Risk Management".

the economic/ environmental/ social dimension as separate, general background.

2.1.4 Terminology

2.1.4.1 "SCB" and "WTP"

The Defra foreword to the main Sugden report describes the current and possible new approaches as "calculus of social costs and benefits (SCB)" and "calculus of willingness to pay". This serves well enough in that context, but these are not terms that are sustainable in general use. In the Specification for this current project they have become *"the current approach of social cost benefit" and "Willingness to Pay - the Sugden Approach (now termed Sugden-WTP approach)"*.

The inevitable further abbreviations to "SCB approach" and "WTP approach" can be seriously misleading, especially in a world populated by many disciplines. They are misleading because **both** the traditional and possible new approaches are concerned with social costs and benefits (that is what CBA is about) and **both** approaches are based on the concept of willingness-to-pay (this too is fundamental to CBA).

In this report we therefore use the terms "current approach" and "possible new approach". This reflects practice in Transport, where the evolution described by Sugden has led to the so called "New Approach to Transport Appraisal" (NATA), which of course extends beyond the technicalities of CBA, to include also the NATA system of unweighted multi-criteria analysis.

It has also been suggested to us that the disaggregation of impacts by stakeholder and income may be described as a "distributional accounting" approach, which we, as does Professor Sugden, find a useful term to describe this aspect of his proposals.

2.1.4.2 "Appraisal" and "evaluation"

The Treasury has for many years encouraged the use in central government of "appraisal" to describe ex ante analysis and "evaluation" to describe ex post analysis.[10] However outside central government "evaluation" is often used more loosely, sometimes to describe either ex ante or ex post analysis (it often not being clear which) and sometimes in place of valuation (i.e. giving a monetary value).

This loose usage, and associated confusion, creeps regularly into central government. It happens occasionally in Transport, and more frequently in FRM. In this note we adopt the Treasury's preferred usage. It could help communication in Defra and the EA if this convention were uniformly adopted.

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10 See for example the current and previous editions of the Treasury Green Book..

2.1.5 Decision-making criteria

2.1.5.1 The public interest and performance measures

The opening sentence of the current Treasury Green Book explains that: **"***All new policies, programmes and projects, whether revenue, capital or regulatory, should be subject to comprehensive but proportionate assessment, wherever it is practicable, so as best to promote the public interest***"**. The opening two sentences of the Preface are: **"***The Government is committed to continuing improvement in the delivery of public services. A major part of this is ensuring that public funds are spent on activities that provide the greatest benefits to society, and that they are spent in the most efficient way***".**

We assume that Defra and the Environment Agency subscribe to these principles, which are, of course, consistent with the executive role of implementing Government policy. They are about interpretation and implementation in the public interest, where they can be operationally important.

Today's "new public management" conventions, of delegating very wide managerial freedom to spending departments and agencies, in exchange for clear understandings about services to be delivered, bring great benefits. However the ultimate public interest criterion is needed to offset the tendencies for (inevitably arbitrary) quantitative measures to displace evidence-based decision making.[11]

A related danger is that of even the finest of principles, such as sustainable development, which can do much to steer decision making towards more imaginative ideas, may sometimes be allowed to displace the analytical trade-offs that should underlie almost every significant expenditure decision.

It seems to us that explicit, if sotto voce recognition of the public service objective on Green Book lines could improve decision making in FRM as elsewhere, although we recognise that opinion about this among officials is divided.

2.1.5.2 The allocation of funding

By convention Defra looks, at least in principle, to budgets other than the FRM budget, to fund any substantial public service enhancements such as the extra spending to provide a wider road bridge, rather than replacing the original narrow one. It also looks to private sector contributions from businesses that, whether as developers or as owners of major facilities, would enjoy a substantial financial gain.

Presentation of CBA results in a way that clearly demonstrates the distribution of such benefits should improve incentives for all parties and help to achieve an equitable distribution of costs. We suggest however that this needs to be accompanied by clear statements about the criteria for seeking external

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[11] Such as the often quoted example of some GP surgeries refusing to make appointments for more than a day ahead, so as to meet a target of all patients being seen immediately (whether the patient wants it or not).

funding, and work to develop procedures for negotiating or in some cases automatically generating such funding.

The decision criteria for seeking external funding appear to be based on the principle that such beneficiaries ought to contribute as a matter of equity. This is a perfectly fair criterion, though it relates to the distribution of costs and benefits, as distinct from the social value of the FRM project.

A possible alternative suggested to us is that benefits such as those arising from, say, a wider bridge, or from an increase in the value of land which is undeveloped but might possibly receive planning permission for development, are benefits which are in a fundamental sense irrelevant to the FRM programme. This framing of the issue is sometimes attributed to the Treasury and sometimes the concept of what Parliament voted the money for. We have considered these carefully, but do not from what we have heard feel they are persuasive.

The question of programme scope is of course real. Probably the best known case of inappropriate spending in recent years is the Pergau Dam in the early 1990s. The then Prime Minister agreed with an overseas government that the UK would financially support the project. It was essentially a trade agreement, but the Government proposed that it should come from the aid budget. It did not meet the Overseas Development Agency's criteria. The Permanent Secretary refused to sign for the money and, after Public Accounts Committee intervention, the cost eventually fell to DTI. However the issue here was that of an inappropriate project – it did not qualify as an aid project.

This is very different from not getting the best possible value from a department's own projects - in this case FRM projects. To suppose that a project is legitimate, but that certain social benefits should be excluded (without legislation decreeing this) is not a convention that, to the best of our knowledge, is applied in other fields. It would appear to us to be contrary to the principles of due process and transparency (against the interests of some stakeholders). It would certainly be against the wider national interest.

The procedures for negotiating such funding will clearly help transparency. Indeed in the case of a potential enhancement of a public service it is easy to envisage a potentially simple procedure. Suppose that for, say £300k a new bridge over a widened water channel could itself be widened to increase capacity and/or improve safety. The Transport department could be invited to check the numbers and decided whether this should be done (on their budget) or not done. There would need to be a *de minimis* understanding, under which the Agency would fund small expenditures that were clearly worthwhile. It would also need to be clear to all that the funding relates to the marginal costs of the improvement, not to its value.

Private contributions raise different issues and, in the absence of legislation to require contributions, they appear to be very much for negotiation, with the private contributor buying perhaps an earlier project and goodwill.

2.1.5.3 Criteria for fairness

The specification invites us to “develop criteria and tests for fairness such that information from the *Sugden-WTP* approach is arranged to forecast more equitable/fair outcomes.”

However it is a function of government to determine what, in public policy, should be regarded as fair or unfair. The concept is inherently subjective and neither economics nor any other discipline can provide a definitive criterion or test.

We address in Section 3.2, below the issue of equity across richer and poorer households, noting that the appropriate technical methodology may depend upon the underlying policy criterion for fairness, which is for Defra and its Ministers to consider and define.

Issues of fairness may arise as between different commercial parties, between different households (for reasons other than income) and between commercial parties and households. The ‘Sugden’ approach of disaggregating so that the costs and benefits of the main parties are made clear can help, or make possible such judgment, but any formal criterion for fairness in such circumstances can only be (or in our view should be) explicitly a political judgement expressing the view of government.

Some examples of such situations suggested to us are:

- CBA points to a town having different standards on different sides of a river, but many residents and others argue that this is unfair;
- CBA similarly points to not defending particularly remote homes, but some argue that this is unfair;
- an area has suffered two extreme events in rapid succession, some claim that fairness demand that it is therefore given exceptional priority; or
- an area that has been defended for 100 years, where people have invested time and money assuming that standards of defence provided in the past will continue, some claim that it would be unfair to let risks increase without at least extremely long notice.

These are situations fairly typical of those that tend to arise in public policy interventions in land use, and many of the arguments used would of course be political rather than economic, environmental, or social. They are all situations in which cost benefit analysis, combined with clear and balanced presentation of those issues that cannot be monetised, can provide essential guidance to decision makers; but final decisions on such matters are ultimately for political or administrative judgement.

Fairness does however depend largely on due process. If procedures are hidden, without clarity as to their basis, there will almost inevitably be unfairness. The Sugden principles of clarification, and the process of CBA which is for the most part inherently objective and evidence based, are thus important contributors to fairness.

2.1.6 Choice between schemes versus choice within schemes

Policy, programme and project appraisal is needed at many levels, in institutional terms and over time. We note Defra's indicative "Hierarchy of Strategic Decision Making" in FRM which records three tiers of planning, namely Catchment Flood Management Plans/Shoreline Management Plans (CFMPs/SMPs); a lower Strategy level; and the Scheme level.

Our understanding is that FRM schemes traditionally have their origins in local initiatives, with local EA staff making proposals, set against a broad brush priority scoring system into which a CBA benefit/cost ratio is one input. If and when a scheme is approved in principle, further analysis is undertaken of options for the scheme's implementation.

We infer that the main impact of CBA is to be at the level of strategy, for use within a priority setting framework for choices between schemes. However CBA (and MCA) may also have an important role in the fuller analysis of options within schemes, after approval in principle. They would also seem to be relevant to the refinement of CFMPs and SMPs. It could be helpful to clearly establish this role

2.2 The choice of a benefit/cost ratio

We turn now to the first of three "specific general issues".

There appears to be widespread agreement, which we share, that the current use in FRM of the ratio of total benefit to total cost (the 'B/C' ratio) as the main output of CBA needs to be modified, in particular to reflect the fact that public expenditure is constrained. The main Sugden report thus proposes the use of an 'NPV/K' ratio, where K is a measure of expenditure and NPV is the net present value of the project. [12]

The proposed switch from a numerator of gross benefit to a numerator of net benefit, as the Sugden report explains (paragraph 3.8), of no deep analytical significance. [13] The retention of gross benefit, B, as the numerator is arguably simpler and would maintain current FRM practice. However the Department for Transport use the net figure as their numerator, and Defra may prefer to follow that precedent.

