

PROJECT 355

Programme Area Reviews of Research and Development

Report on a Review of R&D in Flood Defence
Operational Management

Science Connections Ltd

R&D Note 355



NRA

National Rivers Authority

NATIONAL RIVERS AUTHORITY
PROGRAMME AREA REVIEWS
OF RESEARCH AND DEVELOPMENT

Report on a Review of R&D in
Flood Defence Operational Management

Commissioned by

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Statement of Use

This report is to be used by Flood Defence function staff and the NRA's R&D Section to guide the management of the NRA's Flood Defence R&D programme, in particular the Topic R&D programme in Operational Management.

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PROGRAMME AREA REVIEWS OF NRA RESEARCH AND DEVELOPMENT INTRODUCTION BY HEAD OF R&D

The NRA has a Statutory Duty under the Water Resources Act, 1991 to undertake research in support of its functions. Its R&D programme has now been in operation for about five years. During this time, the NRA has restructured the uncoordinated portfolio of projects which it inherited from the former Regional Water Authorities and the DoE Water Directorate into seven commissioned programmes of business-orientated R&D. Each of its core functions has its own "commission" and one further commission contains a programme of cross-functional R&D. The commissions are further subdivided into 25 Topic Areas, within which projects of a similar theme are managed.

In order to ensure that its R&D programme both delivers the intended benefits and does this efficiently and effectively, the NRA has decided to carry out annual Programme Area Reviews on appropriate areas of the programme. This is in line with Cabinet Office guidelines for assessment of public sector R&D. This report covers one of four areas of its R&D programme in which independent reviews were carried out during 1994 in order to evaluate the effectiveness of both the outputs from the programme and the way in which the programme is managed.

This programme area review of Flood Defence Operational Management R&D was undertaken by Science Connections Limited under the direction of Dr Keith Harrap with experienced professional advice from David Noble. The review was commissioned by the NRA's R&D Section and carried out in close liaison with the NRA's Flood Defence function which is the research customer. Gary Lane, Leader for the Operational Management Topic Area, represented NRA Flood Defence interests.

The report sets out the approach adopted by Science Connections in carrying out the review in Section 1. The outputs and other information which were examined during the review are described in Section 2 and Appendices 3 and 7. The analysis of these is discussed in Section 3 in terms of (a) quality of research; (b) its usefulness; (c) value for money; and (d) R&D contractors. Conclusions and recommendations are given in Section 4.

The overall conclusion of the review was that the R&D programme is delivering good results which are relevant to the NRA's business. Within this overall conclusion, various recommendations for improvement or targeting of the programme and its uptake were made.

These recommendations were discussed with the NRA at a Delivery Meeting held on 23 September 1994 and an approach to reporting and implementing these agreed.

Each recommendation indicates the person or body responsible for its implementation. Recommendations concerning specific technical issues relating to the programme and its uptake will be addressed by the research customer (Flood Defence Function Managers). Those covering the management of research will be addressed by the Head of R&D in conjunction with the R&D committee. Some recommendations are broader and require the support of the NRA's Environmental Managers, its Directors or its Board.

Mervyn Bramley
Head of R&D

January 1995

Flood Defence

EXECUTIVE SUMMARY

- The R&D undertaken in the Operational Management Topic (C4) of the Flood Defence Commission has been reviewed for NRA. The assessment process concentrated on the Evaluation of outputs, principally R&D Notes and Project Records, from seven completed research projects together with an examination of the Rationale and Objectives underpinning the Topic area. The approach specified for the Review was in accordance with the Cabinet Office ROAME principles. A commentary was also to be provided on the on-going programme and some indication given of the desirable future direction of the Topic research.
- The assessment was carried out using a process of desk studies of available documentation including report outputs and interviews of NRA staff and others involved directly or professionally with the content of the Topic programme. Evaluation of the outputs was undertaken primarily by a Technical Expert nominated by NRA. The overall management of the review, together with appraisal processes, management aspects, uptake, and overall delivery of the research in the Topic area was provided by the Review team from Science Connections.
- The Evaluation of the research was undertaken in a structured way in which each project was scored according to a number of parameters grouped in three broad criteria areas. Notes on the technical content of each project were also provided in support of the scoring process. This Evaluation of the individual projects then provided a programme overview to satisfy the need to assess the effectiveness, efficiency, and quality of the Topic area programme overall. A report was drafted outlining the Review task and its methodology, the information retrieved through interview and desk study, the analysis of the resulting findings, and the development of recommendations. Components of the draft report were then presented to a Delivery Meeting of mainly NRA attendees at which further feedback was provided for incorporation into a final report.
- Overall, the Topic Programme was found to be achieving its objectives, although the Evaluation of the project outputs does not indicate a particularly exciting or innovative research orientation. Many of the projects necessarily comprised groundwork review and development survey information, some of which had been inherited at "vesting", on which the aims of the Topic programme in the future can be built. Certain projects have provided useful underpinning operational information (such as Standards of Service) for the development of the effective Programming and Prioritisation of Flood Defence works and the function's Flood Defence Management Manual. One project had to be curtailed because of lack of comparable information obtainable from NRA Regions.

