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NRA

MANUAL OF
INVESTMENT APPRAISAL



ENVIRONMENT AGENCY

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ANGLIAN REGION

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National Rivers Authority
Anglian Region

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SECTION 1

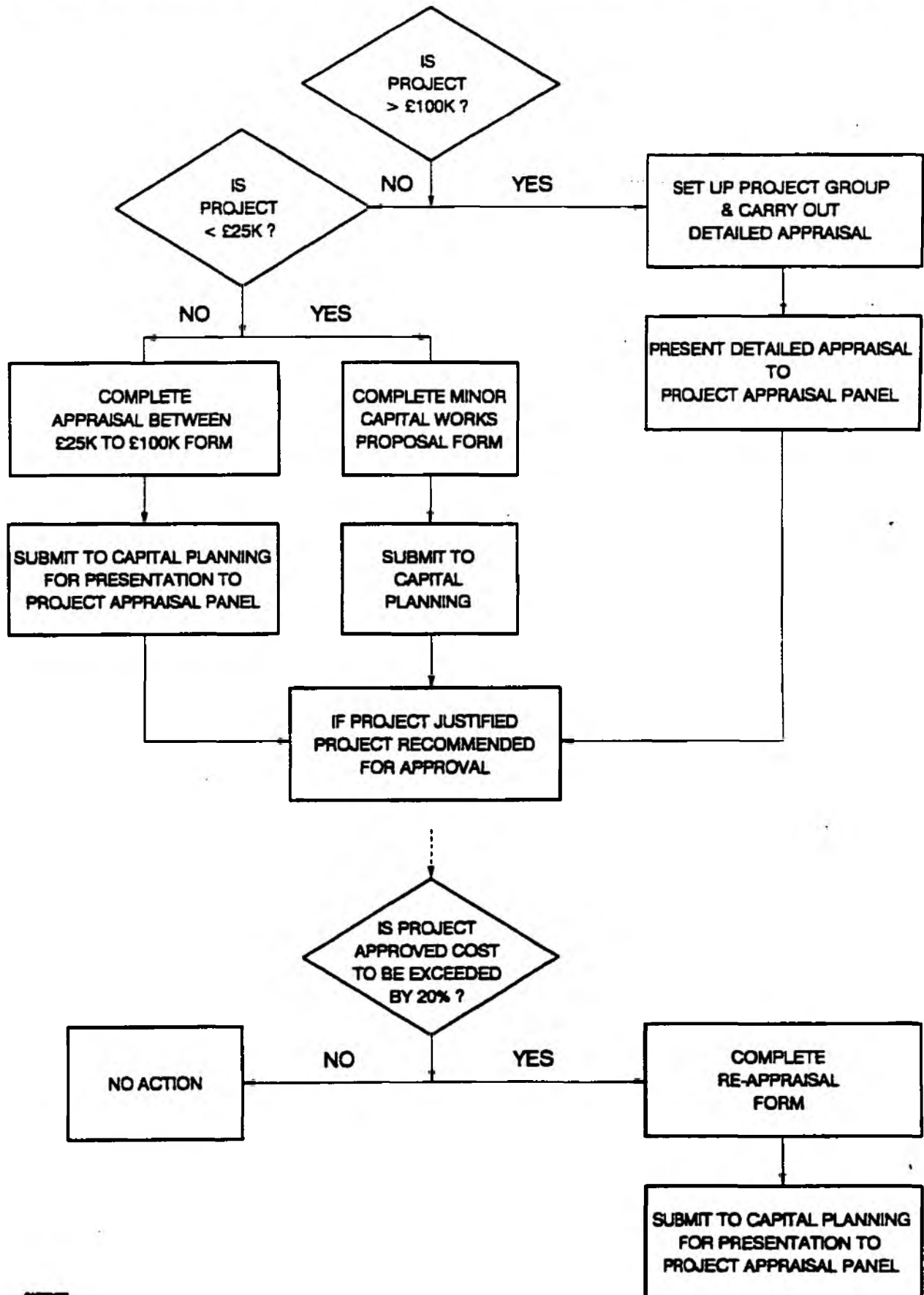
INTRODUCTION

1. INTRODUCTION

- 1.1 This manual describes the requirements for the justification of all investment in capital expenditure regardless of the service or funding arrangements, ie, is applicable to both Flood Defence and DoE projects.
- 1.2 Under the Financial Memorandum, Schedule 6:-
- all projects estimated to cost in excess of £25,000 are subject to full appraisal in line with Treasury Guidelines.
 - there should be no artificial division of expenditure which would affect this requirement.
 - if the costs of a project rise by more than 20% above approved cost, then the project is to be re-appraised.
- 1.3 The appraisal of projects < £100k will be in accordance with the requirements set out under 'Section 2 - Summary Appraisals' for the completion of an appraisal report form (ARF).
- 1.4 The appraisal of projects > £100k will be in accordance with the requirements set out under 'Section 3 - Detailed Appraisals' for the preparation of a detailed appraisal report (DAR).
- 1.5 The re-appraisal of projects will be in accordance with the requirements set out under 'Section 4 - Project Re-appraisal' for the completion of a re-appraisal of project form (RPF).
- 1.6 The post project appraisals of projects will be in accordance with the requirements set out under 'Section 5 - Post Project Appraisal' for the preparation of a post project appraisal report.
- 1.7 Following completion of appraisals all ARF's above £25k, DAR's and RPF's will be submitted for recommendation of approval by the Project Appraisal Panel.

- 1.8 Following completion of a Post Project Appraisal the report will be submitted to the Project Appraisal Panel for comments before submission to Management Team for approval.
- 1.9 The appraisal of flood defence projects must have regard to MAFF guidelines and requirements.

Flowchart for the Appraisal of A Project.



SECTION 2

SUMMARY APPRAISALS

2. SUMMARY APPRAISALS

2.1 Projects up to £25,000 Estimated Cost

2.1.1 For projects below £25k a full appraisal is not required. Form ARF/1 should be completed to show the consequences of doing nothing and the various options considered.

2.1.2 The consequences of doing nothing must relate to what will happen if no action at all is undertaken, and assumes that no maintenance or repairs will be carried out.

2.1.3 Normally the lowest cost option should be preferred and adequate reasons must be given if this is not the case.

Where there is only one solution and no alternative options are available, this fact must be clearly stated.

2.1.4 After completion this form should be forwarded to Capital Planning for them to consider inclusion in the capital programme, and comment accordingly.

2.1.5 The form will then be submitted by Capital Planning for approval to incur expenditure under the Scheme of Delegation.

2.1.6 An example of Form ARF/1 is shown at the end of this Section.

2. SUMMARY APPRAISALS

2.2 Projects between £25,000 and £100,000

2.2.1 For projects between £25k and £100k a full appraisal is necessary but a detailed appraisal report will not normally be required. An appraisal report Form ARF/2 should be completed to demonstrate that the investment is economically justified.

2.2.2 Treasury Guidelines must be complied with (see Annex 1).

2.2.3 A copy of Form ARF/2 and guidelines for completion are shown at the end of this section. An alternative form which is to be used for vehicles and mobile plant is also shown.

2.2.4 Supporting information may be appended to the form. This will be particularly relevant where there is insufficient room on the form to describe the problem/need, or to detail the consequences of doing nothing. A detailed breakdown of the capital costs of options must be provided.

2.2.5 The consequence of doing nothing must relate to what will happen if no action at all is taken, and assumes that no maintenance or repairs will be carried out.

2.2.6 The net present cost of alternative options must be shown. If the preferred option is not the lowest NPC, adequate explanation of why the lowest cost option is not being recommended must be given.

Where there are no alternative options, this fact must be clearly stated. Alternative options which are not considered to be feasible should be outlined, and rejected on technical grounds.

2.2.7 Wherever possible, benefits should be quantified and the benefit/cost ratio of the preferred option shown. Where there are no benefits, or the effort to financially quantify them is disproportionate to the cost of the project, then the NPC of the do nothing option can be used as the "benefit". If it is not possible to quantify the do nothing option in financial terms, then the project justification will rely on the consequences of doing nothing which should be explained in sufficient detail.

2. SUMMARY APPRAISALS

- 2.2.8 All costs and benefits must be at current price levels, and the price base date should be stated.
- 2.2.9 Completed forms, with attachments, should be forwarded to Capital Planning who will liaise with Finance prior to submitting them to the Project Appraisal Panel.
- 2.2.10 If necessary, a short presentation may be requested by the chairman of the Project Appraisal Panel.
- 2.2.11 After submission to the Panel, forms are submitted by Capital Planning for approval to incur expenditure under the Scheme of Delegations.

2. SUMMARY APPRAISALS

2.3 Form ARF/2: Guidelines For Completion

2.3.1 COMPARISON OF OPTIONS

- (a) The net present costs for each Option must be calculated over the same period; this normally being the shortest asset life of any of the Options.
- (b) Asset lives are determined as follows:-
 - (i) for tangible fixed assets - in accordance with the Authority's depreciation policy, (see Annex 2) but with a maximum of 50 years.
 - (ii) for intangible assets (see Annex 2) - an assessment of the effective useful life of the Option, but with a maximum of 50 years.
- (c) Where capital expenditure is proposed during the coming year, the net present cost is the same as the capital cost. However, any expenditure in subsequent years must be discounted to arrive at the net present cost.
- (d) If an Option has a life which is greater than the period of calculation (see Note 1) then it is necessary to take into account it's residual value at the end of the period, which must be discounted to give the true NPC.
- (e) Maintenance costs should reflect the estimated maintenance costs expected as a result of doing each Option, and must be discounted over the period of calculation.
- (f) A discount rate of 6% must be used (see Annex 3).

2. SUMMARY APPRAISALS

2.3 Form ARF/2: Guidelines for Completion

2.3.1 Comparison of Option cont'd

Example (nb calculation period; 30 years)

Option 1 : Life 30 Years

	f	
Capital Cost £50k (Year 0)	= NPC	50k
Maintenance Cost £2k per annum = 2×13.7651 (30 yrs)	= NPC	<u>28k</u>
Total	= NPC	<u>78k</u>

Option 2 : Life 30 Years

Capital Cost £85k (Yr 0 40k; Yr 1 45k = $40 + (45 \times 0.9434)$ (Yr 1))	= NPC	82K
Maintenance Cost Nil		<u>0</u>
Total	= NPC	<u>82k</u>

Option 3 : Life 40 Years

Capital Cost £100k (Yr 0)	100	
less residual value $(10/40 \times 100 \times 0.1741)$ (Yr 30))	<u>4</u>	= NPC 96k
Maintenance Cost £1k pa = 1×13.7651 (30 yrs)		= NPC <u>14k</u>
Total	= NPC	<u>110k</u>

2. SUMMARY APPRAISALS

2.3 Form ARF/2 - Guidelines For Completion

2.3.2 JUSTIFICATION

- (a) Benefits must be calculated over the same period as is used for the comparison of costs.
- (b) The assessment of benefits should relate to the anticipated savings, or avoidance of costs, that are expected to arise in the future as a result of undertaking the project.
- (c) These do not necessarily have to accrue to the NRA but can relate to the community in general (eg flood damage avoided).
- (d) The benefits must be capitalised, ie discounted back from the year they are expected to arise, to give a present day value.
- (e) Details of benefit calculations, including the period used, should be attached to the completed form. The cost to be used in the justification are the total net present costs of the preferred option.

2.3.3 REVENUE CONSEQUENCES

Where revenue consequences are expected to arise, details must be given of costs and timings, so the impact on revenue budgets is clear

This should include the effect on revenue costs of either increases or reductions to the existing level of maintenance or repairs, following implementation of the preferred option.

Similarly any changes to running costs (eg electricity charges) should be stated.