More contentious is the choice of a denominator.

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[12] The NPV is the figure obtained by discounting to a common base date all of the costs and benefits that can sensibly be valued in monetary terms.

[13] In particular since the net benefit, NPV, is equal to the gross benefit, B, minus the cost, C. So NPV/C is equal to B/C minus 1.

The main Sugden report is ambivalent. In paragraph 3.7 it suggests that the denominator should be the scheme capital cost. In paragraph 3.9 (and also in the Defra Foreword) the rule is described as the 'net benefit-public expenditure ratio'. The Executive Summary describes the denominator as 'net cost to public funds'. The Defra specification for Work Area A says that "[the denominator] K refers to the project's capital cost".

The case for using, as a guide to decision making, a benefit/cost ratio, rather than the net present value depends entirely upon there being a cost constraint. If there were no constraint the appropriate criterion (as often proposed in textbooks) would be the NPV: a positive NPV implies a net social benefit – so the opportunity should be followed through. As the main Sugden report (paragraph 3.9) explains, the denominator should be 'the relevant constrained budget'. [14] The rationale is that the best value should be obtained from limited funds, and this is achieved by seeking the highest 'bang for the buck'. [15] The main Sugden report suggests that the denominator should be derived as the present value of total net public expenditure associated with the project. This is the procedure used in Transport and we support it. It reflects a concern to deliver best value for the taxpayers who are providing the public funds.

The main Sugden report also suggests that a parallel, narrower ratio might also be derived "from the viewpoint of a particular agency charged with the particular responsibility of producing benefits of a certain type". This we understand reflects Professor Sugden's concern, which we firmly endorse, that the CBA data should be presented in a way that clearly identifies costs and benefits which might better be attributed to other bodies. But a second ratio would in our view not be helpful, it would be "re-aggregating" categories of costs and benefit that need to be clearly separated. It would also be concealing the manipulation of these aggregates in a (second) CBA ratio. Whatever significance was given to this ratio would we suspect lead to less well based rather than better informed decision making.

However the denominator is defined, the use of the symbol K is confusing, as K is traditionally used in economic analysis to denote capital. Candidates for a less misleading symbol include Cg, denoting net government spending.

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[14] This is also set out in the current Treasury Green Book, paragraph 6.4, "if there is a budget ceiling, then the combination of proposals should be chosen that maximises the value of benefits. The ratio of the net present value to the expenditure falling within the constraint can be a useful guide to developing the best combination of proposals." The constraint will generally be public expenditure in general, since the expenditure review process means that, at the margin, the constraint applies equally across the whole of expenditure. The use of some subset of expenditure would need to be supported by argument that that subset was for some reason especially severely constrained.

[15] Not all of the potential, plausible demands on the FRM budget are known at the start of each financial year, so that there is no sharply defined minimum cut-off ratio defining the set of projects that would use the available budget. However this is not found in Transport, nor presumably in FRM, to be a material problem, partly because the benefit/cost ratio is only one of several factors in decision making and partly because substantial information is always available about proposals in the pipeline.

Another way of looking at the public expenditure constraint, which is attractive to many economists, is in terms of a "shadow price" of public spending – so that £1 of public cost or revenue is valued more highly than £1 of consumption. The use and value of such a shadow price was debated in government during the preparation of the current edition of the Treasury Green Book, but failed to make the draft issued for public consultation. Subsequently the Defra/ODPM/DfT Appraisal Group has obtained approval from the Treasury to incorporate this concept in DfT's appraisal guidance, suggesting that it 'might imply a 30 per cent uplift to expenditure costs'.[16]

This concept, which flows from a considerable and reputable, if quantitatively imprecise literature [17], provides a sound analytical basis for public expenditure rationing, and such a ratio could of course, as an alterative to using a benefit cost ratio, be routinely built into CBAs. However this would have no material effect if priorities were in any case being set on the basis of a benefit to public expenditure ratio, but it is an issue that might usefully be mentioned in the revised PAG, following the example of Transport.

2.3 Impacts on land use and land values and economic development

This Section addresses three issues that are not central to "the 'Sugden' approach", but which have been prominent in discussion as issues that may be suitable for review by Defra. They all relate to the valuation in CBA of the prospective impact of a scheme on the use or potential use of land.

2.3.1 Agricultural land

The current approach to agricultural benefits focuses on agricultural output. However farm economies are now increasingly dependent on diversification. And much agricultural land use policy is now focused on environmental quality.

This suggests that the handling of "agricultural" impacts in FRM appraisal (including but not limited to the CBA) may be ripe for review, with an objective of incorporating all the economic, environmental and social consequences of the change in the potential uses of the land that would be provided by the FRM

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16 See paragraphs 13 and 14 of the document 'Guidance on Value for Money: Explanatory Note', at http://www.dft.gov.uk/stellent/groups/dft_about/documents/page/dft_about_033476.hcsp The Defra/ODPM/DfT Appraisal Group is a grouping of economists, initially established to maintain professional links when DETR was disbanded.

17 The good work on this by government economists in 2001-2002 is summarised in Spackman (2004) (ibid.) (pages 485/6). The shadow price was described as the 'social opportunity cost of exchequer funds' (SOCEF). The concept is touched on loosely in the main Sugden report, insofar as its discussion of the case for using factor costs might be interpreted this way.

investment, which may include, for example, the opportunity for the farmer owner to diversify land into non-agricultural use.

2.3.2 Non-agricultural land

The current approach to impacts on non-agricultural land (and perhaps also diversified use of agricultural land) is robustly stated. PAG 3, Section 4.1.4, explains that **"***Development benefits arising from the intensification of land use should normally be excluded from the economic assessment of flood and coastal defence schemes. The primary reason for this exclusion is to preclude Government funding of works which would enable land to be developed for private gain. Where works are proposed for economic regeneration or similar purposes, there are other sources of funding available. A secondary reason for this approach is the adoption of the precautionary principle. Intensifying development of flood plains and areas of erosion risk is, generally, undesirable because of the restrictions that it will place on the future management of the river or coastal zone***."**

A more conventional approach to CBA would include such development benefits as social benefits, which they are, and deal with any politically undesirable or environmentally threatening aspects of these benefits either within the CBA (if they can be explicitly valued) or in the wider decision making framework. Any other approach lacks transparency.

Whether the benefits should be explicitly quantified within the CBA and its benefit/cost ratio does raise the *pragmatic* question of whether this might distort decision making if, for example, their inclusion gave them excessive weight in the decision making process relative to the associated environmental losses. But however development benefits are handled, there is no good case for not valuing them at all.

The expected increase in value of the newly protected land may lead to some fall in value of nearby land because it is now less "scarce". However that fall in value is not a social disbenefit, but a transfer of wealth between the land owners and those who currently rent or at some future time buy it.

2.3.3 Economic development

Some FRM schemes have implications for local development, typically in the sense of creating or preserving local jobs. This will always be seen by the local authority, and by the local population, as an important benefit, which should rank highly in decision making.

However central guidance (the "3Rs" guidance issued by ODPM)[18] is that local job creation or preservation *per se* is not a social benefit. This is because in

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18 "Assessing the impacts of spatial interventions: regeneration, renewal and regional development - 'The 3Rs guidance'" Report of Interdepartmental Group on the EGRUP Review, May 2004.

generally it will not, except perhaps very temporarily, affect aggregate national employment, which depends upon macroeconomic policies and the flexibility of the national labour market.[19] So, at the margin, employing someone is not only providing a social benefit from the output so produced (and social benefits to the employee). It is also imposing a cost on society by absorbing part of the labour force, and in principle displacing another job seeker elsewhere in the economy.

This logic, which is robust, applies as much to FRM schemes as to any other government intervention. It does not necessarily mean that development impacts bring no social benefit. But it does mean that they have to be handled case by case. For example:

- The prospective development may be in an area of chronically high unemployment, recognised by the government as meriting special treatment within the terms of the 3Rs guidance. It may even be integrated with an ongoing development strategy of the RDA or local authority.
- The employment may exceptionally include some critical facility, perhaps dominating the national supply of some specialist product, which for some reason needs protection and could not readily be moved or replaced by other sources.
- There may exceptionally be a timing issue, that local households and businesses, for defensible reasons, have not until now perceived themselves to be at serious risk, so that works to greatly reduce the risks over a decade or so might greatly reduce the disruption costs of adjusting to long term high risks.

Any development case is likely to require investigation extending beyond CBA, possibly inclusion of “cost per job” estimates as well as the systematic review and assessment of many factors that cannot be monetised. Further refinement of general procedures for such cases would need to be based largely on practical case studies.

2.4 The cost of CBA and data management in the possible new approach

Prima facie, moving to a more disaggregated set of CBA outputs, which is the central, distributional accounting feature of the main Sugden report, might be expected to imply more complex data collection. However the data held is already very sophisticated. To the best of our understanding of the data available, as presented and explained by the FHRC, the disaggregation proposed by Sugden would imply no more than modest one-off adjustments and no increase in the long term costs of data collection and management.

[19] This contrasts with the supply of extra land as potentially usable for development. This is a net social gain (setting aside any negative environmental externalities) because it increases the national stock of land available for development.

Furthermore, introducing the distributional accounting and the other recommended changes into the appraisal process would entail no significant new calculations, as opposed to laying out results in a different form and in some cases defining quantities in a different, but no more complicated way.

There are some new activities which might be introduced in parallel with, or in some cases supporting more disaggregation, such as one or other method of quantifying equity across households, and more work on land use impacts as discussed in Section 2.3 above.