- For the Topic programme overall, there were concerns that, despite a heavily administrative R&D project cycle, in part as a result of a requirement to address business needs, there was some lack of credibility of the R&D undertaken at an operational level. There is a need to seek project appraisal information from more "grass roots" origins within NRA to correct this and communicate the origination and outcome of R&D projects more effectively.
- The management of the projects suffered from the part-time nature of the R&D responsibilities of several Project Leaders. They were often subject to the day-to-day pressures of their core operational responsibilities and R&D project responsibilities had to come second. Furthermore some Project Leaders at the outset of the projects under review had no experience of R&D project management.
- The dissemination and take-up processes for the outputs of the R&D appeared to be inappropriate and ineffective in some areas. On occasion reports had not reached those who should have an operational interest in the project findings. When they did, the reports frequently did not present information in a form appropriate to an operational manager. There was uncertainty as to whether, and at what stage, the operational manager should see R&D outputs before these have been compiled into function policy documents or operational manuals.
- For the future there is a need to identify new key themes for investigation within the Topic area and build commissioned projects into such themes. The Topic Leader has already made a start here. The three areas proposed are operational plan, asset life, and evaluating urban maintenance work. It is also suggested that some longer-term strategic research is considered in order to bring about significant "leaps forward" in the delivery of flood defence operational management to NRA. In addition, initiatives such as adaptive research projects are needed to bring the outputs of R&D projects into operational use.
- The following recommendations are proposed:
 - (1) Origination of research projects must be improved. This must specifically include *asking the real end-users what their needs are* so that there is both a better sense of ownership and a better perception of R&D application and benefit at all levels. (3.1.6, 4.1.5, 4.2.7) (Action: Function)
 - (2) More professional R&D input to the Topic is required both technically and managerially so that technical content and its delivery are increasingly effective in meeting flood defence needs. To assist in this *an external Topic advisor with the requisite professional background should be appointed*. (3.1.7, 3.6.1, 3.6.2, 4.1.2) (Action: R&D)
 - (3) The Operational Management Topic needs to *develop a framework embracing further well thought-out R&D themes of endeavour driven by business needs*, as suggested recently by the Topic Leader, to which R&D projects clearly contribute so that a whole greater than the sum of the parts is apparent to

all. The choice and specification of the individual projects is the key to achieving this. (2.4.9, 3.4.2, 3.4.7) (Action: Function)

- (4) To enhance take-up, less reliance must be placed on standard R&D reports for communicating R&D information. *Report distribution should be more carefully targetted, greater awareness created of other forms of R&D output that are presently available, and other user-orientated procedures such as videos and roadshows explored.* As part of such an approach the *Flood Defence Management Manual should be re-launched* as a tangible R&D product and particular initiatives taken to measure and, if necessary, adjust its take-up. (3.3.6, 3.3.8, 4.2.7, 4.2.8) (Action: Function; R&D)
- (5) To address and implement a number of the recommendations of the review relating to the appropriateness of the Topic R&D, its technical development, communication of its findings, and means of implementation, *a steering group addressing the overall business context of flood defence should be formed drawing its membership along a vertical axis in NRA* in order to involve flood defence personnel ranging from policy-makers to field operatives. Regional variation and geographical emphasis should also be reflected in the group. The external Topic advisor appointed should be a member of such a group. (4.1.5) (Appendix 12) (Action: Function)