2. SUMMARY APPRAISALS

2.4 Form ARF/3 - Guidelines For Completion

1. This form is to be used for the acquisition of replacement or additional vehicles or items of mobile plant.
2. Part 1 is completed by the requisitioner. The consequences of doing nothing, ie not purchasing or hiring the particular item must be stated.
3. The financial appraisal in Part 2 is completed by the Transport Section to show whether purchase or hire is the best economical solution.
4. For replacement items it should be stated whether or not the existing asset is fully depreciated and at the end of its useful life.
5. Where repair or refurbishment of an existing item is an alternative, then this option should be costed for comparison, and consideration given to whether this would be the most economical solution.

NRA ANGLIAN REGION

MINOR CAPITAL WORKS (UP TO £25K) PROPOSAL

ICS PROJECT NO. (to be completed by Capital Planning)		PROJECT TITLE	
SERVICE	AREA	ESTIMATED COST (£000)	
		FINANCIAL YEAR	
DESCRIPTION OF PROBLEM/NEED			
CONSEQUENCES OF DOING NOTHING			
OPTIONS CONSIDERED AND ESTIMATED COSTS (indicate preferred option and give reasons if not lowest cost)			
COMPLETED BY:		DATE:	
CAPITAL PLANNING COMMENTS			
APPROVED BY: SENIOR MANAGER		DATE:	

APPRAISAL OF PROJECTS BETWEEN £25K AND £100K

ICS PROJECT NO. (to be completed by Capital Planning)	PROJECT TITLE		
SERVICE	ESTIMATED COST (£000'S)	199 /9 199 /9 Total	£ _____
AREA			
DESCRIPTION OF PROBLEM/NEED			
CONSEQUENCES OF DOING NOTHING			
COMPARISON OF OPTIONS:			
		£'000s)	
NO.	DESCRIPTION	ASSET LIFE	CAPITAL COST NPC
		MAINTENANCE COST NPC	TOTAL NPC
1			
2			
3			
4			
5			
THE PREFERRED OPTION IS NUMBER:			
JUSTIFICATION:			
BENEFIT	COSTS	B/C RATIO	
REVENUE CONSEQUENCES YES/NO (if YES please attach details)			
ENVIRONMENTAL ASPECTS REVIEWED BY CONSERVATION & RECREATION OFFICER			YES/NO
COMPLETED BY:		DATE	
CHECKED BY TECHNICAL ACCOUNTANT:		DATE	
PROJECT APPRAISAL PANEL COMMENTS			
APPROVED BY		DATE	

NATIONAL RIVERS AUTHORITY - ANGLIAN REGION
PURCHASE APPRAISAL FOR MOBILE PLANT/ADDITIONAL VEHICLES
Appraisal No. _____

Part 1 - DESCRIPTION (COMPLETED BY USER SECTION)

CATCHMENT AREA **DISTRICT** **USER**

REASON FOR PURCHASE

USE

CONSEQUENCES OF DOING NOTHING (i.e. No Owning or Hire)

EXPECTED UTILIZATION BETWEEN TO **WEEKS/HOURS PER YEAR**

SIGNED **POST** **DATE**

PART 2 - FINANCIAL APPRAISAL **TODAYS PRICES** (COMPLETED BY PLANT & TRANSPORT SECTION)

BUDGET PRICE **BOOK LIFE** **YE**

TYPICAL EXTERNAL HIRE RATE:- **DISCOUNTED LIFE COSTS**

<u>AVERAGE ESTIMATED YEARLY COSTS</u>		<u>COST</u>	<u>DISCOUNT FACTOR</u>	<u>N.P.V.</u>
DEPRECIATION	:-.....	CAPITAL:-.....	.....	.....
MAINTENANCE	:-.....	MTCE :-.....	.....	.....
OTHER TAX/INS etc	:-.....	OTHER :-.....	.....	.....
TOTAL COST TO OWN (A)	:-.....	TOTAL COST TO OWN (A)	:-	.....
EXTERNAL HIRE COSTS (B):-.....		EXT (B):-.....	.....	.....
SAVINGS BY OWNING B-A :-.....		SAVINGS BY OWNING B-A	:-	.....

CURRENT INTERNAL HIRE RATE:- **YEARLY INTERNAL HIRE INCOME:-**

SIGNED **POST** **DATE**

CHECKED BY TECHNICAL ACCOUNTANT **DATE**

PART 3 - ACCEPTANCE APPROVAL

SIGNED **DATE** **OPERATIONS/ENVIRONMENT MA**

SIGNED **DATE** **REGIONAL CO-ORDINATOR**

SIGNED **DATE** **REGIONAL MANAGER**

NOTE: N.P.V. = Nett Present Value

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SECTION 3

DETAILED APPRAISAL REPORTS

3. DETAILED APPRAISAL REPORTS

3.1 Projects estimated to cost in excess of £100k are subject to full and detailed appraisal in line with Treasury Guidelines (see Annex 1).

3.2 For Flood Defence projects reference should also be made to MAFF guidelines (see Annex 8).

If separate Engineers Reports are required for submission to MAFF they should refer to the detailed appraisal report, and comment on any changes and revisions, eg introduce current estimates and benefit/cost ratios.

3.3 Sometimes a strategy report will be more appropriate, particularly for projects lasting many years, or with several phases. In such cases the report should follow the requirements for a detailed appraisal.

Subsequently, brief Engineers Reports should be prepared for each phase and should show more accurate estimates of costs together with an updated economic justification. These reports will be submitted to the Project Appraisal Panel and to MAFF.

3.4 Reports must be clear, concise and logical. Statements must be justified in the report or by reference to other works. Diagrams, tables, lists and cross referencing of text should be employed to facilitate and improve understanding. Full use should be made of appendices for matters of detail.

3.5 The advice of the Regional Estates Surveyor should be sought regarding such matters as land values, wayleaves, easements, disposals, building rentals, etc, where these have an impact on the appraisal.

3.6 A Project Group is required, which through the Project Manager will be responsible for the preparation of the report and submission to the Project Appraisal Panel (see Annex 4).

3.7 After consideration by the Panel and approval by the Management Group, Capital Planning will seek the necessary approval to incur expenditure on a project in accordance with the Scheme of Delegation.

3. DETAILED APPRAISALS REPORTS

3.8 The purposes of the report are:-

- To identify problems or needs.
- To recommend appropriate design criteria.
- To explore alternative options to be able to recommend a solution.
- To demonstrate that the project is justified.
- To demonstrate that environmental matters and planning considerations have been adequately and positively considered and that there should be no insurmountable objectives to the proposed option.
- To recommend (or not) preparation of an Environmental Assessment.
- To propose an expenditure profile appropriate to the project and within the constraints of the capital programme and grant eligibility.
- To highlight any matters which may require policy decisions by the Authority.
- To demonstrate compliance with Treasury Guidelines (and MAFF guidance notes if appropriate).
- To be consistent with the aims and objectives of the NRA.

3. DETAILED APPRAISAL REPORTS

3.9 The report should consist of the following sections:-

- Project Summary and plan
- Description of the Problem
- Background Information
- Objectives
- Design Criteria
- Environmental Considerations
- Options
- Project Justification
- Contributions
- Project Timing
- Conclusions and Recommendations
- Appendices

Each of these headings are discussed in detail on the following pages.

3. DETAILED APPRAISAL REPORTS

3.10 REPORT CONTENTS

Each report should include a PGM form immediately following the title page, showing the name and title of each member of the Project Group (see example at the end of this section).

3.10.1 Project Summary

The project summary should ideally be brief (eg no more than 2 sides of A4). It must stand alone, be non technical and refer to a location plan.

The summary should cover the scope of the report with particular mention of location, present standards, the problem, proposed standards, recommended solution, environmental matters, estimated costs, proposed timing and priority. A proposed expenditure profile should be given, and compared with current provision in the medium term plan.

The need for further approvals or licences should be stated as well as Political aspects or consequences and any corporate impacts of the preferred option.

3.10.2 Description of Problem

A description of the problem is required. This is a most important section of the report and will normally include a statement of need. The problem must be fully and accurately defined to ensure approval is achieved and to identify and design the solution. All relevant facts should be included and substantiated.

The section should include a statement of any change in the problem perceived at the feasibility stage with an explanation of any change of scope or cost of the project.

3. DETAILED APPRAISAL REPORTS

Clear evidence of the problem and its cause is required so that any works proposed can be seen to be justified (eg photographs, calculations, test results, other reports, flood data, plant condition reports).

Forecasts of changes should be stated - water levels, wind or wave climate, changes in physical processes, changes in operating procedures.

Current standards or condition must be stated, including safety requirements.

This section should not stray into discussion of solutions or options. It is a description of the problem.

3.10.3 Background Information

This section is available if required for related background or additional information which may be relevant.

Likely inclusions are: History of the area or project.

Records of other relevant works.

Other matters which may have a bearing on the choices of option.

3.10.4 Objectives

The principal objective of the proposed works should be stated, eg:-

- "to prevent loss of life and damage to property by averting a structural failure of the sea defence".
- "to improve the efficiency and reliability of pumps on the Ely Ouse - Essex Transfer Scheme".

3. DETAILED APPRAISAL REPORTS

Any secondary objectives should also be stated, eg:-

- "Maintain or enhance the environment wherever possible".
- "Provide access for maintenance operations".

3.10.5 Design Criteria

The required standards should be stated, and details given of the factors to be considered to achieve them.

For flood defence projects this will include discussion of still water levels, wave climate, fluvial discharges, freeboard, etc, and the source of any data used, eg Sea Defence Management Study.

Consideration must be given to planning requirements, listed properties, conservation areas, etc.

3.10.6 Environmental Considerations

(a) General

The NRA is required to follow environmental assessment procedures as part of its activities. The framework for such assessments, and the production of Environmental Statements, if required, is laid out within statutory instruments 1199 and 1217.

At the earliest stage of any scheme, the Project Manager should consult with the Conservation and Recreation Officer to determine the requirement or not of conservation staff on the project group.

In this section of the appraisal, a preliminary assessment of the environmental impact of the scheme is to be included, which should identify potential problem areas.

3. DETAILED APPRAISAL REPORT

This should take the form of a River Corridor Survey (or similar) and details of the landscape and planning status (eg urban conservation area), and of any known Sites of Special Scientific Interest (SSSI), nature reserves, archaeological sites or ancient monuments in the area of works. A brief statement should be included detailing: a description of the likely significant impact of the scheme; the measures envisaged to avoid, reduce or remedy these effects; and details of any particular elements of the scheme which positively further conservation, and enhance the landscape.

The Project Manager and Conservation and Recreation Officer should decide as early as possible if a full Environmental Statement is required, its extent, and where there is a need for further investigations. They should also decide together whether an external environmental consultant should be appointed. If this course is adopted, then the Conservation and Recreation Officer should be involved in the decision as to which consultants are engaged, and Guidance Note: Environmental Assessment Brief is given in Annex 7.

Careful consideration should be given to the need to produce an Environmental Statement for all projects that fall within an area designated as being of national conservation, landscape or archaeological importance.

This will include Sites of Special Scientific Interest (SSSI), Areas of Outstanding Natural Beauty (AONB) and Heritage Coasts, Environmentally Sensitive Areas (ESA), National Parks (eg Broads Authority Area) Archaeological Areas and Scheduled Monuments.

This section should also be used to identify any need for Planning Permission or to warn of the likely nature of any objections to the scheme on planning/environmental grounds and whether such objections might lead to need for a Ministerial Decision or Public Enquiry.

3. DETAILED APPRAISAL REPORTS

The likely need (or not) for an Environmental Statement under SI 1217 or SI 1199 should be stated.

Any need for licences or consents for 'Dumping at Sea', and Marine Dredging, or from Department of Transport and Crown Estates should be stated.

Reference should be made to the DoE booklet 'Policy Appraisal and the Environment' (Ref ISBN 0 11 752487 5) available from HMSO (£6.75). All environmental impacts of the proposed works (both good and bad) should be clearly tabulated.

(b) Liaison with Environmental Bodies

The majority of the work promoted by NRA is seen as having, or has an effect upon the environment.

Early consultation should be made with all environmental bodies, during the preparation of the appraisal, to ensure that environmental matters are adequately accommodated in the solution. The views of the Conservation and Recreations Officer must also be obtained.