However these are issues that Defra and the EA need to discuss anyway on their own merits. They are not components of "the 'Sugden' approach". And in any case the measures too do not from a theoretical perspective look troublingly resource intensive.

Thus, from a paper based perspective, the impact on appraisal costs of developments on the lines of those discussed in the main Sugden report, beyond a modest initial adjustment cost, should not be material. Ultimately however this is an empirical question, and this verdict may be confirmed the case studies.

We are told that the cost of appraisal processes in FRM is unusually high as a percentage of total programme expenditure. We have sought no firm data on this, in FRM or other programmes, but it would seem to be of interest to examine the composition of these costs and how they quantitatively compare with the corresponding components of other capital intensive public service programmes, such as Highways.

3. Specific Implications

We here address in turn each of the specific implications listed in the Project Specification for Work Area A. The items considered in Sections 3.1 to 3.4 are listed in the Specification as ‘essential’ items to explore and those in Sections 3.5 to 3.9 as ‘desirable’.

3.1 Private contributions/windfalls

We note that, in the context of FRM, ‘windfall’ is normally used to describe private contributions to the FRM budget. The term could also be used to describe the gains to many beneficiaries of the scheme, but the one area in which such gains are contentious we discussed under ‘allocation of funding’ in Section 2.2.5.2 above.[20]

In the current approach private contributions do not usually enter into the CBA, as they are regarded as a benefit to the public sector that is fully offset by the cost to the private contributor. This however overlooks the public expenditure constraint (or alternatively it overlooks the social opportunity cost or shadow price of public spending, which is more than £1 for each tax-financed £1). It therefore does not reflect in the analysis the social benefit of such contributions in terms of economic efficiency. It also conceals an item which raises issues needing judgement about equity.

A private contribution reduces the gross benefits, B, of a scheme and also reduces the public expenditure cost, Cg. It should therefore be deducted from both. For a project with a positive benefit/cost ratio this will always increase the ratio. This is illustrated in the table below, where we suppose that the effect of a private contribution of 1 is to decrease the gross benefit from 15 to 14 (since the benefit to private contributor has fallen by the amount of the contribution) and to decrease the public expenditure cost from 10 to 9 (since 1 unit is now funded by the contribution).

Table 1: Effect of contributions on metrics

	No private contribution	With private contribution of 1
B	15	14
C_g	10	9
NPV	5	5
B/C_g	1.5	1.7
NPV/C_g	0.5	0.7

[20] This latter usage of the term “windfall”, to describe a monetary benefit enjoyed by one party with no corresponding loss by another is more conventional. It could be better to describe private contributions as private contributions, and not as windfalls.

This is the procedure adopted in Transport appraisal.

The incorporation of private contributions into the CBA in this way deals only with their contribution to economic efficiency (or, in operational terms, their easing of the public expenditure constraint). As noted in the main Sugden report, concern about private contributions is driven in practice as much by a perception that it is inequitable for taxpayers to fund large expenditures to provide benefits concentrated on one or a few large private sector beneficiaries.

Explicit identification of such contributions will help the negotiating stance of Defra and the Environment Agency in such cases, by making the contributions, or their absence, more visible, and by demonstrating that they have a favourable impact of the estimated benefit/cost ratio. However the extent to which equity concerns should influence policy[21], and the instruments the government might use or construct to further promoter private contributions, while a rich and interesting field of policy development, are outside the scope of CBA and beyond our terms of reference.

3.2 Equity, income and distributional effects

As noted in Annex 5 of the Treasury Green Book, it is widely accepted that the gain in wellbeing or "utility" to an individual or household from a unit increase in income or wealth decreases as income or wealth increases. In short, a project that generates a WTP-based benefit of £100 for an individual of below-average income will almost certainly increase that individual's wellbeing or utility by more than would the same monetary benefit to an above-average income individual.

This suggests that, in an ideal world, if the government wished to give equal weight to everyone's marginal utility, it would be appropriate to apply marginal utility of income "multipliers" or "weights" to benefits measured in monetary terms before computing a project's overall benefit /cost ratio. However, the Treasury Green Book notes that the application of weights in a cost benefit analysis may be unduly complex and that balanced judgement may suffice for taking account of distributional effects.

In practice the usual way that such distributional weighting is applied in the analysis of public service policy and projects is simply by by-passing, as an unnecessary diversion, explicit monetary valuations by income of those affected, as discussed in Section 2.1.3.2 above.
We note that within FRM CBA the values ascribed to the distress caused to households (as opposed to the monetary cost of repairing damage) are similarly set at a value independent of household income.[22]

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21 Both in the sense of contributions being expected or required from large beneficiaries, and in the near opposite sense of not allowing contributions to contribute, or appear to contribute, to insufficient regard being given to the environment.

22 As set out in Section 3.1 to 3.5 of the Supplementary Note to Operating Authorities of July 2004.

However, in the current FRM CBA regime, physical damage to domestic property is normally valued at its monetary cost, so that the protection of larger homes, with more, and more expensive furnishings and fittings adds more to the estimated benefits of a scheme that does the protection of poorer homes.

Adjustment for this relative favouring of more wealthy properties (in terms of the weight given to the lost utility of those affected) is currently addressed by Defra in the Supplementary Note to Operating Authorities of July 2004.[23] This proposes that, "where necessary and practical", a set of four weighting factors should be applied to the standard depth-damage curves, according to social class group, ranging from 0.74 for AB households to 1.64 for DE households, with intermediate values of 1.12 and 1.22 for C1 and C2. It notes the need to take account of ownership as opposed to occupation where, for example, the properties at risk have a high proportion of rented accommodation. The note records that future developments in distributional impacts will be incorporated in subsequent guidance, having regard to feedback on how the proposals just described work in practice.

This Supplementary Note takes in our view a generally well reasoned, broadly proportionate approach. Obvious potential problems however include possibly very far-from-average correlation between social class and income in specific cases (e.g. groups of poor or ultra rich ABs, or rich Cs), and it will be interesting to see how this works out in practice. Of more concern, perhaps, is the temptation it may offer for more complexities to 'fix' problems that it reveals. We suggest below a simpler alternative,

The Supplementary note also suggests that property write offs should be valued at the average for the physical type of property (e.g. a three bedroom terraced house), applying the same value for all social classes. It suggests, fairly, that this "should go some way towards an approach which takes account of income distribution".

Our suggestion is to carry this logic further and to apply it much more widely, by costing flood damage at the same figure all types of property and social class, equal to say the regional average damage cost for the given depth of flooding. This would follow the examples quoted above of by-passing, in the CBA, explicit monetary valuations that are income dependant.

This may seem radical but, as in the examples above, it would remove the need for explicit weighting factors and, we suspect, be at least as fair as, and much simpler than any defensible alternative. It may or may not in the end be a technically and politically robust solution, but we commend it as an approach meriting discussion on its merits, with some investigation of how it might work in practice.

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23 As recorded in Work Area A Specification, under the heading of "Intangible benefits", and described on the Defra website as an Interim Guidance Note. The note is at http://www.defra.gov.uk/environ/fcd/pubs/pagn/fcdpag3/pag3suppjuly04.pdf

The choice of method depends in part upon the fundamental objectives of FRM policy. Traditionally the policy has been interpreted as that of protecting from risk the physical assets of homes and their contents, regardless of variations in the wealth of the asset owners. The use of regional average damage costs, by flood depth, for all households, would imply a policy objective of protecting households, regardless of variations in the monetary value of household assets. The use of physical asset values, with weighting adjustments for household income, would imply a policy of protecting assets, but with a subsequent income adjustment. At a conceptual level this third option is perhaps most attractive of the three, but in practice, given the serious uncertainties about the relevance of any standard set of weightings to a specific project, and the greater amount of work entailed in an asset based approach, it may well be that the second approach would be more accurate as well as simpler. It would be helpful to construct some data on the relationship between household asset damage and household income.

The use of regional average damage costs, by flood depth, for all households would not remove the need for primary data disaggregated by type of property, since this is needed to estimate regional average costs per property. Whether social class data are needed is less clear. We see little more need for social class data in FRM CBA, than in the need to know the social class of road users in Highways CBA, or of medical patients in comparing treatments in terms of QALYs.

We note the scope for developing income distribution adjustments which complicate rather than simplify the process as we propose. We hope that the procedures for developing the methodology in this respect are sufficiently rigorous to prevent this. The issue may we suggest be an area of sufficient general interest to consider at the DfT/ODPM/Defra Appraisal Group. [24]

3.3 Multi-criteria analysis

Multi-criteria analysis (MCA), in its various forms, is in some literature fairly rigorously defined – presumably reflecting its academic location often in Operational Research, at the boundary of the social and natural sciences. But, in contrast to CBA, MCA is not a single technique. It is an umbrella term that covers a very wide range of techniques, of widely varying complexity and quality and serving a range of different purposes. [25]

One contrast between methodological developments in FRM and in Transport is the divide between the development of MCA techniques and the development of CBA. We are concerned to find that in FRM MCA appears sometimes to be perceived as an "alternative" approach to CBA.

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[24] As noted above, this is a group of economists, initially set up to maintain professional links when DETR was disbanded.

[25] As illustrated for example in Chapters 4, 5 and 6 of the current government MCA manual, commissioned by DETR, taken over by DTLR and now owned by ODPM, at http://www.odpm.gov.uk/embedded_object.asp?id=1142252.

There is no inherent conflict between MCA and CBA. In a field such as FRM, as in Transport, they need to be developed in a coordinated way, with MCA incorporating CBA as a fundamental input.

As a matter of history, the development of NATA in Transport was driven largely by long standing concerns about differences in appraisal methodologies across different transport modes, for which there is no strong analogy in FRM. However it was also driven by the equally long standing problem, which applies also to FRM, that some costs and benefits can be incorporated in CBA while others cannot, with possibly excessive weight tending to being given to those impacts that could be monetised. Successive attempts to overcome this, such as the requirement for environmental assessments to set alongside the CBA, had not been seen as wholly successful.