WIDER R&D IMPLICATIONS

- (6) The *management procedures* through which R&D has to be carried out are too mechanistic and *need reassessment* so that necessary elements are retained and appreciated and unnecessary procedures such as re-authorising work at Regional level are abandoned. It must be clear to everybody involved who takes decisions; where responsibility lies, and what the responsibility is. *The R&D Co-ordinators have a crucial on-the-job function in this respect so they should be fully involved in any reassessment.* (3.5.1, 4.2.6) (Action: R&D)
- (7) R&D projects in this Topic must have obvious operational relevance. Time availability is often a key constraint for Project Leaders so it is important that demarcations between operational and R&D responsibilities are not so marked nor should one activity proceed at an incompatible pace with the other. The commendable principle of a *matrix approach to delivering R&D project management needs to be actively supported by constantly reinforcing at senior levels of management an awareness of R&D and its intrinsic value to NRA function activities.* (3.5.2, 4.2.2) (Action: Function; R&D; Board)
- (8) In certain instances the take-up of R&D project outputs requires the *undertaking of an adaptive research project the aim of which is to bring about operational use of a new methodology or product.* Much greater use should be made of such an approach in particular when field operators and researchers need to be brought together and additional short-term resources are needed to implement the results in a particular location or Region. (3.5.5, 4.2.9) (Action: Function; R&D)

(9) Certain R&D themes should have a longer-term flavour, perhaps up to 20% of resources, and this will *require greater professional R&D input* than is available now. Early consideration should be given to providing this by:-

- *use of external advisors*
- *increased R&D professional, rather than administrative, support to the Head of R&D and the Commissioner*
- *developing the concept of 'core contractors' on longer term contracts tasked with the paramount research role but sub-contracting a designated proportion of available resourcing*

Such provisions can be made available either alone or in combination. (3.4.6, 3.4.6, 3.6.3) (Action: R&D, Function, Board)

(10) Carefully specified *studies should be undertaken on the operational, scientific/technological, and financial benefits* of Topic R&D projects so that model procedures can be derived for assessing impact and value for money. Studies of this type will help to underpin and endorse the importance of the R&D effort to the objectives of NRA overall. (3.3.8, 4.2.8) (Action: R&D)

- A practical programme for implementing these recommendations should be agreed with the Flood Defence function and R&D Committee taking into account the opportunities and requirements for reorganisation of the R&D function with the development of the Environment Agency.

1. CONTEXT AND CONDUCT OF THE REVIEW

1.1 SCOPE AND EMPHASIS

1.1.1 NRA required a Review of its research and development (R&D) work in Flood Defence Operational Management which was based on Cabinet Office guidelines for the assessment of public sector R&D. The terms of reference are given in Appendix 1. Such guidelines encompass the now well known ROAME principles of Rationale, Objectives, Appraisal, Monitoring, and Evaluation.

1.1.2 The prime requirement of the Review as stated in the terms of reference was to cover Evaluation of research project outputs from work undertaken since "vesting" whilst also addressing the Rationale and Objectives of the R&D. NRA is said to have reasonably well established procedures to determine these two latter components that are designed to ensure that projects address the strategic or operational needs of the core functions of the business.

1.1.3 Because NRA R&D programmes are set largely by internal dialogue between core function business groups (as customers) and the R&D Topic Leaders (tasked with R&D supply) it is the intention that NRA R&D responds to a strong business remit of function activities. These are set out in the published core function strategy documents.

1.1.4 In view of the time and effort invested integrating R&D projects into the business needs of NRA a particular emphasis required from the Review concerned the dissemination, take-up, usefulness, impact, and value for money (vfm) aspects of the research outputs. It is for this reason that the Evaluation (or ex-post) component of the ROAME principles was particularly stressed.

1.1.5 Evaluation work however is facilitated by clear Appraisal (or ex-ante) processes undertaken at the initiation of research projects. This appraisal is in turn dependant on having clear rationale and objectives for the research endeavour. This aspect represents the second emphasis given in the terms of reference for the Review

1.1.6 The objectives of the Review were to assess:

- Effectiveness of achieving i) Programme objectives and ii) anticipated benefits
- Effectiveness of targeting the programme in relation to i) the NRA actual needs and ii) the base of existing scientific knowledge

- **Quality** of the scientific innovation in the Programme
- **Efficiency** of the Programme in achieving its objectives and whether **Value for Money** is being obtained

and to identify:

- **Follow up action** either to alleviate particular problems or to learn lessons for the planning and management of the future R&D Topic Programme.