It should be made clear at the initial liaison meetings that the purpose is exploratory and that formal liaison will follow when more firm engineering proposals are available.

Typically the list of Groups will include:-

English Nature
Countryside Commission
National Parks (eg Broads Authority)
English Heritage
National Trust
RSPB
Local Wildlife Trusts

3. DETAILED APPRAISAL REPORTS

MAFF Fisheries
Crown Estates
Planning Authorities
Heritage Groups
Town and Parish Councils
District and County Councils
Archaeological Societies
Geological Societies
Port Authorities
Department of Transport
National Farmers Union

In order to meet our duties under the Water Act 1989 this liaison is essential.

3.10.7 Options

It must be demonstrated that a sufficient number of alternative options have been considered.

- i) This section of the report should start with a list of the various options that have been considered.

A 'do-nothing' option should be included to highlight the consequences of inaction and provide a basis for economical appraisal. This should relate to what will happen if no action at all is undertaken, and assumes that no maintenance or repairs will be carried out.

ii) Description and Evaluation of Options

Options should each be fully described in sufficient detail to distinguish between them and to demonstrate that they have been carefully formulated. Definitions of improvement are included, in Annex 9 to assist in description and evaluation of Options for flood defence projects.

3. DETAILED APPRAISAL REPORTS

Only viable options should be fully evaluated. The design, functional, operational, environmental and economic consequences should be stated and the ability to satisfy key objectives assessed. Non-viable options should be briefly stated and dismissed on either technical, environmental or financial grounds.

A plan of each option may assist in identification.

The economic analysis of the capital and revenue costs of each option should be stated (see Annex 10). Full details of the cost estimates must be given in an Appendix to the report. A table should summarise the results of the economic analysis.

iii) Summary

A table may also be given to allow easy comparison of the various non-monetary features of each option, its advantages and disadvantages.

3.10.8 Project Justification

Economic justification of the proposed project must be shown. This will normally be by demonstrating that the benefits of the scheme exceed the costs and benefits, benefit/cost ratios and net present values should therefore be stated.

The methodology used for determining benefits and the source of any data used should be stated. Detailed benefit calculations must be given in an Appendix to the report. Annex 10 gives further details of the requirements for benefits and economic justification.

3. DETAILED APPRAISAL REPORTS

3.10.9 Contributions

Any contributions due or required should be detailed together with a statement of the justification for the contribution and the effect on the project justification if the contribution is not forthcoming. Reference should be made to the MIMS procedure note for Capital Contributions.

3.10.10 Project Timing

Proposed timing of the project should be given with reasons, including consequences of delay.

For both flood defence and DoE projects the priority ranking of the project should be stated, and the detailed calculation shown in an appendix to the report (see Annex 6).

The existing allocation within the capital programme should be shown together with the proposed phasing of the capital costs.

3.10.11 Conclusions and Recommendations

A clear conclusion should be drawn and the preferred option recommended. Recommendations should also be made where appropriate for further consultation, or submission to MAFF for agreement in principle for grant aid.

3.10.12 Appendices

Appendices should be used to hold all detailed calculations, cost estimates, priority ranking calculations, drawings, data, photos, soil investigation information, references, etc.

The following sequence of Appendices is suggested.

1. References.
2. Project Justification.
3. Cost estimates for options.

3. DETAILED APPRAISAL REPORTS

3.10.12 Appendices - Continued

4. Conservation liaison.
5. Miscellaneous correspondence.
6. Calculation of Priority Ranking.
7. Photographs.

PROJECT GROUP MEMBERSHIP

DETAILED APPRAISAL

This report was prepared in consultation with the following Project Group:-

PROJECT GROUP MEMBERS

<u>NAME</u>	<u>TITLE</u>
.....
.....
.....
.....
.....
.....
.....

In addition to the members of the project group, assistance was given by and consultation took place with:-

<u>NAME</u>	<u>TITLE</u>
.....
.....
.....
.....

SECTION 4
PROJECT RE-APPRAISAL

4. PROJECT RE-APPRAISAL

- 4.1 As soon as it becomes evident that the revised cost will exceed the approved cost by 20% a project must be re-appraised.
- 4.2 As far as possible prior approval to incur expenditure above the approved cost of a project is to be obtained. If the approved cost is to be exceeded when tenders are received then approval to exceed the approved cost is to be obtained prior to letting the contract.
- 4.3 A Re-appraisal Form (RPF) is to be completed to identify the reasons for the increase in cost. Comparisons between the original approved cost and the revised cost should be shown.
- 4.4 Re-evaluation of all the options considered at Detailed Appraisal Stage should be carried out to demonstrate that the preferred option recommended in the Detailed Appraisal is still the most cost effective. If there were no alternative options then this fact must be stated.
- 4.5 Supporting information may be appended to the form. This will be particularly relevant where there is insufficient room on the form to adequately demonstrate the reasons for the increase in cost.
- 4.6 Completed forms together with supporting information should be forwarded to Capital Planning, who will liaise with Finance prior to submission to the Project Appraisal Panel.
- 4.7 After submission to the Panel forms are submitted by Capital Planning for approval.
- 4.8 An example of Form RPF is shown at the end of this Section.

RE-APPRAISAL OF PROJECT
(Where the revised cost exceed the approval cost by 20%)

ICS PROJECT NO.	PROJECT TITLE					
APPROVED COST (£000)	REVISED ESTIMATED COST (£000)					
SERVICE	AREA	FINANCIAL YEAR				
REASONS FOR INCREASE IN COST						
RE-EVALUATION OF OPTIONS						
OPTION DESCRIPTION	ASSET LIFE	CAPITAL COST NPC		MAINTENANCE COST NPC		TOTAL NPC
<div style="display: flex; justify-content: space-between;"> PREFERRED OPTION NO: ORIGINAL REVISED </div>						
<div style="display: flex; justify-content: space-between;"> REVISED JUSTIFICATION: </div>						
BENEFITS	COSTS			B/C RATIO		
COMPLETED BY:				DATE:		
CHECKED BY TECHNICAL ACCOUNTANT:				DATE:		
PROJECT APPRAISAL PANEL COMMENTS						
APPROVED BY				DATE		

SECTION 5
POST PROJECT APPRAISALS

5. POST PROJECT APPRAISAL

5.1 The aim of Post Project Appraisal is to obtain the maximum benefit from lessons learnt and the experiences gained at all stages of the project and thus improve project appraisal, design, management and construction. Successful post project appraisal is based on a critical look at the project's objectives including its expected costs, timing and environmental impact and how they are being met.

5.2 Post Project Appraisal is to be carried out in two stages:-

Stage 1 Construction Appraisal.

A technical and financial audit of the project 3 months following the end of the maintenance period.

Stage 2 Performance Appraisal

A technical review of the performance of the project 4 years following the end of the maintenance period or sooner if a project has been subject to a severe event. An alternative time period may be specified in the Stage 1 Construction Appraisal Report.

5.3 Project Team

The appraisal should be led by one person who must be independent of the sponsoring department. That person shall be responsible for co-ordinating the report and must consult with other departments and bodies on a needs basis.

The Project Team shall consist of nominees from:-

Capital Planning

Finance

Sponsoring Department

Operation

Conservation Officer

Wherever possible team members should not have been involved in the original project group but the original project manager can be co-opted, where necessary.

5. POST PROJECT APPRAISAL

5.4 Approach

The following approach is recommended:-

- Review all documentation.
- Visit site accompanied by the original Project Manager and other functional representatives, where appropriate.
- Identify the main aspects of the project, draw up list of consultees and establish tasks.
- Draft report to be discussed with original project manager for factual check and comments. The Project Team may wish to reply to these comments and report accordingly. All comments are to be bound into the report as an addendum.
- Final report with recommendations to be submitted to the Project Appraisal Panel before submission to Management Team for approval.
- Circulate report widely to Senior Managers, Project Managers, Project Engineers, Finance, Environment, Public Relations, etc.

5.5 Selection of Projects

Projects for Post Project Appraisal should be carefully chosen from the wide range of the Authority's work and should include projects making use of new techniques. This will offer the greatest opportunity to continuously improve our performance from the experiences gained.

At the beginning of each year Capital Planning will liaise with all functional departments to compile a schedule of projects for Post Project Appraisal. This schedule will be submitted to the Project Appraisal Panel for recommendations to the Management Team.

5. POST PROJECT APPRAISAL

Projects for Post Project Appraisal can be selected at any stage of progress - detailed appraisal, design and construction. A wide choice of projects is to be encouraged to obtain the maximum benefits.

Two projects should be undertaken each financial year.

5.6 Format of Reports

Report headings and bullet points (to be used as a checklist).

Stage 1 Construction Appraisal

5.6.1 Summary

- Standalone statement of findings
- Successes
- Failures
- Recommendations

5.6.2 Introduction

Summary of project

- Problem (purpose)
- Solution
- Structure of project management
- Cost
- Time

5. POST PROJECT APPRAISAL

5.6.3 Time

- Compare actual dates with target dates for key activities:-
 - detailed appraisal
 - detailed design
 - contract documents
 - MAFF submission
 - construction start
- Compare initial contract period with actual contract period
- Conclusions

5.6.4 Cost

- Compare actual cost to target cost for key activities:-
 - detailed appraisal
 - detailed design
 - contract documents
 - site supervision
 - project management
- Compare final account value with tender value at appraisal and design stages.
- Conclusions

5.6.5 Design (Specification)

- Selection of preferred option
- Adequacy of site investigation

5. POST PROJECT APPRAISAL

- Any change from detailed appraisal
- Adequacy of contract documents
- Liaison with Operations/other functional departments
- Consultation with general public/Local Authorities
- Performance of In-House/Consultant
- Level and ability of staff
- Compliance with brief
- Quality assurance
- Contractor responsible for any aspects of design
- Review decision whether to prepare an Environmental Assessment
- Conclusions

5.5.6 Construction (Implementation)

- EWF/Contractor
- Performance of Contractor
- Quality of Workmanship
- Disputes, claims or difficulties

5. POST PROJECT APPRAISAL

- Liaison with site staff/Operations/General Public/Other Bodies
- Complaints and Commendations
- Environmental damage caused during works
- Quality assurance
- Conclusions

5.6.7 Conclusions

5.6.8 Recommendations

- recommend actions arising from conclusions
- need for further appraisal

5.6.9 Appendices

- Project Details Form (see example)
- Financial Statement
- Performance Assessment(s)

5. POST PROJECT APPRAISAL

PROJECT DETAILS FORM

Project Title

Project Manager
Project Engineer
Consultant
Contractor

Detailed Appraisal

Approved Cost
Approved Date
Benefits
B/C Ratio

MAFF Submission

Submission Date
Approved Date
Approved Cost

Tender

Tender Value
Latest Contract Out-turn
Date of Commencement Certificate
Contract Period
Due Completion Date
Actual Completion Date
Actual Contract Period

Activity

	<u>Target</u>	<u>Actual</u>
Detailed Appraisal (completion)		
Detailed Design (completion)		
MAFF Submission		
Construction Start		

Costs

	<u>Target</u>	<u>Actual</u>
Detailed Appraisal		
Detailed Design		
Contract Documents		
Site Supervision		
Project Management		

5. POST PROJECT APPRAISAL

5.7 Stage 2 Performance Appraisal

This report is to cover a review of the performance of the project over a period of time. Report to concentrate on the following aspects:-

5.7.1 Summary

5.7.2 Design Performance

- project performance against design standards/criteria set at appraisal stage
- in keeping with the surroundings
- quality
- effect of change in policy, design criteria, climatic conditions
- in hindsight what could we have done better?
- conclusions

5.7.3 Operational Performance

- compare actual maintenance costs to target costs
- achievement of operational expectations
- were recommendations for change in maintenance practice/policy implemented
- conclusions

5. POST PROJECT APPRAISAL

5.7.4 Environmental Impact

- achievement of long term environmental enhancements/Environmental Assessment recommendations
- change/improvements to environment
- conclusions

5.7.5 Public Relations

- change in public perception
- conclusions

5.7.6 Conclusions

5.7.7 Recommendations

ANNEX 1

TREASURY GUIDELINES

TREASURY GUIDELINES

1. The guidelines are set out in a booklet entitled 'Economic Appraisal in Central Government - A Technical Guide for Government Departments' available from HMSO (reference ISBN 0 11 560034 5) at a cost of £7.75.
2. Essentially the guidelines require that:-
 - (a) A range of options be considered, including a 'do-nothing' option.
 - (b) Costs and benefits should be valued at the best alternative use to which they could be put (ie their opportunity cost).
 - (c) Any important costs and benefits which cannot be valued in monetary terms should at least be recorded and whenever possible quantified (using weighting and scoring if appropriate).
 - (d) Costs and benefits should normally be expressed in 'real terms' ie, at the general price level applying when the appraisal is carried out. However, relative price movements should be taken into account where the price of a particular good or service is expected to increase or decrease significantly more or less than the general rate of inflation.
 - (e) Costs and benefits which can be valued in money terms should be allocated to the time period in which they are expected to occur.
 - (f) Projectives or forecasts should be consistent with national trends.
 - (g) Costs and benefits should be discounted for the period over which they extend, and the net present value given.
 - (h) Where there are uncertainties about the estimated costs or benefits, sensitivity analyses should be used to test how the project outturn varies with each uncertainty.