Whether the present NATA regime is as good as can possibly be achieved is debatable, but it does at least set out the information needed for prioritising projects, including the CBA output, in a systematic, impartial and manageably concise way. It provides an unweighted MCA, which is considered on the whole to work. There has never been, to the best of our knowledge, any question of "comparing" MCA with CBA, let alone seeing them as alternatives. It is universally accepted that for competent appraisal in that field CBA has to be a core technique, that some important factors cannot be incorporated in the CBA, and that some methodology is needed to bring the CBA output and these other factors together.

The Sugden MCA report in contrast was required to address the issue of "MCA versus CBA". While we agree with the technical content of the resulting critique we would not ourselves frame the issues in that way.

It is well established in government that where reliable monetary values can be derived these should be used in policy, programme or project analysis, and where these values include impacts that are not directly marketed this is called CBA. CBA is itself one form of MCA. However the term MCA is more often reserved for analysis applied to costs and benefits which cannot all be explicitly valued in monetary terms. What is needed for FRM is an assessment of how MCA, in one or more of its several different forms, might be best be used to incorporated the CBA and other material information needed to guide decision-making.

The latter part of the Sugden MCA report moves most usefully in this direction by comparing the categories of cost and benefit advocated for CBA with those advocated in Defra's then proposed version of MCA. In a systematic and constructive way the report suggests a coherent structure for the FRM Appraisal Summary Table (AST). As the report notes, this closely follows the analogous presentation used in Transport.

The integration of CBA outputs with other material data, to provide manageable but unbiased information for decision making, is an issue that we would like to pursue much further, but this would be beyond the scope of this Work Area. We record however some observations, as follows.

1) In a policy field such as FRM, CBA is a fundamental requirement – we would say the fundamental requirement – for competent appraisal.
2) CBA cannot however cover all the material issues (such as environmental impacts that cannot be explicitly valued, and some distributional impacts); a methodology is thus needed to present all the relevant information in a manageable and unbiased way for decision making.
3) Any such methodology will be a form of MCA. However, in contrast to CBA, MCA is not a single technique, but an umbrella term which covers a wide range of techniques (not all of which are sound). The current NATA framework in Transport concludes with a simple form of MCA. The current Defra Priority Scoring system for comparing FRM schemes is another form of MCA.
4) There is no inherent conflict between MCA and CBA. They are complementary not competing methodologies. If such conflict arises it implies that:
   - the MCA is not adequately incorporating the CBA; and/or
   - the need to incorporate issues beyond the CBA, or the scope for doing this systematically, is not adequately recognised; and/or
   - there is misunderstanding of the technical content, or role in policy advice, of MCA and/or CBA.
5) Some MCA techniques are very rigorous, but also sophisticated and not generally transparent. We understand that such a technique, often described as multi-criteria decision analysis, is being tested in the current MCA pilots. This is an interesting experiment, which should be of interest and value widely across government. However it seems to us unlikely that such a rigorous form is currently appropriate for general use in FRM. It is not seen as currently appropriate to Transport.
6) We understand that another alternative being considered is that of absolute, centrally defined scales for standard criteria that cannot be valued, to which centrally defined weights might be applied. However for the impacts covered by the CBA these scales will be monetary. This implies, in effect, ascribing explicit monetary values to the centrally defined scales for all the other impacts. If it were possible to do this reliably they should all be incorporated in the CBA.
7) However it has been suggested to us that monetary valuations of non-market impacts derived by stated preference or revealed preference techniques are in some fundamental sense different from and non-commensurate with consumption values, so they all ought to be taken outside the CBA. This seems to us to misunderstand the nature of CBA valuations of non-marketed impacts.
8) More generally, the issue of what is inside and what is outside the CBA, and how the CBA is handled within the MCA, may be handled excellently if the relevant experts in economics and in MCA are enabled to work closely together and develop a good understanding of each others' expertise. This is needed for several reasons, one being the obvious danger of double counting if issues such as environmental, distributional and/or economic development impacts are handled in the CBA and again, separately, at the stage of the MCA.

9) The simple form of MCA used in Transport may provide a good medium term template for FRM.
10) Whatever methodology is used, a clear distinction needs to be maintained between consultation – which can provide information relevant to decision making – and decision making itself. Some MCA methodologies, such as multi-criteria mapping, can be used to explore stakeholder viewpoints. This can be valuable, but other MCA methodologies are needed for decision making.

3.3.1 Monetised costs and benefits and the Appraisal Summary Table

At Appendix A we attach, with some explanatory text, a proposed structure for a table of monetised costs and benefits, which would summarise the outputs of the a project CBA, together with a proposed structure for a Appraisal Summary Table (AST), which would also record the CBA results, but alongside data and commentary on factors that cannot be monetised.

The table of monetised costs and benefits is derived from the CBA summary table recorded at the end of main Sugden report. The AST is derived from the discussion on the Sugden MCA report of the headings for such table and their consistency with the CBA headings. The AST would be the basis for whatever version of MCA is to be used to provide for decision makers an overall picture of the proposal.

3.4 Residential/commercial/other trade losses; the numeraire; capping of losses

This heading differs from the other ‘specific issue’ headings in that it is framed in terms not of technical methodology but of the mechanics of its implementation – in particular the changes that might be required in the Middlesex FHRC property dataset if the CBA methodology were to be developed in the spirit of the main Sugden report.

These datasets, for residential and non-residential property, record the property located on floodplains in England and Wales and the losses to be expected for different types of property, according to the type of dwelling, its age and the social class of its occupants, as a result of flooding of different depths and duration. The data are currently recorded in the numeraire of ‘factor costs’ – that is market prices adjusted downwards to remove indirect taxes.

As already noted, the data held is very sophisticated and appears to meet virtually all the needs of a distributive accounting approach to CBA as proposed in the main Sugden report.

We discuss below the methodological aspects of each of the items covered by this heading

3.4.1 Residential/commercial/other trade losses

Apart from the choice of numeraire, discussed in Section 3.4.2 below, the only other qualifications suggested under this heading in the main Sugden report to current procedures are in the treatment of ‘goodwill’ in the case of abandonment of buildings (paragraph 6.10) and the conceptually related treatment of loss of profits in the case of disruption to trade (paragraph 6.13).

Assessing the welfare impact of local business expansion of contraction raises tricky conceptual issues. In general it should be assumed, for example, as noted in Section 2.3.3 above, that total employment in the economy is not more than very transiently affected as many feedback mechanisms come into play, via for example wage levels, physical mobility, business start ups, and fiscal and monetary policies. However, as noted in the main Sugden report, there are arguments for regarding the ‘goodwill’ component of the lost value of abandoned buildings and the profit element losses from trade disruption as social costs. We feel these are examples of issues that Defra and EA economists should consider and agree upon a recommendation.

The case for including the goodwill element of abandoned buildings looks to us fairly persuasive. The main Sugden report notes that *“if, say, a hotel is lost to erosion, then consumers’ expenditure will obviously be diverted to other goods and services. But goodwill is not a measure of expenditure; it is a measure of the component of surplus that the business is able to capture by virtue of its special features (e.g. location, reputation, history). Since there seems no reason to assume that when surplus is lost in one part of the economy there will be a compensating creation of surplus elsewhere, goodwill should be treated like other components of the market value of property.”* It seems plausible that when a surplus of this kind is lost there is no good reason to assume that a corresponding surplus will be generated elsewhere.

The case for including profits lost through trade disruption looks to us also on balance sound, but less clear cut. The financial value of the lost profit can be assumed to be diverted to increased profits of other businesses. On the other hand the trade disruption means that the management and planning and other inputs to the disrupted business, which generated the profit element in the sales revenues, are (almost certainly) themselves disrupted, with an associated loss of social welfare.

In any case the loss of profit is a cost to the disrupted business. Even if it were not counted as a net loss at the national or regional level, there would remain case for recording it as a profit loss to certain business, with another line recording a profit gain to other, non-flooded businesses. We have not investigated data sources for profits, but we would expect broad brush data such as national average figures for profit as a ratio to sales area (and/or possibly as a percentage of turnover) for business categories to be readily available and sufficiently accurate.

3.4.2 The numeraire: factor costs and market prices

We support the preference in the main Sugden report for the use of market prices in CBA. As noted in the Sugden report, any numeraire can be used in principle (such as pence, or euros), and the absolute requirement is for consistency. But there are several factors favouring the use of market prices.

- As emphasised in the Sugden report, WTP valuations of people's preferences, for example for environmental quality, or risk reduction, are measured in market prices and it must be hoped that over time more valuations of this kind will become available for use in FRM CBAs.
- Market processes are simpler to understand. Market prices are what most people, including senior officials and Ministers, understand by quantities of money.
- Market prices are simpler to collect and handle. Primary data are usually available either at market prices or at both market prices and factor cost (e.g. 'excluding VAT').[26] More work is needed to produce a comprehensive factor cost data set than a market price data set, and there is also scope for uncertainty about how indirect taxes are defined and measured.
- Perhaps the most significant, albeit reflecting the above, market prices are the numeraire recommended in the Treasury Green Book[27] and used almost universally in government (including Transport).
- Finally the abstruse technicality that, although arguments can be marshalled in support of factor costs, one conventional argument, as well set out in the main Sugden report, appears to have less force than was once presumed.[28]

3.4.3 Capping of losses

The Sugden report makes no reference to capping and it is not relevant to distributional accounting aspects or the other Sugden recommendations.
The capping debate does touch on the handling of distributional equity across domestic households at risk from flooding, and on the proposal in the

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26 Although not quite always. Some primary data for use in FRM CBAs is collected from businesses, such as those repairing household flood damage, that traditionally quote in VAT exclusive prices.