1.1.7 To assist with the assessment of the quality of science and innovation in the Programme a Technical Expert nominated by NRA was involved who was recognised in and conversant with flood defence matters. His prime responsibility was to evaluate the project outputs provided as R&D Notes or Project Records.

1.1.8 In early discussion with NRA it became apparent that there was interest in a commentary on the present R&D Programme and its likely future direction. This was of interest in addition to the strict assessment of R&D effort that had already been undertaken and reported on in the project outputs provided.

1.1.9 The Topic Programme Review was required to retain a general overview of the sector and not lapse into a series of detailed reviews of individual projects. Furthermore it had to be set within the context of any related R&D being pursued outside NRA. The overall objective was to learn from successes and mistakes (or problems) and for this to be fed into future Programme direction. This should improve the overall shape and delivery of R&D in NRA and help to ensure that its anticipated benefits are effectively implemented.

1.2 METHODOLOGY

1.2.1 The Review was managed by Dr Keith Harrap of Science Connections Ltd assisted by Dr John Montague. In addition to the Review management role they assessed R&D project appraisal, project delivery, and take-up aspects. As indicated a technical/scientific evaluation of the outputs of the research in the Programme was undertaken by a Technical Expert - Mr David Noble. This evaluation was done in a pre-determined and structured way.

1.2.2

By analysing project outputs usually in the form of Reports or R&D Notes or Project Records, (amplified when appropriate by discussion/interview with Topic Leaders, Project Leaders, or research contractors) individual projects were scored on a +2 to -2 classification. The score markings can be interpreted as follows:

-	Excellent/High	+2
-	Good or Sound	+1
-	Fair/Some doubts or flaws	-1
-	Poor or seriously flawed	-2

The scorings were applied to a number of chosen parameters grouped under the broad criteria of **quality of research**, **usefulness of research**, and **value for money**. A pro forma of the assessment scheme used is provided in Appendix 2. Individual project scores were then assembled into an overall Programme tabulation so that patterns of performance emerged for the Programme overall.

1.2.3

To assess the **rationale** and **objectives** of the Programme and the way in which individual projects were **appraised**, the R&D project cycle initiation in NRA was carefully analysed in discussions with Topic Leaders and R&D staff. Particular attention was paid to needs identification, the way in which these needs were articulated to specify R&D projects and at the end of the cycle the way in which the results of the R&D project were fed into the NRA business areas so that the originating needs were satisfied.

1.2.4

In undertaking both the output evaluation and the appraisal aspects of the assessment work, a number of internal documents were examined. These included business area strategies, position papers, topic investment appraisals and project initiation documents. The documentation reviewed during the assessment is listed in Appendix 3. To facilitate the technical evaluation of the research outputs in particular, archived information from NRA Head Office or Regional Offices was obtained in order to inform the Technical Expert on the origination of the projects whose outputs were being evaluated.

1.2.5

In both appraisal and evaluation areas interviews were undertaken with Topic and Project Leaders, with Commissioners, and other staff involved, both face to face and by telephone. On occasion questionnaires were also used (see Appendix 4). A list of people interviewed is provided in Appendix 5 and the interview structure used in Appendix 6.

1.2.6

A report was drafted addressing inter alia particular issues at the Programme Area level identified by NRA in the terms of reference for the Review. The findings set out in this draft report were presented at a Delivery Meeting in order to obtain feedback from those involved within NRA (and in certain instances outside it) so that this could be taken into account prior to the drafting of a final report and recommendations.

2. INFORMATION RETRIEVED

2.1 NEEDS APPRAISAL

2.1.1 The principal aims of the NRA in relation to flood defence are to

- provide effective defence for people and property against flooding from rivers and from the sea
- provide adequate arrangements for flood forecasting and warning

NRA therefore supports R&D which will assist in identifying future flood defence needs related to these aims.

2.1.2 In its operational work, the NRA undertakes to:

- continue to operate river systems as required
- produce and agree operational procedures and seek an increased efficiency
- take account of both flood defence and environmental considerations
- formulate and agree operational plans with other bodies involved such as English Nature or the Countryside Council for Wales to cover operations which are in, or affect, sites of special scientific interest (SSSIs) and other environmentally important sites.