- (i) The test discount rate of 6% should be used.
- (j) The time horizon for appraisal will normally be determined by the economic or physical life of the main asset concerned or the period over which the service is required.
- (k) Costs of goods and services which have already been incurred should be ignored in an appraisal (ie sunk costs).
- (l) In order to compare options with different lifetimes it is necessary to either assume that a piece of equipment would be succeeded indefinitely by similar equipment or to assume a residual value where the appraisal period ceases short of the lifetime of a piece of equipment.

ANNEX 2

ASSET LIVES

RECOMMENDED ASSET LIVES

TANGIBLE ASSETS

ASSET LIFE

Land	--
Buildings - Brick, Stone, etc	60
Buildings - Steel Frame, Timber	30
Buildings - Temporary	10
Roads, Car Parks	60
Bridges - Masonry, Brick	100
Bridges - Metal, Timber	40
Boreholes - Civils	60
Boreholes - Greensand	15
Pumping Stations Civils	60
Gauging Stations - Civils	60
Jetties, Piers	20
Locks, Weirs	100
Sluices	40
Boreholes - Mechanical	20
Pumping Stations - Mechanical	20
Sea/River Structures	60
Other Operational Plant	20
Vessels, Boats	7-20
Fencing	15
Equipment (inc Offices, Computer, Laboratory)	5-10

EXAMPLES OF "INTANGIBLE" ASSETS

Piling

Channel Works/Excavations/Dredging

Earthworks on River Bank

Stoning

Bank Works (Steel or Concrete)

Culvert (or property/Bridges belonging to third parties)

Such "Intangible" assets are therefore defined as:-

- (i) River bank, channel and related works which are of no economic use to any other organisation (earthworks, concrete or steel), and not capable of being operated by another organisation (ie not active operationally).
- (ii) Assets that have no intrinsic value, and cannot be disposed of for any cash proceeds.
- (iii) Work on the structures and property belonging to third parties, where the ownership of the work undertaken does not vest with the NRA.

ANNEX 3

DISCOUNT FACTORS

Discount Factors for a Discount Rate of 6%

Year	Present Value of \$1 at end of year	Present Value of \$1 per year	Year	Present Value of \$1 at end of year	Present Value of \$1 per year
1	0.9434	0.9434	26	0.2198	13.0034
2	0.8900	1.8334	27	0.2074	13.2108
3	0.8396	2.6730	28	0.1956	13.4064
4	0.7921	3.4651	29	0.1846	13.5910
5	0.7473	4.2124	30	0.1741	13.7651
6	0.7050	4.9174	31	0.1643	13.9294
7	0.6651	5.5825	32	0.1550	14.0844
8	0.6274	6.2099	33	0.1462	14.2306
9	0.5919	6.8018	34	0.1379	14.3685
10	0.5584	7.3602	35	0.1301	14.4986
11	0.5268	7.8870	36	0.1227	14.6213
12	0.4970	8.3840	37	0.1158	14.7371
13	0.4688	8.8528	38	0.1092	14.8463
14	0.4423	9.2951	39	0.1031	14.9494
15	0.4173	9.7124	40	0.0972	15.0466
16	0.3936	10.1060	41	0.0917	15.1383
17	0.3714	10.4774	42	0.0865	15.2248
18	0.3504	10.8278	43	0.0816	15.3064
19	0.3305	11.1583	44	0.0770	15.3834
20	0.3118	11.4701	45	0.0727	15.4561
21	0.2942	11.7643	46	0.0685	15.5246
22	0.2775	12.0418	47	0.0647	15.5893
23	0.2618	12.3036	48	0.0610	15.6503
24	0.2470	12.5506	49	0.0575	15.7078
25	0.2330	12.7836	50	0.0543	15.7621

ANNEX 4

PROJECT GROUPS FOR DETAILED APPRAISALS

PROJECT APPRAISAL PANEL

PROJECT GROUPS FOR DETAILED APPRAISAL - FORMULATION AND ROLE

1.0 INTRODUCTION

- 1.1 Project Groups are intended to provide a multi-disciplinary approach to project appraisal and hence capital investment.
- 1.2 Project Groups are required for all detailed appraisals of capital investment regardless of the service or funding arrangements (ie both Flood Defence and DoE projects).
- 1.3 Project Groups, through the Project Manager, are responsible for providing the appraisal report in accordance with agreed procedures and submitting the completed report on target to the NRA Regional Project Appraisal Panel.

2.0 MEMBERSHIP OF PROJECT GROUPS

- 2.1 Each Project Group shall consist of:-

Project Manager
Project Engineer
and nominees from:-
Finance Department
Capital Planning
Operations and/or Environmental Managers
Conservation Officer
Others (eg from Systems Engineer)

- 2.2 Meetings of the Project Group are to be chaired by the Project Manager and must be minuted.
- 2.3 In the case of a Consultants project, it may be necessary either to have one further additional member (usually a second Project Engineer) or to designate the consultants representative as the Project Engineer.

3.0 ROLES OF GROUP MEMBERS

- 3.1 a) To set and agree project objectives.

- b) To assist in the production of the appraisal report in accordance with the agreed brief and to the agreed target.
- c) To examine and understand the problem and the options investigated.
- d) To be responsible for liaising with other people and sections within the particular department represented.
- e) To produce a recommended option having regard to the need, justification, urgency, environmental and financial implications.

3.2 The majority of the work and production of the report will be the responsibility of the Project Manager and the Project Engineer. However, each member shall plan a full and active role notwithstanding their particular discipline and particularly contribute towards the production of the report in the areas of their own expertise and Section representation. Other Nominated Representatives may be co-opted as members of the Project Group with the approval of the relevant Section Head when other specific expertise is required.

4.0 PROJECT APPRAISAL PANEL

4.1 A multi-discipline panel of Senior Managers meet once a month to receive presentations of appraisal reports and to make recommendations regarding approval. The Panel also receive presentations of Strategy Reports and make recommendations regarding agreement to the strategy as a basis for future detailed appraisals.

4.2 The prime objectives of the Project Appraisal Panel are to:-

- a) Check that the proposals are in accordance with current NRA policy in terms of the NRA's key objectives, aims and strategies and that they comply with the rules and regulations covering capital expenditure.
- b) Be satisfied that there is sufficient justification for the proposed capital expenditure.

- c) Be satisfied that all reasonable options have been fully considered and evaluated, including the "do-nothing" option.
- d) Ensure that the preferred option is the most cost effective in meeting the objectives of the proposals.
- e) Make recommendations to a Regional Manager/Regional General Manager for his approval or his recommendation to NRA Head Office for approval.

5.0 PRESENTATION TO PROJECT APPRAISAL PANEL

- 5.1 Project Appraisals are target dated such that on completion by the target month end, they will automatically be included on the agenda for the Project Appraisal Panel meeting set up normally for the third week of the following month. Project Appraisal Panel members must receive a copy of the appraisal report at least 7 days before the meeting or presentation will be deferred. Where a project appraisal report has not been completed by the target date, the Project Manager will notify the Project Appraisal Panel Secretary at least 2 weeks before the scheduled Project Appraisal Panel meeting so that the project can be excluded from the agenda.
- 5.2 The Project Manager will normally be expected to present the appraisal report to the panel. The presentation of the report should not exceed twenty minutes. However, the Project Appraisal Secretary will liaise with the Project Manager and allot presentation time accordingly to each project.
- 5.3 The presentation needs to include:-
 - a) why investment necessary
 - b) options investigated
 - c) political/environmental conflicts
 - d) implementation/promotion problems
 - e) cost benefit and financial consideration
 - f) recommendation and reasons
- 5.4 Whenever possible the presentation should include slides/ photographs, diagrams and overhead viewfoils (although complicated tables should be avoided).

PROJECT GROUP MEMBERSHIPDETAILED APPRAISAL

This report was prepared in consultation with the following Project Group:-

PROJECT GROUP MEMBERSNAMETITLE

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.....

In addition to the members of the project group, assistance was given by and consultation took place with:-

NAMETITLE

.....
.....
.....
.....

ANNEX 5

LEVELS OF SERVICE

Meeting: Anglian Regional Flood
Defence Committee
Date: 20 September 1989

Subject: Interim Target Levels
Service: Flood Protection

Summary

There is some confusion concerning target levels of service for flood protection. It is important that this confusion be removed, particularly in regard to the responses of the Anglian Region of the National Rivers Authority to proposed development. The paper summarises the present position and puts forward interim proposals.

Report

1. In January 1985, Anglian Drainage Committee approved a paper which proposed that "levels of service be initially worked up regionally in terms of arbitrary "target" levels of service". For each of nine land classifications, arbitrary targets were chosen and expressed in terms of flood return period.
2. The Board of Anglian Water subsequently adopted these targets, where economic, for fluvial flooding. For tidal flooding the Board adopted standards recommended by the Flood Protection Research Committee of MAFF which were based on the worst recorded storm tide event, taking account of wave height, sea level and frequency.
3. In January 1986, Anglian Drainage Committee approved a modification of the priority ranking system, which required inter-alia that the definition of flood protection return periods expressed as a series of bands, be changed, resulting in incompatibility with the previously established targets.
4. In 1987, the Water Authorities Association set up a working group whose terms of reference included proposing levels of service indicators that could be used in planning, resource allocation and measurement of performance. The group recognised that because of the permissive nature of the land drainage powers, it would not be possible to set down mandatory target levels of service. However it did recommend national guidelines for five land types for fluvial and tidal flooding. These together with a definition of land type are set out in the attached table.

Recommendation

To ensure a consistent approach in capital planning, priority ranking, a response to development proposals, etc, it is recommended that the Water Authorities Association working group's proposed national guidelines be adopted within the Anglian Region as a minimum level of service and as an interim measure.

Levels of Service : Minimum target standards of flood protection

The following minimum target standards of flood protection have been adopted by the Anglian Region of the National Rivers Authority as an interim measure.

Land Classification Band	Minimum target standard of flood protection expressed as flood return period (years)	
	Fluvial	Tidal & Sea Defences
A	100	200
B	50	100
C	20	50
D	10	20
E	-	-

BAND A

Areas of dense conurbations where widespread flooding would cause serious infrastructure failure and endanger life. Major trunk roads and/or motorways and railways may be included in this band.

BAND B

Predominantly urban areas, including house, industry and commerce. The flood plain will include 'A' and 'B' class roads. Little agricultural land is likely to be present.

BAND C

High grade agricultural land suitable for cereal and cash crops. Residential and industrial property, as well as roads, amenity and/or navigation interests may also be prominent.