27 Treasury Green Book paragraph 5.11: "Costs and benefits should normally be based on market prices as they usually reflect the best alternative uses that the goods or services could be put to (the opportunity cost). However, market prices may need to be adjusted for tax differences between options." The last sentence refers to not allowing decisions to be distorted by their tax treatment – for example in comparing prices from one bidder for a product which include VAT with those from another which do not include VAT.

28 Feldstein (1997) ('How big should government be?', National Tax Journal, vol. 50, pp. 197–213) notes that the standard textbook position that a tax increase will reduce aggregate demand, with some consequent fall in tax revenue, does not apply in practice, because other instruments are used to maintain demand. He records however that many supply impacts, and distortions in the distribution of demand, are usually overlooked or underplayed – so justifying a very significant "social opportunity cost of exchequer funds", which is not however directly related to indirect tax rates.

Supplementary note of July 2004 to value write offs at the average for the physical type of property. However it is an issue which we feel needs to be approached from first principles. Our only recommendation is that whatever approach is decided – and we note that this is being debated, should be consistent with the principles underlying the Sugden reports and this report.

3.5 Insurance

Normally insurance is not an issue that needs to be considered in a CBA. It normally serves to smooth out the burden of physical losses over time and across people, but, via insurance premiums, leaves the loss ultimately with the group at risk. This can be important, since it protects those who are insured against very severe loss and spreads the load more evenly (and hence, in principle, at a lower total social cost in terms of loss of utility), but in practice this is generally an issue of much more political than analytical importance, and outside CBA.

However we note that FRM presents special issues, in at least two dimensions. One is that insurance premiums for flood protection are in general not "risk-based", but cross-subsided to the benefit of properties in flood plains. The other is that some properties are not-insurable against flood or coastal erosion risks. We note that the main Sugden report initially took as a working assumption a competitive (i.e. no longer cross-subsiding) insurance market, on the grounds that this seemed a plausible future scenario. But the final version includes a paragraph taking account of the market's current non-competitive features.

There is little doubt that a competitive, risk-based insurance market would best serve the public interest. It would be fairer and would provide more efficient incentives (for example for insurance companies to promote household flood damage mitigation measures). However it appears to be necessary for the government to sustain one distortion (agreement to spread premiums for flood risk over the whole of the property insurance market) to offset another distortion (unwillingness by the industry to insure competitively more than very small flood risks). As set out in a paper referenced in the main Sugden report[29], this has a very long history and is not an issue for this current project.

The lack of a competitive insurance market affects the distribution of benefits, since the reduction of flood damage insurance claims impacts mainly on property insurance premiums across the rest of the nation. We differ here on a presentational detail from the main Sugden report in that, for clarity of presentation, we believe this data, were it available, should be made explicit, for example by describing these benefits as a benefits to other households via insurance premiums, rather than simply benefits to insurance companies. However to the best of our understanding there is no data on the extent to

29 "Reforming the UK Flood Insurance Regime: The Breakdown of a Gentleman's Agreement" by Michael Huber, CARR Discussion Paper 18, January 2004, at http://www.lse.ac.uk/collections/CARR/pdf/Disspaper18.pdf

which, for a specific project, the household damage would be covered by insurance, or how much the premiums are subsidised. Such data would be of interest, but acquiring it would not seem to justify substantial effort.

Where previously non-insurable property is made insurable by an FRM scheme, this does not affect the total benefit in the CBA. The benefit will fall to the property occupiers and owners, who will presumably then generally enjoy insurance. However the protection of such properties may have a significant political value, and also provides an exceptionally high value to the particular occupiers and owners, who may be relieved of the risk of catastrophic loss. These however are factors to consider in the wider decision making framework beyond the CBA.
A clearer, or more widely understood picture of the extent to which flood protection increases individual property values, whether from data already available to Defra, the EA and their consultants or from new research, could be a useful contribution to policy development.

3.6 Intangible benefits

The valuation of intangibles is not an issue that would be affected by the adoption of a more disaggregated approach to CBA, although such an approach might help to emphasise such impacts more, and encourage research into their clearer definition and valuation. [30]

Much the same applies to heritage and recreational benefits. Our understanding is the Environment Agency and Defra economists have good links with leading authorities in these fields[31] and we see no reason for work in this area or its application to be affected by the choice of a more or less aggregated approach to CBA.

We believe the scope for explicit valuation in this field case by case may always be very limited, as the impacts are usually substantially case-specific and the work required for reliable valuation, even if it were technically feasible, would usually be disproportionate.

It is reasonable to hope that the accumulation of studies, progress in the hard sciences, and methodology development in valuation will over time give an increasingly good feel for the types of impact that matter and the value ascribed to them. This may however have more bearing on the stages beyond CBA, in

30 Discussion suggests that the figure for intangibles for households may merit further study, especially since the 50 per cent deduction for depreciation applied in the valuation of non-permanent assets implies that all of the inconvenience and hassle, as distinct from financial cost, of replacing these assets is covered by the intangibles figure.

31 We note for example the CSERGE Workshop at the University of East Anglia on 19 March 2003, which was chaired by Bill Watts of the Environment Agency, and where the joint author of the main overview paper was Stavros Georgiou, now in Defra Environmental Policy Economics. See http://www.uea.ac.uk/env/cserge/pub/wp/pa/pa_2004_01.pdf

helping to indicate how much weight should be given to such impacts within whatever new approach is adopted for the final comparison of all the impacts of a scheme, within some form of MCA, than within the CBA process.

3.7 Tax revenues and subsidies

The main Sugden report notes that exchequer cost[32] flows associated with changes in specific taxes (such as fuel duty, if, as the report says, it is interpreted as a revenue-raising tax, not as a charge equal to the environmental damage associated with fuel use), or subsidies (for example to agriculture) should be recorded. For the reasons discussed above, they should be recorded with the associated budgets to which they are a contribution, or from which they are sourced, including those funded from the FRM budget. As noted in the main Sugden report, they are excluded from the current approach and not mentioned in PAG 3.

In practice these flows are probably very small. The impact of an FRM project on vehicle fuel usage can rarely be substantial; and agricultural subsidies are now not only smaller than they have been, but also designed in such way that it seems unlikely that an FRM project would often have a substantial impact.

3.8 Water Framework Directive (WFD) implications

We understand that, although considerable Defra resources are currently devoted to WFD issues, and the WFD will in due course have a bearing on Flood Risk Management priorities, there do not appear to be any current WFD concerns that have implications for this study, which is addressing the basic analytical principles of appraisal. We would however expect the development of a distributional accounting approach to CBA (and a well understood technically satisfactory approach to MCA) to be helpful in applying WFD principles, by making clearer the trade offs entailed in any scheme.

3.9 Agricultural losses

We understand that results of a parallel research programme on this issue, to which this item of the specification refers, are not as yet available. However we support the recommendation in the main Sugden report, paragraphs 6.11 and 6.12, that impacts on agricultural producers should be recorded at market prices, and subsidies recorded as exchequer costs. Initially, the nature of the questions and issues faced by decision makers dealing with interface risk will

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32 Curiously the 2003 Green Book as issued makes no mention of exchequer costs, perhaps because of the last minute withdrawal of the "social opportunity cost of exchequer funds" from the consultation version. However we note that the term remains in widespread use in the Treasury and elsewhere in government.

need to be defined within this topic, before the guidance can begin to be developed.

4. Conclusions

The two Sugden reports make many recommendations for introducing into flood risk management (FRM) a distributional accounting approach to CBA, which would set out clearly how the costs and benefits of a proposed scheme would be distributed. The reports also made a number of other proposals about general methodology, relating to, for example, the numeraire, the benefit/cost ratio and MCA.

We endorse the distributional accounting proposals, with detailed suggestions on presentation and handling. We make a specific proposal for the inclusion of private contributions in the CBA benefit/cost ratio. More radically we suggest that the income distribution of household beneficiaries of flood protection might be handled in a fair and simple way by valuing flood damage to all domestic properties equally in the CBA. We endorse the principle of making clear the various sources of funds and the distribution of benefits, and propose an appropriate table of monetised costs and benefits and a consistent Appraisal Summary Table that would bring together the material for a final multi-criteria analysis.

Since the data needed for the distributional accounting recommended by Sugden are already available, and the other changes proposed are essentially presentational it is unlikely that the ongoing costs of adopting the principles advocated by Sugden would be significant, although this may become clearer from the case studies.

We also broadly endorse the recommendations in the main Sugden report on general methodology, with regard to the benefit/cost ratio, where we suggest the denominator should be total net exchequer cost, and with regard to the numeraire, which, with Sugden, we suggest should be expenditure at market prices. We also suggest some further standardisation of terminology, such as the use, following Treasury convention, of appraisal to describe ex ante analysis and evaluation to describe ex post analysis, and a clear understanding of what by convention is included and not included in a “cost benefit analysis”.

This examination of and commentary of the Sugden recommendations provides we believe a sound foundation for the case studies, which we will follow through in Work Area B, subject of course to further preparation to establish clearly, for example, the criteria against which the current approach and possible new approach or approaches should be compared.

We note the several references, in the Defra specification and in the main Sugden report, to practice in Transport appraisal and find ourselves drawing comparisons, especially with regard to Highways, where, although the policy field is inherently different in many ways from FRM, the scope for meaningful comparisons is also striking.

The most conspicuous difference in handling is the extreme degree of delegation and dispersal, in FRM, of responsibilities with respect to the development of technical methodology. There is no single expert authority within government controlling FRM appraisal development, in consultation as occasionally appropriate with the Treasury, in the sense that control is exercised over the development of WebTAG.[33]

We are impressed by the professionalism of the current MCA project management, which embraces a strong understanding of MCA. We are also impressed by the quality of the economic advice available in Defra and the EA.