2.1.3 When flood conditions or high tides are predicted, prompt and effective operation of the system is required. The detailed knowledge gained by daily operation is the key to this response. It is these elements which represent the core operational management aspects of flood defence.

2.1.4 For R&D requirements in the Operational Management Topic of Flood Defence the overriding aims are:

- to develop the framework for management of NRA flood defence maintenance
- to ensure that work programmes through the NRA are consistent, prioritised adequately, justified, and cost effective

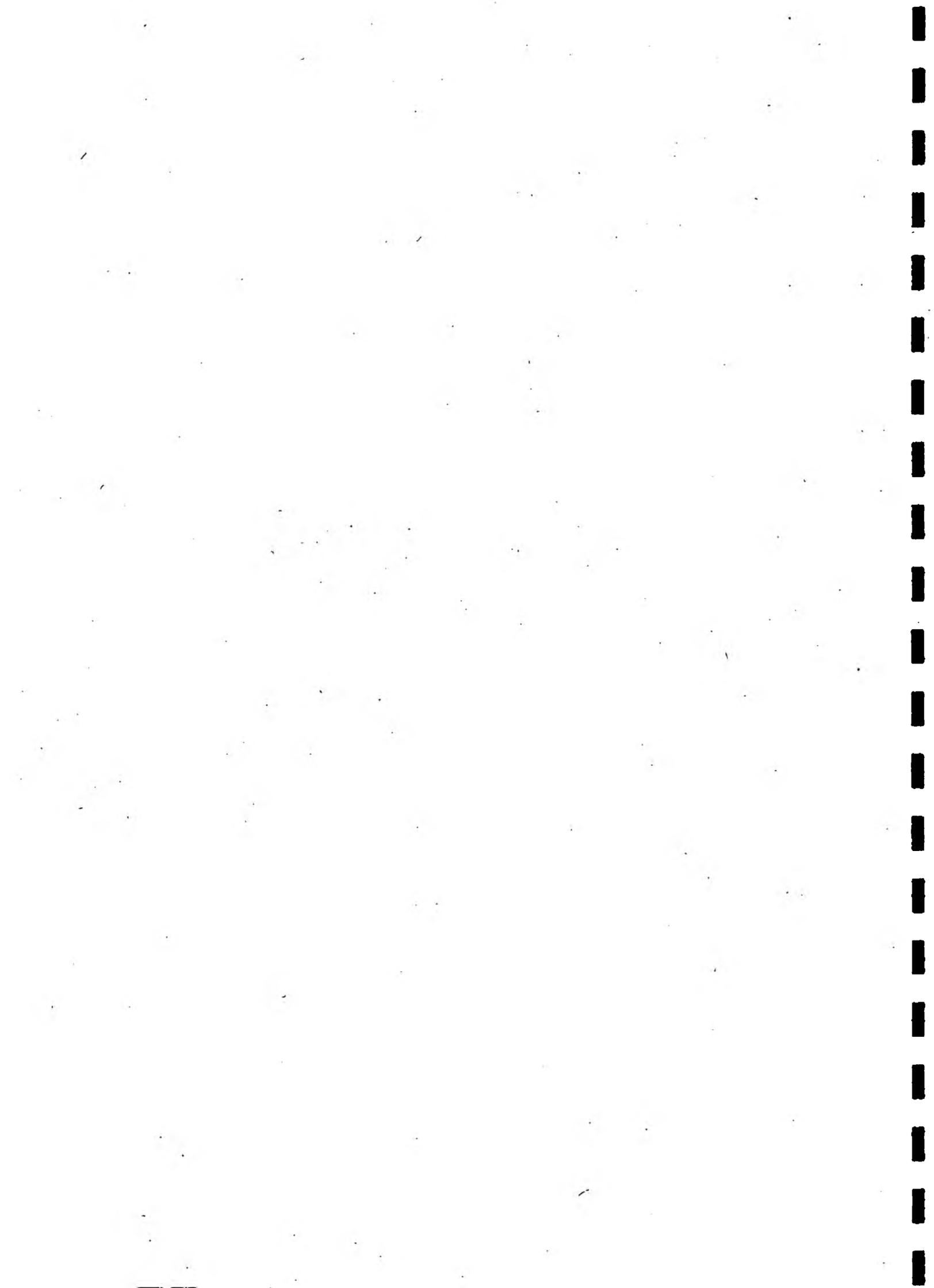
- to ensure that the interests of other functions are recognised.