BAND D

Typical land use incorporating average gross-margin crops, and permanent pasture. Little residential or industrial property will be present. Conservation and water ecology interests may significantly influence the standard of service to be applied.

BAND E

This covers areas which are generally of low grade land use. Residential or industrial property is unlikely to be present. Agricultural use is likely to be limited to horse paddocks, forestry and scrubby grazing land. Land within this category may have a high conservation value requiring a lower standard of service than would be expected otherwise. Flood storage washlands or land which is deliberately allowed to flood may fall into this band.

ANNEX 6

PRIORITY RANKING

CALCULATION OF PRIORITY RANKING FOR FLOOD DEFENCE

The calculation of priority ranking is based on weighted scores depending on purpose of works, level of service improvement/residual asset life and benefit/ cost ratio.

Projects are ranked in five priorities as follows:-

Project Score	Priority Ranking
15.1 - 18	1
13.1 - 15	2
11.1 - 13	3
9.1 - 11	4
6 - 9	5

The improvement in Level of Service is assessed comparing the current flood return period against the return period provided after the completion of the project. The flood return period is related to a series of flood protection bands:-

<u>Flood Return Period (Years)</u>	<u>Flood Protection Band</u>
Less than 1	1
1 - 2	2
3 - 4	3
5 - 9	4
10 - 19	5
20 - 49	6
50 - 99	7
100 - 199	8
>200	9

These flood protection bands are in accordance with the 10 yr Need Programme Level of Service Bands.

Projects where the principle reason is renewal or replacement of a deteriorating asset may be assessed using the residual asset life.

The breakdown of the calculation of priority ranking score is detailed in Table A.

- B : Soon
- Residual asset life between 2 and 5 years
 - Justified operational requirement in the next 2 to 5 years
 - Scheme subject to significant external interest
 - Significant external investment/contributions forthcoming
 - Research data required soon
 - Pay back period 2 - 3 years
 - Significant need (Water Resources)
- C : Later
- Residual asset life greater than 5 years
 - Justified operational requirement in 5 years + time
 - Scheme subject to public awareness
 - Research data would be beneficial
 - Pay back period 4 - 5 years
 - Identified need (Water Resources)

c) Finance Refinement

Project Scores

a) Purpose -

	<u>Points Score</u>
Legal obligation and/or safety requirement (Band A)	9
Level of service restoration and/or asset replacement to maintain level of service (Band B)	9
Operational requirement eg. structures, materials, systems, monitoring etc (Band C)	6
Operational efficiency (Band D)	3
Research, modelling, information augmentation (Band E)	3
Promotion of conversation and recreational interest (Band E)	3

b) Need -

Immediate (Band A)	6
Soon (Band B)	4
Later (Band C)	2

c) Financial Refinement -

The financial refinement factor is considered to 'fine tune' a project score after points from Purpose and Need are totalled.

The estimated project value is considered, and further points are added (interpreted from the following table), to arrive at the total Project Score.

The inclusion of financial refinement' operates on the assumption that projects of a lower financial value (having equivalent Purpose and Need scores) are more financially acceptable or likely to be undertaken sooner (should overall finances be limited) than projects with a higher value.

		<u>Project score (Purpose + Need)</u>		
		15 - 12	11 - 8	7 - 5
<u>Estimated</u>	Less than 100	3	2	1
<u>Project Cost</u>	100 - 300	2	1	0
<u>(£'000)</u>	Greater than 300	2	0	0

ANNEX 7

GUIDANCE ON ENVIRONMENTAL ASSESSMENT

GUIDANCE NOTE: ENVIRONMENTAL ASSESSMENT BRIEF

1. The Environmental Assessment will be carried out in accordance with the letter dated 18th July 1988 from the Ministry of Agriculture Fisheries and Food and is described in the schedule to SI1217 or SI1199 as appropriate.
2. The Environmental Assessment shall take account of the views of interested/affected parties:-
 - i) To establish "interests" so that these can be taken into account in formulating/developing the options;
 - ii) To obtain views on the feasible options;
 - iii) To confirm acceptability of the preferred option.

The Environmental Assessment will include an impact review of the options on the following: Nature Conservation; Landscape; Tourism; Recreation and Amenity; Heritage; Physical Characteristics of site; Land use (Urban or Agricultural); Access and Traffic; Industrial and Commercial Interests; Services and Utilities.

Data relating to all aspects of human, natural and physical environments should be collected. Maximum use shall be made of existing data and it is proposed that meetings will be held with the statutory consultees: English Nature; the Countryside Commission; English Heritage and the Landowners. Meetings shall be arranged with the prior consent of the NRA Project Manager.

Further contact will include the following (as appropriate):-

County Council - County Planner/Archaeologist, District Council, Parish Council, Town Council, MAFF - ADAS and Fisheries, NFU, National Trust, RSPB, Landmark Trust, Naturalist Trust, Ramblers Association and other Local Recreation and Interest groups. It is suggested that these groups will be contacted through letters and telephone conversations.

3. The Environmental Assessment shall, where relevant, encompass means of carrying out the works (eg transportation to and from site) and sources of material (eg sand for beach nourishment, timber for groynes, etc). All options considered must be given a brief account including the do-nothing option.
4. A consultation document outlining the main features of the proposals, complete with any available detail on both the construction process and operational aspects of the scheme, will be required. The parties who demonstrate an interest in the area should be contacted to establish their views on the proposals. This exercise, together with a desk study, shall lead to the identification of likely scheme impacts and these impacts will be evaluated to determine their importance. Where adverse impacts are identified, mitigating measures will be investigated and, where appropriate, recommended. Opportunities for environmental enhancement works should also be assessed.
5. The Environmental Assessment shall as far as practicable be an independent report and shall be bound as a separate document. It shall be prepared by a team with necessary experience and expertise. The composition of the team will be subject to the Authority's approval. On conservation aspects the team shall liaise closely with the Conservation Officer of the Authority's Anglian Region.
6. The Assessment report will make maximum use of colour maps and diagrams accompanied by photographs and a relatively simple explanatory text in plain English. Technical appendices, complete with a glossary, will be required to explain and verify the analysis, results and conclusions. The reports should be presented in A4 format.
7. The conditions for the appointment will be the NRA Anglian Region Form of Appointment. These are based on the 'ACE Conditions of Engagement 1981, Agreement 1 - Conditions of Engagement for Report and Advisory Work' with amendments.

ANNEX 8

MAFF GUIDANCE FOR FLOOD DEFENCE PROJECTS

**INVESTMENT APPRAISAL
OF
ARTERIAL DRAINAGE, FLOOD PROTECTION AND
SEA DEFENCE SCHEMES**

**GUIDANCE FOR
DRAINAGE AUTHORITIES**

**MAFF
LAND AND WATER SER
RIVER AND COASTAL
ENGINEERING GROUP
WELSH OFFICE**

1985

1. Introduction

The Minister of Agriculture, Fisheries and Food and the Secretary of State for Wales require all schemes submitted for grant under the Land Drainage Act 1957 meet certain basic criteria. They need to be technically sound, environmentally acceptable and worthwhile in terms of the benefit that is to be derived from the expenditure. This paper summarises the form of appraisal that should be submitted to the Ministry to demonstrate that a scheme meets these criteria. It is not intended to be a comprehensive statement of the method to be used but highlight the most important factors that should be considered.

Much of the data upon which an appraisal is based can never be exact and therefore the conclusions can only be used as a guide in deciding whether a scheme meets the criteria.

The procedures to be used for the appraisal should be based on the Treasury booklet "Investment Appraisal in the Public Sector" as amplified in this paper. Any appraisal should be made from the viewpoint of the benefit or cost to the nation as a whole.

2. The Appraisal

The appraisal should consist of four main parts:

- (i) A statement of the problems, the objectives of the scheme, alternative ways of achieving them and a description of the scheme proposed.
- (ii) An identification of those costs and benefits that can be quantified in money terms.
- (iii) A listing and full description of all the considerations which cannot be quantified in money terms.
- (iv) A discussion of the importance of those costs and benefits quantified in money terms relative to those considerations quantified in other terms or not quantified to show that the scheme meets the criteria and hence should be eligible for grant.

3. Scheme Objectives and their Achievements

The problems which have caused the need for the scheme should be outlined and the resulting objectives of the scheme clearly stated. All alternative feasible methods of solving the problems should be considered including the consequence of doing nothing. Appraisal techniques should be used both to help determine the appropriate degree of flood protection to be provided and to help choose between alternative means of providing that protection. It is possible that options considered may have different scheme lives and care should be taken to ensure appropriate techniques are used when making comparisons. The proposed scheme should be fully described, shown to be both feasible and worthwhile and to use the most appropriate standards and designs.

4. Costs and Benefits Quantifiable in Money Terms

Costs and benefits that are quantifiable in money terms will arise at different times over the life of the scheme which should normally be the expected life of the main capital component in it. Both costs and benefits should be allocated to the years in which they will occur. The effects of inflation are excluded by valuing

all costs and benefits at a common price base date*; allowance should be made any expected future change in relative prices.

Money in the future is worth less than money now, even excluding the effects of inflation, because the money now can be invested to obtain a return over future years. It would, therefore, be misleading to derive the totals of the costs and benefits by simple summation of the annual amounts. For purposes of comparison costs and benefits for each year should be discounted using the Treasury discount rate (currently 5%) to obtain present values. Benefits will never be realised until after some costs have been incurred. Costs and benefits should normally be discounted to the time of initial investment in the scheme which is, of course, subsequent to the submission of the appraisal and the decision to proceed with the scheme.

Because of the inherent uncertainty concerning much of the data and many of the assumptions made, alternative analyses using a suitable range of parameter values should be carried out, where it seems necessary, both to identify those parameters to which the results are most sensitive and to test the stability of the results changes in those parameter values.

4.1 Costs Quantifiable in Money Terms

All costs related to the scheme that are quantifiable in money terms incurred during the life of the scheme should be included in the analysis no matter who incurs them. The costs of the promoter of the scheme embrace, where appropriate, capital costs, whether occurring at the start of the scheme or later, changes in operation and maintenance costs and increased damage repair costs. Other secondary costs, such as additional costs incurred by Internal Drainage Boards and/or farmers, may be necessary to realise the full benefits of the scheme. In the case of farmers this may go beyond field drainage to include new buildings, machinery and livestock. Any existing benefits that may be foregone by the scheme should be considered as costs.

4.2 Benefits Quantifiable in Money Terms

All benefits that are quantifiable in money terms resulting from a scheme should be included no matter who receives them. Benefits may accrue from:

- (i) damage averted by flood protection works. It is not known when floods would occur in the absence of the scheme. The probability of occurrence of floods of various magnitudes can however be estimated as can the damage which a flood of each magnitude would cause. By summing the values of the damage so prevented adjusted by the probabilities of their occurrence an average annual damage can be obtained. The damage averted should include both the direct damage caused by floods and the indirect costs that may result from them as, for example, from traffic disruption. Damage averted should also include repair costs to any existing flood defence works that would be averted by the scheme;

* The common price base date is the most recent for which there is sound knowledge of existing prices. The precise date is not important provided it is clearly identified, it is common to all costs and benefits and it is a year in which there were no serious distortions to relative market prices resulting from unusual weather or unusual market conditions.

- (ii) the enhanced agricultural output obtainable from a scheme which results either from increased yields from existing cropping patterns or from the opportunity to grow more profitable crops. The benefit is based on the difference between the gross margins obtained before and after the scheme. A guide to gross margins provided by the "Farm Management Pocket Book" by J Nix, Farm Business Unit, School of Rural Economics, Wye College. Both gross margins must be reduced to allow for the inclusion in them of the UK share of the cost of support to farmers under the Common Agricultural Policy or national support schemes. The deductions to be made will be notified by MAFF from time to time.

The damage averted principle must not be used to estimate benefit from agricultural land in addition to the benefit already estimated by enhanced output.

Investment by others than the promoter of the scheme may be needed before some of the benefits can accrue. Care should be taken to ensure that these benefits are not attributed to the scheme in years before the required investment is assumed to have been made.