The development of a technically sound, workable and authoritative set of procedures to integrate the CBA and other aspects of FRM appraisal, including, most importantly, the prospective OPM regime, will depend upon the MCA expertise in the Environment Agency and the economics expertise in Defra/EA working closely together and developing a good understanding of each other's field of expertise, preferably promoted by a strong Senior Civil Service lead.

This is especially important because of the danger that improvement of the CBA may give even more emphasis in decision making to impacts that can be monetised at the expense of those that cannot.

A review of the kind launched with Sugden papers inevitably opens up other areas of potential refinement. Examples in this case include the review of the handling and valuation of agricultural and non-agricultural land use impacts, and of impacts on employment. There may also be scope for further work developing from this project in helping to facilitate the coordination of methodological development and of technical expertise.

We also note comments made to us that the appraisal process under the current FRM regime appears to be relatively costly as a percentage of the total programme cost.

The priorities for the review reported in the companion report to this report (Jones-Lee and Spackman, 2006) were informed by the views of participants at a workshop. However, as work continued on the project, it was decided that some additional work was required on the implications of insurance for the application of the "Sugden", or disaggregated, approach to cost-benefit analysis in flood and coastal defence. We reviewed literature (in particular Huber 2004 and Crichton 2005) and discussed the issues with a number of experts[34]. The results are reported in Annex B. It appears that there is now little cross-subsidy between premiums for dwellings at risk from flooding and those not at risk. We

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33 This professional role in controlling the development of CBA and NATA in Transport is led by senior management , with substantial professional interest and input at Grade 3 level, and very strong inputs at Grade 5 level, from more than one division.

34 Defra and EA economists, and particularly Matt Crossman, Policy Adviser, Natural Perils, ABI (on secondment from Defra) and Federico di Pace, Economist, ABI

conclude that as the market is moving increasingly towards risk-based premiums there is no need for any line in the Appraisal Summary Table for the disaggregated approach to show cross-subsidisation by households not at flood risk of those that are flooded.

5. References

Assessing the impacts of spatial interventions: regeneration, renewal and regional development - 'The 3Rs guidance'" Report of Interdepartmental Group on the EGRUP Review, May 2004.

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Appendix A. Coordination of the Analysis of Monetised Costs and Benefits with the Appraisal Summary Table A

The Sugden MCA report recommends (paragraph 2.9) that “it seems highly desirable to retain as much as possible of the structure of CBA within a broader appraisal framework which allows non-monetary impacts to be registered.” To achieve this Sugden proposes the complementary use of an Appraisal Summary Table (AST) and an Analysis of Monetised Costs and Benefits. We endorse both the objective of retaining as much as possible of the structure of CBA within a broader appraisal framework and the achievement of this by the use of an AST and an Analysis of Monetised Costs and Benefits (or MCB table).

As Sugden recommends, the categories in the AST need in this case to be chosen so that, “as far as possible, they correspond with a mutually exclusive and exhaustive classification of cost and benefits that, in principle, are relevant for a CBA”. This, as Sugden notes, “avoids double counting and preserves the option of expanding the range of factors that are given monetary value as CBA methodology advances and as data that can be used for benefit transfer[35] accumulate”. As he further notes, it also ensures that the monetised entries in the AST are the constituent parts of the CBA.

As Sugden further notes, tables so designed “are features of the current appraisal framework for transport projects”.

We present below suggested structures for these two tables. The proposed Analysis of Monetised Costs and Benefits table is based on the “CBA spreadsheet” presented in the Sugden main report. The proposed Appraisal Summary Table is based on Table 2.3 of the Defra/EA R&D Technical Report FD2013/TR of November 2004 on *Evaluating a multi-criteria analysis (MCA) methodology for application to flood management and coastal defence appraisals*, referred to in the Sugden MCA report, and here, as *Evaluating MCA*.

A1 The Analysis of Monetised Costs and Benefits

Figure A1 presents a table which is based on that at the end of the Sugden main report and refined in the following ways.

- The costs include an explicit listing of sources of funds.
- The tabulation of benefits identifies explicitly, as in the Sugden main report, those benefits for which it may be reasonable to seek financial contributions from beneficiaries. However these are listed under their appropriate main heading (e.g. transport enhancement, which might

[35] Benefit transfer is the derivation of monetary values by use of experience from other applications.

reasonably be funded, if at all, by the Transport Department is listed under "Net impact on transport, utilities, and emergency services".) This replaces the listing of such benefits in the Sugden main report under a separate main heading of "non-FCD benefits". This is for two reasons. One is that it greatly simplifies the table and so improves transparency. The other is that it also much better distinguishes between the presentation of social costs and benefits and the presentation of data to assist in the negotiation of funding, both of which are important, but which are different functions.

- The "Impact on environmental/heritage value" is disaggregated into whichever sub headings in the AST are covered in the CBA.

In practical application the table would be applied to alternative options, for example with and without the enhancement by widening of a new road bridge. The comparison of the options would reveal the benefits and the extra costs and would provide the basis for a settlement, between the Environment Agency and the Transport Department, of whether the extra work should be undertaken and the funding of the extra cost.[36]

One feature which does not appear in either this table or that in the Sugden main report, although the text of the Sugden report implies that it might do, is the impact on national insurance premiums. If many houses protected from flooding had previously had subsidised insurance premiums, the insurance companies will receive a benefit because now, with no change in premiums paid for those houses, they are faced with less risk. This benefit will most probably filter through to other households, nationwide, via a very small reduction in national premiums. However it is seems doubtful that would be material value to decision making in undertaking a numerical estimate of the total reduction in expected costs to insurance companies. (There may be political importance in making houses that were previously uninsurable insurable, but this is primarily a political issue, to include in the Appraisal Summary Table.)

The table includes, in the calculation of the net exchequer (or public expenditure) costs, an item for the change in indirect tax revenue. This might fairly often be a material item for major transport projects, but for FRM schemes this would not be expected to be material in any but very rare cases, if any. However it is retained for completeness.

[36] The funding at issue in this case should of course be the extra cost, not the extra transport benefit, which might be much greater. The situation is different in the case of negotiating contributions from developers or other private sector beneficiaries, where the negotiation will be on the basis of the private sector partner contributing a share of the benefit which it enjoys.

Figure A1
Analysis of Monetised Costs and Benefits (MCB table)

Monetised Costs

Total monetised cost
C(total)
of which
Construction and maintenance C(c&m)
Funded from:
FRM budget (Defra, LAs, IDBs) C(pub1)
Public funding partner 1 (highway authority: government)
C(pub2)
Business funding partner 1 (developer: non-government)
C(bus1)
Business funding partner 2 (property-owner: non-government)
C(bus2)

Monetised Benefits
Total monetised benefits
B(total)
of which:
Reduced flood damage to/ abandonment of buildings B(buildg)
of which:
households B(buildg-hous)
businesses B(buildg-bus)
of which business funding partner 2 B(buildg-bus2)
public agencies B(build-pub)
Reduced flood damage to/ abandonment of agricultural land B(agric)
Reduced disruption to trade B(trade)
of which business funding partner 2 B(trade-bus2)
Net impact on transport, utilities, emergency services B(util)
of which:
households (e.g. as transport users) B(util-hous)
businesses B(util-bus)
public agencies B(util-pub)
and
of which the enhancement element is B(util-pub2)
Reduced intangible costs B(intan-hous)
Impact on environmental/heritage value B(env-hous)
of which
historic environment
landscape and visual amenity
etc. [using AST headings, where values are available]
Impact on recreational value B(rec-hous)
Development benefits B(dev)
of which project funding partner 1 B(dev-bus1)

Figure A1 (continued)
Analysis of Monetised Costs and Benefits (MCB table

Net benefit (net present value, NPV) = B(total) – C(total) = B(net)
Net exchequer cost = C(exch)
[C(exch) = C(pub1)+C(pub2) – B(build-pub) – B(util-pub) + C(subs) – ∆indirect tax]
B/Cg = B(total)/C(exch)

Attribution of benefits by initial incidence
Households
B(hous) = B(buildg-hous) + B(util-hous) +B (intan-hous) + B(env-hous) + B(rec-hous)
Businesses other than funding partners
B(bus-non-partners) = B(buildg-bus) + B(trade) + B(util-bus) – B(buildg-bus2) – B(trade-bus2) - B(util-bus2)
Business funding partner 1
B(dev-bus1) – C(bus1)
Business funding partner 2
B(buildg-bus2) + B(util-bus2) – C(bus2)
Agriculture
B(agric)

A2 The Appraisal Summary Table

Figure A2 presents a table which is based on Table 2.3 of Evaluation MCA, but modified in the following ways, mainly following the recommendations in Section 4 of the Sugden MCA report.