2.1.5 Income for flood defence is raised primarily through Local Authority levies. These levies raised in any Flood Defence Committee area are required by statute to be spent within the area from which they have been raised. Exceptions are however made for the funding of NRA Head Office and R&D to which each Committee contributes. Nevertheless Regional and Local Flood Defence Committees can represent a significant customer voice for R&D in the Topic Area.

2.1.6 The national policy framework for flood defence is set by the Ministry of Agriculture, Fisheries and Food (MAFF). Its research requirements are generally influenced by the recommendations of the "Ackers Report" and are largely strategic in nature. In contrast NRA research activity in the Flood Defence area looks primarily towards application and operational usage. NRA R&D carried out for Flood Defence is frequently aimed at providing "best practice" for staff. This perhaps is particularly true for the Operational Management Topic - an area most distanced from MAFF policy considerations in relation to flood defence.

2.1.7 There are many other bodies and organisations where effective liaison is required for the NRA Flood Defence strategy to be a success. These include:

- Commission of the European Communities
- Department of the Environment
- Ministry of Agriculture Fisheries and Food
- Welsh Office
- Statutory Regional Committees
- Local Flood Defence Committees
- Local Authorities
- Maritime District Councils
- Internal Drainage Boards
- the Police
- the Meteorological Office
- research establishments
- English Nature and the Countryside Council for Wales
- angling organisations and water recreation groups
- the media
- voluntary groups
- the public



2.1.8 Overall R&D in Flood Defence addresses a number of key issues:

- investment planning
- design standards and specifications
- emergency response
- regulation and enforcement

2.1.9 For the Operational Management Topic (C 4) of Flood Defence the standard "Frascati" classification of R&D is "applied research with specific aims and experimental development". R&D within the Topic aims to develop a nationally agreed framework for maintenance of flood defences in the NRA. On vesting, regions had developed their own approaches to varying degrees but none was comprehensive.

2.1.10 NRA has responsibility to carry out capital and maintenance work on main rivers to ensure their adequacy for flood defence and land drainage. The aims relevant to the Operational Management Topic therefore are:

- to provide effective defence against flooding from rivers
- to improve efficiency in the exercise of the flood defence function
- to conserve and enhance related wildlife and landscape

2.1.11 Objectives relevant to the Topic as set out in the Topic Investment Appraisal (TIA) are to:

- develop a database system for management information for planning flood defence strategy
- develop a system for identifying priorities for maintenance, renewals, refurbishment, and construction of flood defences.
- undertake asset surveys and develop a suitable GIS System to display recorded data
- prepare action plans for each Region and establish target levels of service indicators for land use classification bands

2.1.12

The programme of work for the Topic set out in the Topic Investment Appraisal is therefore subdivided into four main elements:

- to develop procedures for surveying and classifying the condition of assets (Asset Management Systems)
- to develop improved understanding of how to monitor and quantify the need for flood defence maintenance work leading to better programming and prioritisation of maintenance activity (Levels of Service)
- to categorise and describe methods and associated frequencies of carrying out maintenance programmes on flood defence assets (Best Practice Surveys)
- to assess the benefits of different river maintenance strategies through post project appraisals by field monitoring of the effects of maintenance on channel characteristics

2.1.13

In pursuing this Programme, existing knowledge and experience has to be reviewed and ongoing R&D projects taken into account. Surveys of present practice have to be undertaken and close consultation maintained with NRA Regions. Pilot studies need to be carried out to assess the current situation and the effectiveness of new methods. For example there is no point in initiating a project that is dependent on comparability of information from the NRA Regions if such information does not exist in certain Regions.

2.1.14

NRA requirements are said to be sufficiently specific and advanced in relation to other organisations for there to be limited opportunities for transfer of knowledge from elsewhere. Nevertheless extensive work on asset management surveys has been undertaken for the water industry and methods for such surveys are being developed in relation to flood defences in The Netherlands. The topic investment appraisal requires that an exchange of information should be arranged here early in the Programme. It is also necessary to maintain liaison within NRA both with other Topic Areas in the Commission and with other Commissions. In practice certain maintenance-related R&D projects in other Topic Areas seem to have had similar or overlapping objectives and have started at about the same time with the same contractor.