- (iii) the terminal value of any works with some useful life remaining at the end of the analysis period.

Capital enhancement as, for example, increased land values resulting from (i) and (ii) above are not admissible as the basis for estimating benefits.

5. Considerations not Quantifiable in Money Terms

Some effects of a scheme cannot be quantified in money terms (though they may be quantifiable in other terms). These can include both benefits and disbenefits and costs. These effects should be thoroughly explored and quantified in non-money terms and, where possible, provision made in the scheme to overcome any harm resulting from them. In any case, all such considerations should be fully described in the appraisal which should include an indication of the extent to which they may be irreversible.

5.1 Benefits not Quantifiable in Money Terms

Most benefits that are unquantifiable in money terms result from flood protection and are benefits to individuals. These may include the avoidance of such things as loss of human life, loss of sentimental possessions, stress induced ill health, worry or fear. A different type of benefit, seldom recognised but which clearly should be, is a possible enhancement to the environment resulting from the scheme. New landscape features, although different, may be attractive in their own right and new habitats for fauna and flora may be created and new forms of recreation may be possible.

5.2 Disbenefits or "Costs" Unquantifiable in Money Terms

Most disbenefits that are unquantifiable in money terms result from the effect of the scheme on the existing environment. Such effects may be the loss of wetlands, the resulting loss of possibly important fauna and flora, or loss of landscape features. Others may be the loss of recreational or commercial interests that no price can usually be put on the latter.

6. Discussion and Proposal

The result of the benefit cost analysis that has been quantified in money terms should be expressed in two principal ways:-

- (i) The Net Present Value: the difference between the present value of all the benefits and that of all the costs.
- (ii) The Benefit Cost Ratio: the ratio of the present value of all the benefits to that of all the costs.

The effects of sensitivity analyses on the net present value and benefit cost should be discussed.

The analysis of the proposed scheme should be summarised as shown on the attached forms for benefits and costs quantified in £'000 and for other considerations. Forms are typical and may be adapted to suit the calculations made as, for example, by showing all costs and benefits in the years in which they occur. The analysis of the factors that have been quantified in money terms should be compared with other considerations so as to show that the scheme proposed meets the criteria. It should therefore be eligible for grant.

7. Grant Aid

Appraisals should always take into account all appropriate costs and benefits. They should not be limited in any way to those costs that may be eligible for grant. The extent of grant aid will be determined after the scheme has been shown to be worthwhile.

8. Queries

Any queries concerning the above document should be referred to Mr B R Street, Ministry of Agriculture, Fisheries and Food, Room 206, 41065 HOUSE 30/34, ALBERT EMBANKMENT, London, SE1 7LJ or to Mr P R Marsden, Welsh Office, Cathays Park, Cardiff CF1 3NQ.

INVESTMENT APPRAISAL OF ARTERIAL DRAINAGE FLOOD PROTECTION AND SEA DEFENCE SCHEMES

AGRICULTURAL OUTPUT VALUATION ADJUSTMENTS

1. The document circulated in July 1985 entitled "Investment Appraisal of Arterial Drainage, Flood Protection and Sea Defence Schemes (Guidance for Drainage Authorities referred to the issue of additional guidance regarding an allowance for the UK share of the cost of support to farmers under the Common Agricultural Policy or national support schemes within the appraisals.

2. This note provides the additional guidance. It sets out deductions to be applied by reducing the market prices underlying the commodity gross margins which are used in the measurement of benefits from these schemes. In addition, the examples are included to illustrate the use of these adjustments.

3. Deductions will be made for four commodities only. Until further notice, the percentage reductions in market prices will be as follows:

COMMODITY	REDUCTION TO BE APPLIED %
CEREALS	20
OILSEED RAPE	20
BEEF (a)	
From LFA herds in:	
(1) Severely Disadvantaged Areas	30
(2) Disadvantaged Areas	25
From Non-LFA herds	20
SHEEPMEAT (b)	
From LFA flocks:	
(1) SDA Specially Qualified Flocks	50
(2) SDA Qualified Flocks	35
(3) Flocks in Disadvantaged Areas	30
From Non-LFA flocks	20

Notes:

EC European Community

LFA Less Favoured Areas

SDA Severely Disadvantaged Areas

(a) Applied to cattle prices on a liveweight basis

(b) Applied to lamb and sheep prices on a deadweight basis including variable premium

4. The above percentage reductions will be revised if and when it becomes necessary to do so rather than on any regular basis.

5. Beef farmers in Less Favoured Areas are eligible for the Hill Cow Compensation Allowance (HCCA) and the rate of subsidy paid is higher for Severely Disadvantaged Areas than for Disadvantaged Areas. Non-LFA farmers do not receive HCCA. To take account of this difference in subsidies, three adjustment figures are given for beef.

• Maps at a scale of 1:50 000 showing the LFAs are available from the Ministry's Land Improvement Division, Great Westminster House, Horseferry Road, London, SW1P 3QU.

6. The position for sheep is similar to that for beef. In this case there are three rates of Hill Sheep Compensatory Allowance (HSCA) payable to LFA farmers. Non-LFA farmers are not eligible for HSCA. This means that four adjustment figures are necessary, the higher figures reflecting the areas which receive the largest subsidy.

7. No adjustment is given for milk because the quota system means that, from the national standpoint, no extra milk can be produced. It is of course possible for existing milk production on drained land to be intensified after drainage or for the land to move into milk production after drainage. However this can only be achieved by transferring quota to the drained land from elsewhere. National production remains unchanged.

8. The adjustment for each commodity is a broadly based average which must be applied, where relevant, in all arterial drainage and sea defence appraisals. These adjustments have been derived from the best available estimates of relevant CAP expenditure by the European Community and from estimates of the likely change in the UK refund from the European Community budget under the Fontainebleau Agreement. The initial calculations, were undertaken on a cost per tonne of production basis and have been expressed as a percentage of the market price for the commodity concerned, using the prices underlying the gross margins published in the Farm Management Pocketbook by John Nix.

9. The adjustment is applied in each case by reducing, as necessary, the gross margin both before and after drainage by the relevant percentage of the appropriate market price upon which each gross margin is based.

10. Technical advice is available on request from the Ministry's Economics (RU) Division.

ECONOMICS (RU)
November 1985

EXAMPLE A: MEASURING THE BENEFITS OF AN INCREASE IN WHEAT YIELDS AFTER DRAINAGE

The first step is to adjust the market price as follows:

Market price of feed wheat	£125/tonne
Relevant percentage reduction	20%
Adjusted price	£100/t

	Calculation of Adjusted Gross Margins	
	<u>Before drainage</u>	<u>After drainage</u>
Wheat yield (a)	5t/Ha	6t/Ha
Value of output (b)	£500/Ha	£600/Ha
Less Total Variable Costs (c)	£200/Ha	£200/Ha
Adjusted Gross Margins	<u>£300/Ha</u>	<u>£400/Ha</u>

The difference in adjusted gross margins (in this case £100) multiplied by the appropriate area will then give the annual benefit.

Notes

The above figures are intended to be illustrative rather than accurate.

- (a) Wheat yields are assumed to increase from 5 to 6 tonnes/Ha after drainage.
- (b) Adjusted price multiplied by yield.
- (c) It is assumed that the extra yield is achieved without an increase in variable costs.

EXAMPLE B: MEASURING THE BENEFITS OF A SWITCH FROM BEEF TO WHEAT PRODUCTION
AFTER DRAINAGE

Once again the agricultural benefit is the difference in adjusted gross margins. In this case adjusted gross margins are calculated for beef (before drainage) and wheat (after drainage).

For beef, the first step is to calculate the adjusted price as follows:-

Market price of beef	£1100/tonne
Relevant percentage reduction (assuming this is a Disadvantaged Area)	25%
Adjusted price	£825/tonne

Calculation of Adjusted Gross Margin for Beef:

Assume that the beef system in use is 24 month beef from bucket reared calves:

Fattened weight per head	520 Kg
Sale price per head (a)	£430
Less cost of calf	£120
Less Total Variable Costs	£250 per head
Adjusted Gross Margin	<u>£ 60 per head</u>

Assuming 2/3 of a hectare per head, the adjusted gross margin per hectare is £90. Assuming the adjusted gross margin for wheat is £400/Ha (as calculated in the previous example) the difference (£310) multiplied by the relevant area will then give the annual benefit.

Notes

The above figures are intended to be illustrative rather than accurate.

(a) Adjusted price multiplied by fattened weight.

EXAMPLE C: CALCULATION OF AN ADJUSTED GROSS MARGIN FOR LOWLAND SHEEP

The first step is to adjust the price producers receive for their lambs (the market price plus variable premium) as follows:

Average price per lamb	£40
Relevant percentage reduction (Non-LFA flock)	20%
Adjusted price per lamb	£32

Calculation of adjusted gross margin per ewe

Lambs reared per ewe	1.41
Lamb sales per ewe (a)	£45
Ewe (annual) premium	£ 3
Wool	£ 3
Cull ewes and rams	£ 7
Less ewe and ram replacements	£18
Less Total Variable Costs (including forage)	£18
Adjusted Gross Margin	<u>£22 per ewe</u>

Assuming a stocking rate for ewes with lambs (eg 9 ewes per forage hectare) gives an adjusted gross margin per forage hectare (£198).

Notes

The above figures are intended to be illustrative rather than accurate.

(a) 1.41 lambs per ewe valued at the adjusted price.

ANNEX 9

DEFINITIONS OF IMPROVEMENTS

FLOOD DEFENCE PROJECT

DEFINITIONS OF IMPROVEMENT

Certain classifications of 'improvement' may be identified in a typical defence project and these are set out below, together with a definition of each. Reference should be made to these when formulating options.

a) Improve (ie increased LOS)

Improvement to the design return frequency of the wall which would result in an increase in level of service. Capital investment is required.

b) Maintain (ie constant LOS)

The design return frequency of the existing flood defences will be maintained at their present level of service over time. The effect of greenhouse and secular sea level rise infers that this will require capital investment over time.

c) Sustain (ie reducing LOS)

The existing defence level will be sustained over time. Secular Trend will imply that the level of service will diminish with time. Capital investment may be involved.

d) Hold

Nominal maintenance work is carried out until such time as the defences breach when no further action is taken. Revenue expenditure only involved.

e) Do Nothing

No further work will be undertaken in any form, (ie no expenditure).

ANNEX 10

ECONOMIC ANALYSIS

ECONOMIC ANALYSIS

Each detailed appraisal report must include full details of costs and benefits of the various options and must clearly identify the most economical solution. Justification of the project must be demonstrated in economic terms. Reference should be made to Annex 1 (Treasury Guidelines).

COSTS

1. The capital cost of each option must be given, together with a detailed breakdown over suitable headings. Estimates are normally based on current rates for similar contracts, but the basis and source of data should be stated.
2. Revenue maintenance and operating costs over the appraisal term for each option should be detailed, and the basis and source of data stated.
3. A common price base must be used for all costs and this must be stated. Any adjustment to historical costs to update to present levels, including assumptions on inflation, should be given.
4. Where expenditure is phased over more than one financial year a cost profile is required.
5. Costs relating to the feasibility and appraisal of the project and the subsequent design and supervision of the contract(s) must be included, but shown separately. The basis of the costs should be stated.
6. Money values should be expressed in real terms, ie at the general price level applying when the appraisal is carried out. However, 'relative' price movements should be taken into account where the price of a particular good or service is expected to increase or decrease significantly more or less than general inflation.
7. Any costs which have already been incurred prior to the consideration of the project should be ignored in the appraisal, as they represent sunk costs.