- A column has been added, listing the components of the CBA calculation, allocated to their appropriate category in the AST.
- The previous category of “Development benefits” has been replaced with a narrower category of “Regeneration benefits”, applying only to areas with exceptionally high unemployment. As the Sugden MCA report explains, the original category as described was not altogether consistent with Treasury and ODPM guidance. In particular local employment creation by FRM schemes should not be presented as a net social benefit. The alternative “Regeneration benefits” category as described is consistent with the practice adopted in Transport.
- In the description of the “Economic” type of impact the words “that can be easily valued” have been omitted. This is because, as noted in Section **2** of the main text, ‘economic” should not be equated with “can be valued”. CBA is not specifically about ‘economic’ impacts. It will make use of monetary values wherever a sufficiently reliable willingness-to-pay methodology can be developed. These are often environmental or social impacts, as for example with the valuation of time, or risk of death, or recreational values, or sometimes environmental impacts.
- Under the Economic type a new category has been added of “Public accounts”. The AST needs to incorporate the financial costs of the project to taxpayers as well as all its subsequent consequences.
- Under Health and Safety the words “posed by flood or erosion” have been inserted to avoid potential confusion and double counting among users who might seek to include under this heading health and safety benefits from other consequences of the project, such as better access for emergency services, which come under the separate category of “availability and accessibility of services”.
- Under Availability and accessibility of services the words “to the extent that theses impacts are not fully covered under Transport or Assets” have been added, to reflect the concerns properly raised in the Sugden MCA report (paragraph 4.7) of the dangers of double counting here.
- The description of the Equity category has been modified to include the important qualification that some equity issues have already be covered within the CBA, and thus are already covered in the quantified component of the Assets category, and possibly other categories. It has also been modified to include the issue of reducing the number of uninsurable properties, and to explain the reference to social tensions in terms of the possible resentments that may arise from conspicuously different treatments of different stakeholders - such as residents on either side of a river.

- “Sense of Community” at the end of the Social types of category has been deleted, because we share the view in the Sugden MCA report (paragraph 4.9) that it is hard to see issues here meriting inclusion in decision making advice that are not better covered under other categories.

One aspect which is not included in the table, but may be of substance, perhaps under the category of equity, is that of local political popularity.

Figure A2
Components of an Appraisal Summary Table for Flood Risk Management projects

Types	Categories	Category Description	Monetised costs and benefits
Economic Reflect impacts that affect that affect the local, regional and national economy.	Assets	Includes flood damages and/or losses relating to (permanent and temporary) private and public property such as residential, industrial and/or commercial property, caravan parks, public buildings (for example, schools, hospitals) sewage and water supply networks, pipelines, etc.	B(buildg)+B(trade)
	Land use	Includes flood damages to land used for agricultural, industrial, urban, forestry, commercial fisheries purposes.	B(agric)+B(dev)
	Transport	Includes impacts to roads, bridges, railways and navigation.	B(util) (part)
	Regeneration benefits	Includes any contribution which the scheme makes to local regeneration plans in an area of exceptionally high unemployment.	
	Public accounts	Net public expenditure cost of the scheme.	C(exch)
Environmental Reflect impacts that affect the natural and built environment.	Physical habitats	Includes impacts to terrestrial (including coastal), aquatic and marine habitats and biodiversity, its conservation designations, and its flora and fauna.	B(env-hous)(part), if available
	Water quality	Includes impacts on biological and chemical quality of surface and groundwaters. Important indicators to consider include: chemical and biological GQA grades; river quality objectives; consented and un-consented discharges; and designated bathing waters.	B(env-hous)(part), if available
	Water quantity	Includes impacts on the water levels and water supplies (such as drainage and runoff).	B(env-hous)(part), if available
	Historic environment	Includes impacts on heritage, archaeological and geological features.	B(env-hous)(part), if available
	Landscape and visual amenity	Includes impacts on the appearance of the land (its shape, colour, and particular features), its	B(env-hous)(part), if available

Types	Categories	Category Description	Monetised costs and benefits
		landscape designations as well as its agreeable nature.	
	Natural Processes	Includes impacts on flow dynamics, sediment transport, geomorphology, etc.	
Social Reflect impacts that affect the general public and their way of life.	Recreation	Includes impacts on the processes or means of entertainment. It includes angling, informal recreation (walking, sunbathing, picnicking, sitting, swimming, etc.) and formal recreation (sports and other activities that require specific equipment).	B(rec-hous), if available
	Health and safety	Includes impacts such as risk posed by flood or erosion to life or serious injury, stress and anxiety (mental health and livelihood) and other health effects, such as those created during the construction phase of the project (noise and air pollution, for example).	B(intan-hous)
	Availability and accessibility of services	Includes impacts on availability and accessibility to public services such as education, housing, emergency and cleaning services, health, cultural facilities, to the extent that theses impacts are not fully covered under Transport or Assets.	B(util)(part)
	Equity	Includes any important distributional impacts not captured on the monetised costs and benefits - e.g. large reduction in number of uninsurable properties; unusual impacts on vulnerable groups (the elderly, children, etc.); social tensions because of local distribution of costs and benefits	

Appendix B. Extracts from Defra Specification: Work Area A

B1Work Area A: Assess Implications of *Sugden-WTP* Approach

In this work area, implications arising from the *Sugden-WTP* calculus approach should be considered in two discrete, but linked areas, regarded as the *General implications* and *Specific Implications*. For each, implications should be considered from the viewpoint of Defra, the operating authority and the appraiser. It will also be important to identify the various impacts upon current policy and practice in order to understand how best to manage such impacts, but this will be further explored in Work Area C. The successful tenderer will be invited to an early project workshop with Defra and EA to enable to project team to meet; exchange ideas and concerns; manage expectations; provide clarifications; confirm the key questions that this contract should answer and set direction for Work Area A.

1 The General Implications

Tenderers should explore the basic methods proposed by Prof. Sugden's paper (Appendix B, Section 3), including future use and application of the NPV/K rule generally, in FCERM projects in practice, where NPV refers to net present value of a project and K refers to the project's capital cost. Tenderers should explore the advantages and disadvantages in the evidence arising from the research, and consider what this means for decision making in broad terms. For example (and amongst other questions that the successful tenderer should ask), how would the cost to Defra/EA of *Sugden-WTP* approach compare with current SCB approach. See Foreword to Appendix B covering *'Summary statistic'* for more information.

2 The Specific Implications.

Tenderers should explore the pros and cons of more specific implications/impacts arising from the *Sugden-WTP* calculus approach and build on the issues and initial concerns raised by Prof Sugden's papers (Appendix B and C). In considering these appendices, impacts arising from Prof Sugden's papers have been identified below (list is not necessarily exhaustive) with a more detailed specification shown in Appendix A. The impacts have been grouped into what Defra currently considers as *'Essential'* and *'Desirable'* in terms of research importance, and may guide tenderers on the scale of time and effort in considering each of these impacts.

'Essential' impacts to explore:

i. *Consideration of private contributions; windfalls; developer benefit additionality multi-objective scheme appraisal, recognising the wider policy need for optimal use of the flood plain and the need for long term resilience to potentially increasing flood events.*
ii. *Consideration of equity, income and distributional effects.*
iii. *Relationship to Multi Criteria Analysis.*

iv. *Research on residential/commercial/other trade losses, including implications for existing datasets used within the industry; factor costs and market prices; capping of residential/non-residential property losses.*

'Desirable' impacts to explore:

v. *Competitive insurance market recognising the significant contribution that the wide availability of insurance cover can play in management of flood risk.*
vi. *Intangible benefits including: environmental (e.g. wetlands), heritage, recreational and human health.*
vii. The appropriate treatment of tax revenues and subsidies.
viii. Water Framework Directive (WFD) implication.
ix. Agricultural losses.

For considering several areas of impact, above, the successful tenderer is likely to liaise with Middlesex University's Flood Hazard Research Centre (FHRC) to assess the implications of *Sugden-WTP* calculus on their data. The current industry-standard data that FHRC produces was designed for use with existing social cost benefit appraisal approaches.

The successful tenderer may also consider other factors that they consider critical for assessing the implications of WTP calculus, based on further reading of Prof Sugden's papers, the Defra forewords, and other relevant knowledge and experience. This could feature as part of the supplementary tender information as described in Section 1.13.

Prioritisation of Flood and Coastal Erosion Risk Management (FCERM) projects and strategies may be significantly influenced by the findings of this project. Tenderers are not asked to consider policy solutions to any prioritisation issues that emerge at this stage, but rather to just 'surface' these issues for future work items, either for this contract or elsewhere.

Appendix A

Work Area A - Specific Requirements.

Tenderers should explore more specific implications arising from this WTP calculus approach, considering a balanced view of the advantages and disadvantages associated with the approach, and build on the issues and initial concerns raised by Prof Sugden's papers, as described below. It is important to stress that this Work Area is about considering the evidence for policy making rather than making policy itself.

<u>**Essential Impacts**</u>

i. ***Consideration of private contributions; windfalls; developer benefit additionality multi-objective scheme appraisal, recognising the***

wider policy need for optimal use of the flood plain and the need for long term resilience to potentially increasing flood events.

Although the present appraisal guidance attempts to encourage private contributions, many are treated as a 'windfall' to national FCERM public budget rather than featuring in any accounts following the SCB approach. This offers limited incentive for contributions to come forward. The successful tenderer should take full account of the supporting documents covering private contributions, windfalls; developer benefit additionality; multi-objective scheme appraisal.

The successful tenderer should consider how the *Sugden-WTP* approach could: allow contributions and multi-objective schemes to play a more important role in option appraisal; affect economic efficiency and priority and how this information is presented; differentiate between core and non-core benefits; enable project costs to be disaggregated to fall on relevant departmental budgets; and how *Sugden-WTP* approach can be used as a lever for additional private sector or other public contributions outside the FM budget.

Tenderers should also consider how developer benefit additionality is treated under Sugden-WTP. Depending on the type of development, there are likely to be dead-weight and displacement effects, and leakage and multiplier effects at a local level. The successful tenderer should consider simple approaches for tackling non-additionality.

As discussed earlier, a balanced investigation of the pros and cons of the Sugden-WTP approach is necessary in terms of appraising contributions by others.

ii. Consideration of equity, income and distributional effects.

FCERM decision making typically involves the discretionary allocation of large benefits and often raises questions of fairness. For example, decision making with SCB approaches have a 'national interest' perspective, rather than a disaggregated perspective of the *'gainers and losers'*. As such it is important to be able to explain how costs and benefits are to be distributed, not just to disaggregate the benefits under the *Sugden-WTP* approach.