- 2.1.15 Work in the Topic Area is expected to progressively embrace fluvial, estuarial and coastal maintenance. Initial outputs of the Programme in general are expected to be reviews and definition studies influencing future work. Assessment of output reports must therefore confirm that any emerging framework is practicable.
- 2.1.16 The benefits from the Topic Programme are anticipated to be:
- reduction in unit costs of maintenance
 - reduction in frequency of non-essential work
 - better understanding of the practical ways in which conservation, recreation and amenity interests can be accommodated
- 2.1.17 The initiation of R&D projects as components of the Topic Programme has its origins in outline proposals drawn together or developed by the Topic Leader and Commissioner. The draft programme each year is then agreed with the function business group consisting of the Head of Flood Defence and Regional Flood Defence Managers. Approval for this needs-orientated specification of the R&D is then obtained from Chairmen of Regional Flood Defence Committees who might question the composition of the R&D effort and the way in which it addresses gaps in knowledge.
- 2.1.18 After designation and approval of the projects as constituent components of the Topic Programme Area, Project Leaders are selected by (and with) the Regional Flood Defence Managers and the Topic Leader. If a project had its origins in a Region via the input of operational staff, the Project Leader is often self-identifying. This can greatly assist the subsequent take-up of project outputs and the management of the project more generally.
- 2.1.19 The selected Project Leader then drafts the specification, or terms of reference, for the identified project with support from the Regional R&D Co-ordinator and Topic Leader, and the contractor is selected. Tendering may be either competitive or by single tender action depending on the nature of the projects and the type of facility and expertise required. There are some well recognised research contractors in the Topic who might often feature quite logically on a tender list. From this point on the project and the delivery of the work from the contractor is the responsibility of, and monitored by, the Project Leader though there is a formal progress reporting system to the Topic Leader.

2.1.20 At a Regional level the above process is ably facilitated administratively by an R&D Co-ordinator with responsibilities in the Region in which the Project Leader appointed for the national R&D project happens to be located. Both in this Topic Area and in general, NRA research is seen as becoming commendably more structured and addressing more specifically the needs of the NRA business areas.

2.2 THE PROJECT OUTPUTS REVIEWED

2.2.1 The project outputs reviewed in the Topic Area are listed in Appendix 7. They include five completed projects undertaken for operational reasons and one completed project undertaken for policy reasons. Of the projects designated as "due to complete in the near future", one (341) resulted in a report submission which could be evaluated in this Review. The other two in this category could not be evaluated as reports were not available.

2.2.2 Work currently ongoing in this Topic Area is set out in Appendix 8. The progress or initiation of some of these projects was embraced in discussion with Topic and Project Leaders held during the course of the Review.

2.2.3 Some projects related to operational management issues are being undertaken in other Topic or Commission areas. The existence of these needed to be known particularly in relation to the identification of any gaps in the Programme. Projects related in this way to Topic Area (C 4) are set out in Appendix 9.

2.3 TAKE-UP AND IMPACT

2.3.1 As stated above, within the Topic Area the R&D projects commissioned are intended to be identified by operational flood defence staff. At each level of the R&D hierarchy NRA staff, mainly drawn from the Regions, are appointed as Project and Topic Leaders to supervise and manage the research. This is done to ensure that business objectives are achieved and also that duplication is avoided. Accordingly, it is pre-eminently in matters of dissemination, take-up, and impact of the research that the amount of time invested integrating the research supply so closely into the business needs of the organisation should be seen to be paying dividends.

2.3.2 This is perhaps particularly so with this Topic Area as NRA regards its flood warning and operational role as the heart of its flood defence work. It is expanding the service it is providing in identifying and assessing potential flood events. This service can be enhanced by improved forecasting techniques and by targeting

warnings at the people and property at risk. Forecasts of rainfall and tidal conditions allow potential flooding to be forecast earlier, the police and Local Authorities alerted, and emergency action taken.

2.3.3 The take-up of research output is therefore intended to be through the business group who signed up for the research supply initially. Inputs to the Flood Defence Management Manual which have R&D project origins are very much of this type. The Topic Leader keeps management informed on developments in the area for example by circulating appropriate information to flood defence managers, or possibly a sub-group of them, in order to bring R&D outputs to their attention.