8. The life of the proposed works or of alternative options should be stated. These will be determined by the asset lives given in Annex 2 for tangible assets, or by assessment for intangible assets, but normally with a maximum of 60 years.
9. The term of the appraisal should be stated. Normally this will be the asset life, or the shortest life of any of the options.
10. Distinction must be made between current and expected revenue costs. It is the consequential effect of each option that should be included in the comparative costs, not the marginal increase in revenue costs. However, any impact on current revenue budgets due to anticipated changes in the level of revenue expenditure must be clearly stated. This is particularly important where the options necessarily involve the requirement for maintenance (or similar) contracts in the future.
11. The net present cost of each option must be shown. As well as the total, the constituent elements, eg construction, fees, revenue, etc, should be shown. Where option lives differ from the term of the appraisal it will be necessary to separately include reconstruction costs or residual values as appropriate. The test discount rate of 6% must be used.

BENEFITS

12. The benefits for a project are those which are expected to arise as a direct result of undertaking the project. It should be noted that these do not necessarily have to be realisable by the NRA.
13. For a flood defence project the benefits will normally be established by reference to the cost of flood damage that will be avoided by the improved level of protection.
14. In other cases including DoE projects the benefits may be based on savings that are expected to be achieved in the future. Examples are savings in manpower costs following the installation of a telemetry scheme; or savings in power costs following the installation of more efficient pumps.

15. Sometimes it is not possible to quantify benefits in monetary terms and any such benefits must be clearly stated. Where no (or insufficient) benefits are capable of being expressed in money terms consideration should be given to either:-
- a) a weighting and scoring system of presenting the non-monetary benefits so that their importance in relation to the various options is made clear. (For guidelines see DoE booklet referred to below) or
 - b) evaluating the consequential costs of the 'do-nothing' option, which can be used as a baseline against which alternative options are compared.
16. The basis and source of data should be stated, together with the price base (nb costs and benefits must have same price base). All money values should be expressed in real terms, ie at the general price level applying when the appraisal is carried out.
17. The benefits must be assessed over the term of the appraisal (see above under 'costs') and where appropriate a profile showing the incidence of benefits accruing over the years should be shown. The net present value of the total benefits must be calculated using the test discount rate of 6%.

JUSTIFICATION

18. It must be shown that the project is economically justified by demonstrating that it has a positive net present value, ie benefits exceed costs. This is normally expressed as a benefit/cost ratio greater than one.
19. Where alternative options give rise to differing benefits, the net present value and benefit/cost ratio must be shown for each option.
20. The option with the maximum NPV (and highest B/C ratio) is the most financially advantageous, and will normally be the preferred option.
21. However, it is not always expedient to determine the maximum NPV because this requires that all benefits are capable of being identified and quantified in monetary terms.

In many instances, even though this is possible, the cost in time and money to identify and value all the benefits cannot be justified. It is appropriate in such cases to assess sufficient areas of benefit to justify the project, and to state the other benefits which are relevant, but which have not been quantified.

22. Where uncertainties exist in the estimating of either costs or benefits, a sensitivity test should be applied to each uncertainty in order to show what effect a variation in each will have on the overall justification of the project.
23. Where alternative phasing of expenditure is a possibility then this should be regarded as another option, and the costs and benefits evaluated accordingly.
24. The DoE booklet 'Policy Appraisal and the Environment' (Ref ISBN 0 11 752487 5) which is available from HMSO (£6.75) gives guidelines on the determination and evaluation of costs and benefits relating to environmental impacts.

Where it is considered that a project justification is sensitive to the costs and benefits relating to such impacts, or that the environmental issues are in themselves significant (eg likely to be of public concern) then they should be evaluated in monetary terms.

The results should be shown separately and complementary to the more conventional approach of only including the costs and benefits more directly attributable to the project, as already discussed.

25. Where it is not possible to quantify benefits, the cost of the 'do-nothing' option may be used as the baseline for demonstrating whether alternative options are economically justified. Using this cost as the 'benefit', B/C ratios should also be given.

Alternatively the project justification should be based on a statement of the consequences of doing nothing, supplemented where appropriate by the results of a weighting and scoring of benefits. (see above)

26. It should be noted that the replacement of an existing worn out asset is not in itself justification for incurring expenditure.

ANNEX 11

ECONOMIC ANALYSIS
OF FLOOD DEFENCE PROJECTS

ECONOMIC ANALYSIS OF FLOOD DEFENCE PROJECTS

1. GENERAL

The specific report requirements for a typical flood defence project are shown below. However, it is important that reference is made to the general requirements for economic analysis as set out in Annex 10, which are applicable to all projects.

2. COSTS

- 2.1 The capital cost of each option must be shown. A detailed breakdown of the costs over suitable headings should be given in an Appendix to the report (see following example).

Design and Supervision costs should be shown separately. The source of information on rates used in estimating the costs should be stated.

- 2.2 Maintenance costs for each option (ie, the estimated needs of the proposed works not the marginal change in costs) must be shown over the term of the appraisal.

Costs should normally be based on data supplied by the appropriate Operational department, but the basis and source of data must be stated.

- 2.3 The (discounted) net present cost of each option over the term of appraisal must be given, with details of the calculations shown in an Appendix to the report.

The term of appraisal will normally be the period of the lowest asset life of any of the options being compared.

Due allowance must be made for either reconstruction costs or residual values for any option with a life that differs from the appraisal term.

A table should be included in the body of the report to show the comparison of net present costs (see following example).

Item

SANDILANDS DEFENCES - Pl.28**OPTION 5 - SEABEES AND BERM**

A	Preliminaries (Insurance, Mobilisation, etc.)			25%	149,405	
B	Site Investigation.	Sum			7,875	
C	Groyne renovation.	Sum			40,000	
D	Excavation.	5540	m ³	6.00	33,240	
E	Seawall grouting.	Sum			14,230	
F	Steel Guardrail.	211	m	55.00	11,605	
G	Formwork to berm and box out for end beam.	375	m ²	24.00	9,000	
H	Formwork to capping beam.	396	m ²	24.00	9,505	
J	Supply and place C.30 concrete for berm.	630	m ³	62.40	39,315	
K	Supply and place C.40 topping to berm 500mm including fibre mesh.	527	m ³	75.00	39,525	
L	Supply and place C.40 concrete for capping beam (including fibres).	126	m ³	75.00	9,450	
M	Supply and place C.40 end beam.	97	m ³	75.00	7,275	
N	Provide only Frodingham IN Pile.	107	t	425.00	45,475	
P	Drive piles.	990	m ²	25.00	24,750	
Q	Provide and place Seabee Armour units (1200 x 700mm).	2060	Nr	80.00	164,800	
R	Provide and place rock underlayer 200-400kg.	1903	m ³	36.00	68,510	
S	Provide and place lower rock layer 20-100kg.	1144	m ³	36.00	41,185	
T	Provide and place geotextile.	3161	m ²	5.50	17,385	
U	Provide Beach Access.	Sum			7,000	
V	Provide and place rebar bolts.	1070	Nr	3.50	3,745	
W	Supply and place C.40 infills by End Beam and Capping Beam to Seabees (including fibre mesh).	50	m ³	75.00	3,750	
	SUB-TOTAL				747,025	
	General Contingencies at 10%				74,705	
	TOTAL				£ 821,730	

TABLE OF NET PRESENT COSTS

Option	Construction Costs	Design and Supervision	Total Cost	PV of Maintenance	Life of Structure	PV of Residual value or reconstruction	TOTAL NPC
1							
2							
3							
4							
5							

NOTE: Period of appraisal years.

ECONOMIC ANALYSIS OF FLOOD DEFENCE PROJECTS

2. BENEFITS

2.1 Primarily there are 2 scenarios to consider viz:-

Scenario 1 - consideration of justification of an 'improve' or 'maintain' option on the basis of the cost of flood damage avoided.

Scenario 2 - consideration of justification of a 'sustain' or 'hold' option on the basis of the value of assets being protected.

This is shown graphically on the attached flow chart.

Where a project incorporates more than one self contained sector, the above test must be applied to each.

2.2 In some instances it may be desirable to show the incremental costs and benefits of the improvement options, relative to the 'do-nothing' and 'sustain' options. Normally in such cases the total lost asset value (as under scenario 2) is calculated for the 'do-nothing' baseline. Residual damages are then deducted from this baseline to give the flood damage avoided for the improvement works. In this context residual damages are the flood damage costs that will still be encountered after the project is implemented, ie because some breaches will still occur if a more severe event occurs. Where this method is used it should be adequately demonstrated that the net damages (ie do-nothing less residual damages) equate to the average annual damage avoided, as under scenario 1.

2.3 SCENARIO 1

(a) Refer to extent of flooding for different return periods (as shown in tables), including the area likely to flood and the depth of flooding. State types of land and properties for which flood damage is calculated (eg residential properties, agricultural land).

ECONOMIC ANALYSIS OF FLOOD DEFENCE PROJECTS

2.3 (cont)

State what has not been calculated (eg damage to holiday caravans, infrastructure, loss of life etc).

Cost of repair of breaches may be included - but this must be for breaches avoided by carrying out the works, and should normally be substantiated by a history of flooding.

(b) Give details for each type of benefit calculated, eg:-

Residential, Permanent Holiday and Business Properties

List categories of properties and numbers

Describe effect of flooding

State basis of assessing damage costs (eg Penning - Rowsell)

State details of uplift to required price base.

Tabulate return periods, flood levels (mAOD) and total damage costs.

Agricultural Land, Buildings and Equipment

Describe area at risk, land usage, and effect of flooding

State basis of assessing damage (eg net margins per Nix handbook)

State details of uplift to required price base

Tabulate return periods, flood levels (mAOD), area flooded, and total flood damage cost.

(c) Tabulate the total flood damage costs for each return period. Show annual average damage calculations by curves, and in tabular form (see examples)

Calculate the present value of benefits (ie capitalise the average annual benefit).

ECONOMIC ANALYSIS OF FLOOD DEFENCE PROJECTS

Where AAD's are calculated for the beginning and end of the design period (eg. 1992 and 2042) the assumptions on how benefits will increase over the period should be given, and the method used stated (eg. "Simpsons" rule for linear increases).

2.4 SCENARIO 2

- (a) Describe area at risk and types of assets (ie land and buildings) that will become valueless if subjected to regular flooding.
- (b) Detail each category and give numbers, basis of valuation and total values.
- (c) Profile the lost values over the term of the appraisal. Calculate the (discounted) net present value of benefits.

2.5 Where alternative options give rise to different levels of benefits, the net present value for each must be calculated. The details of all benefit calculations should be included in an Appendix to the report.