Hence the successful tenderer should also develop criteria and tests for fairness such that information from the Sugden-WTP approach is arranged to forecast more equitable/fair outcomes, as well as apportioning the benefits and costs to interested parties, and evaluate any impacts related to the use of equity multipliers. The successful tenderer should: examine the supporting documents and consider any implications to appraisal associated with this, and determine whether/how existing arrangements, including recent Defra FM policy on socioeconomic equity, (See http://defraweb/environ/fcd/pubs/pagn/fcdpag3/hodjuly04.htm) should change in practice.

Again, a balanced investigation of the pros and cons of the *Sugden-WTP* approach is necessary, in terms of exploring equity, income and distributional effects.

iii. Relationship to Multi Criteria Analysis.

Prof Sugden's paper *Integrating Cost-Benefit Analysis and Multi-Criteria Analysis of Flood and Coastal Defence Projects* (See Appendix C) has highlighted a number of opportunities to develop on earlier MCA research (FD2013) for Defra, and build the links with a *Sugden-WTP* approach. As well as raising issues with the earlier research, the paper sets out how *Sugden-WTP* and MCA could be integrated.

The successful tenderer should fully consider and report with recommendations on the pros and cons of integrating the Sugden-WTP approach with MCA, based on the support documents in Appendix B and C; and the risks of overlapping and double counting with these integrated approaches. They should take available opportunities to collaborate with other ongoing work in EA/Defra piloting the MCA techniques emerging from earlier research.

iv. Research on residential/commercial/other trade losses, including implications for existing datasets used within the industry; factor costs and market prices; capping of residential/non-residential property losses.

In moving to the *Sugden-WTP* approach, the successful tenderer should consider whether there is any systematic bias in the current industry standard data sets used for loss or cost evaluation, and whether/where adjustment to data or approach is worthwhile in relation to the relative precision of valuations and other sources of uncertainty.

Tenderers should also consider in particular the extent and form of further information would be required to evaluate commercial/non-residential losses under the *Sugden-WTP* approach, particularly trading losses which are assumed to be netted out in current SCB analyses and are not therefore evaluated. Close liaison with Flood Hazard Research Centre (FHRC) would be key to this, since FHRC are owners of non-residential damage datasets (based on SBC approach), used by the majority of the industry.

<u>**Desirable Impacts**</u>

v. Competitive insurance market recognising the significant contribution that the wide availability of insurance cover can play in management of flood risk.

FCERM currently relies on there being an effective insurance market to manage extreme risks. The successful tenderer would need to consider whether/how any distributional effects which may emerge from the *Sugden-WTP* approach, would positively or negatively impact the insured, the uninsured and other interest groups, given that impacts of a flood event on these groups can be different. The successful tenderer should evaluate any impacts that the *Sugden-WTP* approach would offer.

The successful tenderer is to consider whether there is a need to take account of impacts of the insurance market and, in particular, any need to differentiate between insured and non-insured parties. Included in this work should be consideration for the treatment of *ex-post* costs and *ex-anti* risks, as set out by Prof. Sugden in Appendix A, Section 6.6.

In carrying out this work and making recommendations, the successful tenderer should be aware of the fundamental role of insurance in the flood risk management system in supporting recovery from extreme events. They should also consider the data that would be needed to implement any recommendation and its likely availability.

vi. Intangible benefits including: environmental (e.g. wetlands), heritage, recreational and human health.

The successful tenderer should consider any implications of recent research into environmental evaluation (e.g. wetlands) and whether/how the methodologies recommended in that research require modification.

Additionally, implications on heritage and recreational benefit assessment should be assessed, along with benefit assessment of human health and related Defra policy guidance at http://defraweb/environ/fcd/pubs/pagn/fcdpag3/hodjuly04.htm In addition, the successful tenderer should consider whether/how the *Sugden-WTP* approach is compatible with the various techniques available to evaluate the intangible benefits and whether/how the approach can be used with consistency.

vii. The appropriate treatment of tax revenues and subsidies.

The successful tenderer should consider whether there are any further implications of the *Sugden-WTP* approach, *not covered by iv above*, in the treatment of direct and indirect taxes in relation to using consistent factor costs. Included in this work should be any further consideration for the treatment of indirect tax and related correction factors, as discussed by Prof Sugden in Appendix B, Report Section 5.

The successful tenderer should also consider any further implications of the Sugden-WTP approach in relation to agricultural subsidies (See Appendix B, Report Section 6.9 and 6.10), and other subsidies and grants that are considered with FCERM appraisal.

viii. Water Framework Directive (WFD) implications;

Article 4 of the WFD sets environmental and specific objectives to meet in order for a water body to achieve good status or good potential. One requirement will be to determine how strategies or projects pass through tests of cost effectiveness and disproportionate costs. Such tests, currently under development, are likely to accommodate a *Sugden-WTP* approach, especially as social, environmental and economic costs and benefits may need to be identified and disaggregated.

The successful tenderer should liaise with Defra Water Framework Directive Team and its Collaborative Research Project. The following project is of particular relevance: *Project 1b of the CRP on River Basin Management Planning Economics – Consistent Appraisal Approaches.* The successful tenderer should then report back summarising any key issues arising with the *Sugden-WTP* approach, and its relationship with WFD and work into cost effectiveness and disproportionate costs.

ix. Agricultural losses.

Defra is currently reviewing its agricultural assessment methods for FCERM appraisal. This is due to the recent Common Agricultural Policy reforms and the introduction of the Single Farm Payment (SFP) form of subsidy, to replace the previous regime. However, other issues are under investigation, such as the effect of various land uses that may be distorting the price of agricultural land, in addition to that of the SFP.

The successful tenderer should: review existing agricultural assessment policy for FCERM appraisal, including the ongoing policy development work by Defra to update policy guidelines; and explore how the *Sugden-WTP* approach can be applied to agricultural appraisal, for example, to the identification of different gainers and losers; e.g. Farmers, Government and others.

The successful tenderer should highlight the pros and cons of using this disaggregated information and make recommendations as to how existing policies might need to be adjusted.

Appendix C: Further investigation into insurance issues

The priorities for the review reported in the companion report to this report (Jones-Lee and Spackman, 2006) were informed by the views of participants at a workshop. However, as work continued on the project, it was decided that some additional work was required on the implications of insurance for the application of the "Sugden", or disaggregated, approach to cost-benefit analysis in flood and coastal defence. We reviewed literature (in particular Huber 2004 and Crichton 2005) and discussed the issues with a number of experts[37].

We are advised that in England and Wales, 2.3 million out of a total of about 26 million properties are located in flood plains. Of these over half are thought to be at "low risk" (once in 200 years or more), just under a quarter "medium risk" (between once in 200 years and once in 75 years) and about quarter at "significant risk" (more than once in 75 years). There is however considerable uncertainty in the national scale assessments; the Environment Agency has a flood risk map, but this is not at individual property scale (although the Agency will provide information to householders to help in dealing with insurers). Individual ABI Members, especially the larger ones, have their own commercial data, but the ABI does not hold area-specific data.

The severe autumn and winter floods of 2000 led to increased debate among the many institutions affected, and in 2002 the ABI issued a Statement of Principles, to the effect that it would continue generally to insure properties at flood risk, subject to sufficient government activity to reduce flood risks. In October 2005 the ABI produced an "Anniversary Report" on "Revisiting the Partnership Five Years on from Autumn 2000" and in November 2005 the ABI published an updated Statement of Principles agreed with Government.

These updated Principles explain that for areas with a flood risk of one in 75 years or less flood cover will continue to be available as a standard feature of household and small business policies. For areas at higher risk, but with improved defences planned within five years to reduce risk to one in 75 years or less, cover will generally be maintained. The premiums charged and other policy terms, such as excesses, will reflect the magnitude of the risk.

For areas at higher risk but with no flood defence improvement planned, the risks will be examined case by case. Larger insurers in particular are now starting to look at improving incentives for households and businesses to make their higher risk properties insurable against flood risk. As a contribution to this the ABI and the National Flood Forum have jointly produced a booklet on "Repairing your home or business after a flood – how to limit damage and disruption in the future", designed mainly to help make properties insurable against flood risk, by improving flood resistance (keeping water out) and/or flood resilience (reducing damaged caused by flooding inside the property).

[37] Defra and EA economists, and particularly Matt Crossman, Policy Adviser, Natural Perils, ABI (on secondment from Defra) and Federico di Pace, Economist, ABI

It is believed that very few properties at flood risk have no buildings cover. A recent ONS report (Family Spending 2005: A report on the 2004/05 Expenditure and Food Survey) provides a breakdown on insurance take-up by income decile.[38] It may be that the current UK system of flood insurance, with premium levels increasingly based on risk, provides better incentives to avoid flood risk than those typical of other countries. In France for example premiums are paid into an emergencies fund and in the Netherlands the government provides the cover.

It appears that there is now little cross-subsidy between premiums for dwellings at risk from flooding and those not at risk. We conclude that as the market is moving increasingly towards risk-based premiums there is no need for any line in the Appraisal Summary Table for the disaggregated approach to show corss-subsidisation by households not at flood risk of those that are flooded.

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[38] We were subsequently advised that the ONS data shows that, for house buildings insurance, 85 per cent of the lowest income decile of households buying a home with a mortgage have buildings insurance compared with 90 per cent of all such households. In the lowest income deciles, 85 per cent of households owning their home outright have buildings cover compared with 89 per cent of all outright home owners. In terms of contents cover, some (primarily social) landlords provide insurance with rent schemes that cover the home contents, but the ABI has no statistics on this. The ONS statistics suggest that 45 per cent and 58 per cent of the households in the two lowest income deciles respectively have home contents insurance, compared with an average 77 per cent for the UK population as a whole.

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