3.0 JUSTIFICATION

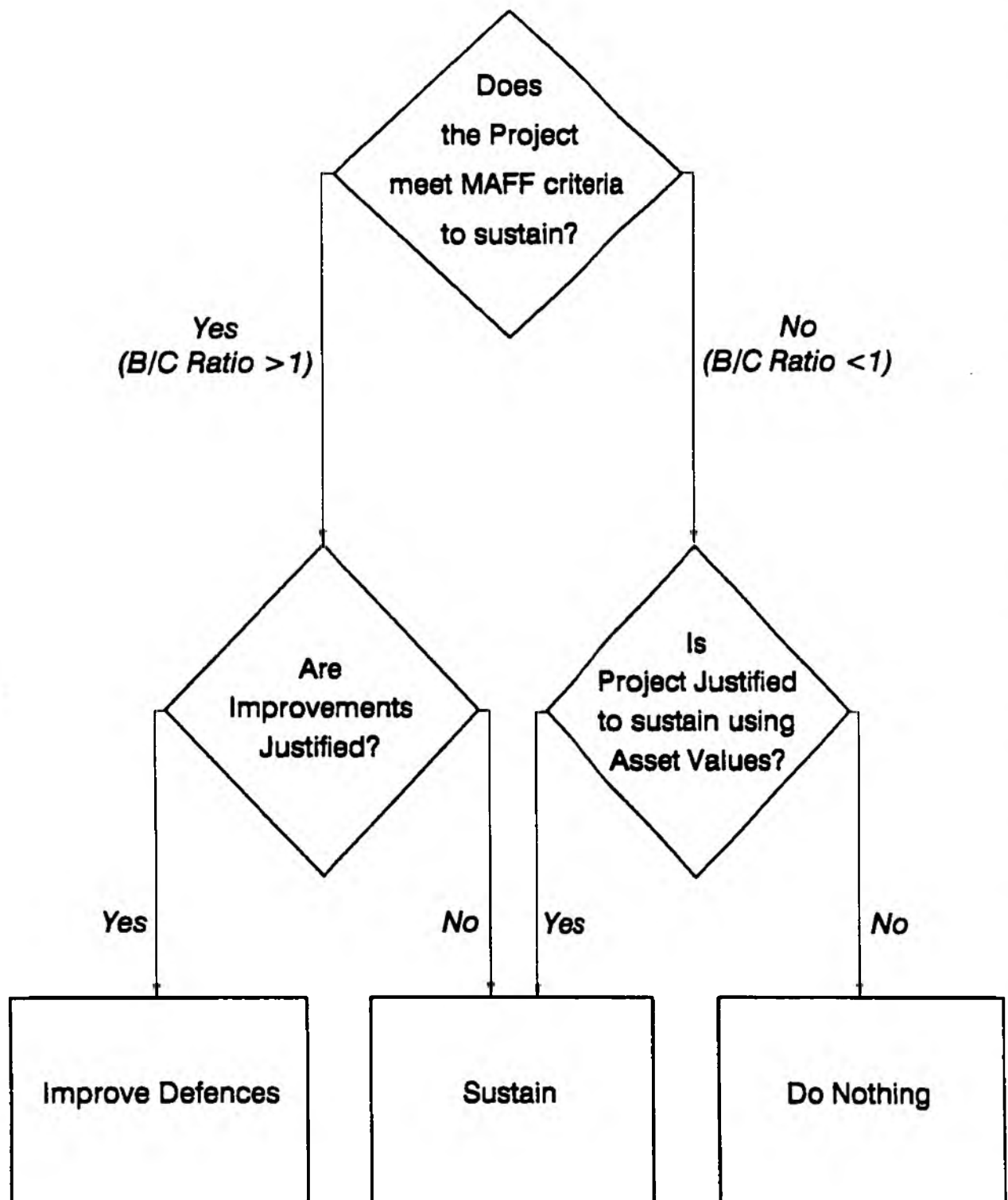
3.1 The economic justification of the project should be demonstrated by the inclusion in the body of the report of a table showing the following details for each option:-

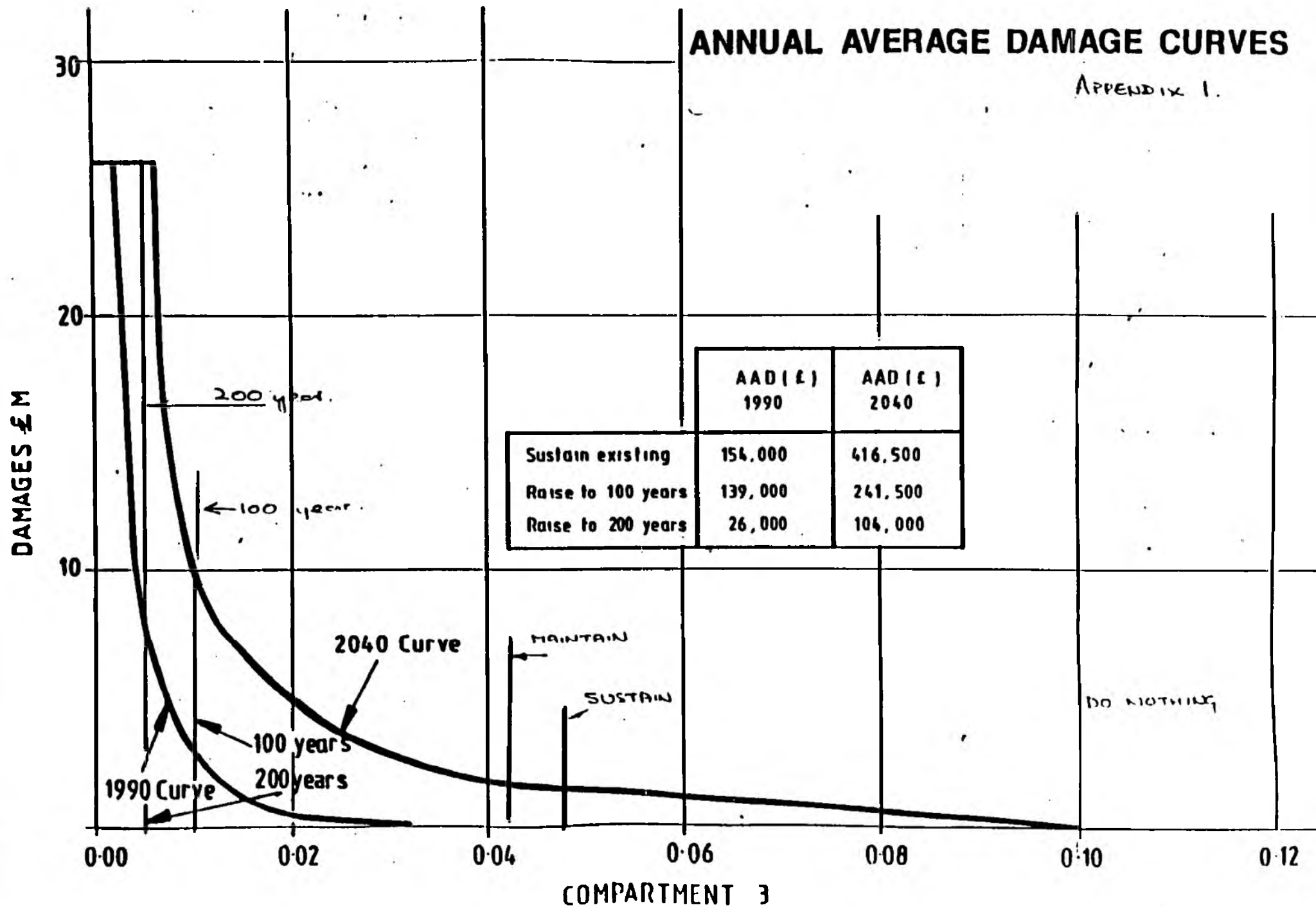
- net present value of total benefits
- total net present costs (taken from the 'costs' table)
- the net present value (ie, discounted benefits less net present costs)
- the benefit/cost ratio (ie, discounted benefits divided by net present costs).

ECONOMIC ANALYSIS OF FLOOD DEFENCE PROJECTS

- 3.2 Where uncertainties exist in the estimating of either costs or benefits, a sensitivity test should be applied to each uncertainty in order to show what effect a variation in each will have on the overall justification of the project.
- 3.3 The preferred option should be identified and where this is not the most economical solution, adequate explanation must be given in support of the recommendation.

Flowchart for Project Justification





Calculation of Average Annual Benefits

Example

<u>Return Period Yrs</u>	<u>Frequency</u>	<u>Total Benefit £</u>	<u>Frequency of Interval</u>	<u>Average Benefit of Interval £</u>	<u>Average Annual Benefit £</u>	<u>Cummulative A.A.B. £</u>
10	0.1	392,840				
			0.05	438,354	21,918	21,918
20	0.05	483,868				
			0.03	3,003,237	90,097	112,015
50	0.02	5,522,606				
			0.01	6,349,904	63,499	175,514
100	0.01	7,177,202				
			0.005	7,195,486	35,977	211,491
200	0.005	7,213,770				
			0.003	7,398,676	22,196	233,687
500	0.002	7,583,582				

ANNEX 12

ECONOMIC ANALYSIS
OF DOE PROJECTS

ECONOMIC ANALYSIS OF DOE PROJECTS

1. GENERAL

Because of the diversity of DoE projects it is impossible to be precise about report requirements, but the checklist below shows typical matters to be considered.

However, it is important that reference is made to the general requirements for economic analysis as set out in Annex 10 which are applicable to all projects.

2. CHECKLIST

2.1 Term

Decide the term of the appraisal. This will normally be the life of the main asset, or the lowest asset life of the alternative options.

2.2 Capital Costs

- state impact on each option of elements of costs eg construction, equipment etc.
- give cost build up in Appendix and summary details in main report.
- allow for design and supervision of contract (show separately).
- state source of data of rates used in estimated costs.
- allow for cost of replacing any equipment if life is shorter than term of appraisal.
- allow for residual values if any element or option has life longer than term of appraisal.
- show cost profile
- show total costs for each elements/asset life.

2.3 Revenue Costs

- state impact on each option of elements of cost, eg
 - * Staff costs
 - * External charge
 - * Operating costs (eg, electricity, cleaning etc)
 - * Maintenance contract
 - * Repairs

(NB the consequential costs of the option not the marginal change to existing costs).

- state source of data and give any calculations in Appendix.
- state total impact over term of appraisal (eg, annual recurring costs).

2.4 Net Present Costs

- discount capital and revenue costs to give net present cost of each option.
- give details of calculations in Appendix.
- show table in main report comparing the total net present cost of each option.

2.5 Benefits

- identify savings expected as a result of implementing the project.
- assess benefits over term of appraisal.
- discount benefits to give net present value.
- give details of calculations in Appendix and summary details in main report.
- consider weighting and scoring system for non-monetary benefits.

ECONOMIC ANALYSIS OF DOE PROJECTS

2.6 Justification

- show table in main report giving for each option:-
 - (a) net present value of benefits.
 - (b) total net present costs.
 - (c) net present value (ie discounted benefits less net present costs).
 - (d) benefit/cost ratio (ie discounted benefits divided by net present costs)
- do sensitivity tests on any uncertainties of the estimated costs or benefits to see what effect each has on the overall project justification.
- consider environmental benefits; or using the consequential costs of doing nothing in lieu of benefits; or state the consequences of doing nothing.
- the preferred option should be identified. Where this is not the most economical solution, adequate explanation must be given in support of the recommendation.

2.7 Revenue Budget

- state impact on future revenue budgets of expected changes in levels of revenue expenditure.

3. EXAMPLE

An example of an economic comparison of options is given on the following page.

Comparison over 10 year period using 6% Discount Rate

Option (a) (Extension)

	£K	£K
(i) Capital Cost (at start of yr 1)	325	
less residual value at yr 10		
$5\% \times £325 \times 0.5584$	<u>151</u>	174
(ii) Additional Staff		
20 No Grade 2 plus oncost 20%		
Yr 1 7 x £9,927 x 1.2 x 7.3602	614	
Yr 2 7 x £9,927 x 1.2 x 6.4168	535	
Yr 3 6 x £9,927 x 1.2 x 5.5268	<u>395</u>	1554
(iii) Annual building costs, £93 per m ²		
300 m ² x £193 x 7.3602		<u>205</u>
Total NPC		<u>£1923</u>

Option (b) (Contract out)

(i) External charges		
Yr 1 £500K x 0.9434	472	
Yr 2 £1,000K x 0.8900	890	
Yr 3 £1,500K x 0.8396	1259	
Yr 4 to Yr 10 £1,700K x 4.6872	<u>7968</u>	10,589
(ii) Additional Staff		
3 No Grade 2 plus oncost 20%		
3 x £9,927 x 1.2 x 7.3602		263
(iii) Saving on equipment not purchased		
Yr 2 £45K x 0.8900	40	
Yr 9 £95K x 0.5919	<u>56</u>	(96)
Total NPC		<u>£10,755</u>

Option (c) (Lease)

(i) Lease rental £25K pa with 5% pa increase. £25K x 9.0909 (ie 1% net discount)		227
(ii) Additional staff (same as Option 1)		1544
(iii) Additional staff		
2½ No Grade 2 plus 20% oncost		
2½ x £9,927 x 1.2 x 7.3602		219
(iv) Fitting out cost for leased building (at start of Yr 1)		185
(v) Annual building costs £93 per m ² 350 m ² x £93 x 7.3602		240
(vi) Additional equipment		
Yr 2 £20K x 0.8900	18	
Yr 9 £20K less residual value (£ x 20)		
£20-17 = 3 x 0.5584	<u>2</u>	20
Total NPC		<u>£2,435</u>