2.3.4 The on-the-ground operational user still remains remote from innovation. Operational issues are driven by the need to get the job done. Getting such areas supported by R&D is a necessary component of take-up of research. Re-presentation of the findings may be a requirement in a number of cases so that they appear in a way that suits the operational culture. Any such presentational work needs an action point. Where it should be is not always obvious.

2.3.5 Both the Topic Leader and the Commissioner have designated R&D responsibilities for reviewing and signing off project deliverables. These include project outputs and plans for their take-up on behalf of their function committee. Take-up procedures are set out in Section B4 Project Closure of the R&D Project Management Manual. Several post-holders and/or groups are specified in this process. One purpose of this Review has been to endeavour to determine whether or not the procedures in place for take-up of research outputs are working in practice. It has to be remembered however that many of these procedures have been put in place only in the last year so their benefits cannot yet be judged.

2.4 PAST PRESENT AND FUTURE

2.4.1 The focus of the R&D projects in the Topic Area has been to develop and encourage the adoption of nationally consistent planning and management systems drawing on Regional experience and current practice. This has involved adopting Regional initiatives and expanding objectives in some cases and commissioning new projects to identify or promote best practice in others.

- 2.4.2 A further element of research has been to encourage progress simultaneously in different areas but within an overall framework. Here surveys of maintenance techniques and frequencies to identify environmentally acceptable and economic methodologies have been a significant aspect.
- 2.4.3 One tangible output from the R&D projects undertaken during this period has been the evolution and development by the function staff of a Flood Defence Management System and a manual to support it.
- 2.4.4 The bulk of the work covering the period 1990-93 has been reviewed previously as Project 373 undertaken by Mott McDonald and Gould Consultants and published as R&D Report 7.
- 2.4.5 A number of aspects of work undertaken in the projects reviewed in Project 373 are still on-going at the current time. They are set out in Appendix 8. A significant number relate to maintenance strategies, for example, grass management operations and aquatic weed control. A project proposed to start in the current financial year concerns quality assurance for survey techniques in order to determine what quality of survey work NRA should specify.
- 2.4.6 It should be noted that a specific evaluation is being undertaken by the Centre for the Exploitation of Science and Technology (CEST) of the Aquatic Weeds Research Unit in order to recommend how the requirements of the NRA and other sponsors of the Unit for information and advice on the management of aquatic weeds should be provided in the future.
- 2.4.7 In the future it is likely that research capability will be invested in progressive computer database development of the Flood Defence Management System in which stored information can ultimately be manipulated to facilitate problem identification. It is likely that software development will become an important component of running this aspect of NRA business.
- 2.4.8 It is also anticipated that developments to appropriate databases and other IT tools will progressively assist detailed work planning. Furthermore operational management systems will increasingly need to be linked to other flood defence initiatives perhaps within a GIS or other Expert System or management tool that is software-based.
- 2.4.9 The Topic Leader has pointed out that the strategy for the Topic Programme has, until now, been the rather empirical one of Where, What, and How work should be done supplemented by an analysis of how effective it has been. He has proposed that in the

future the Topic should encompass three key issues namely:

- operational plan
- asset life
- evaluating urban maintenance work

as strategic themes on which to drive the Topic forward. Certainly the Topic would be easier to evaluate if clear issues such as these were identified as its prime concern.

2.4.10 Currently the overall flood defence budget is around £245 million of which about £45 million is spent on maintenance work. Almost half NRA personnel are engaged in flood defence activity. Set against this level of expenditure the current R&D spend on flood defence is around 1 million pounds annually. The anticipated spend in the Operational Management Topic for 1994-95 is £188k.

2.4.11 It should be noted that there is a perception that opportunities are being missed in relation to research activity undertaken in Europe or elsewhere abroad of which the Topic as yet takes insufficient account. This situation should be contrasted with the stated aims in this connection to be found in the TIA (see 2.1.14)

3. ANALYSIS OF THE FINDINGS

3.1 RATIONALE, OBJECTIVES, AND APPRAISAL PROCESSES

3.1.1 The overall mission of NRA includes the aim "to provide effective defence for people and property against flooding from rivers and the sea".

3.1.2 Supported by this mission statement the rationale for conducting research in Flood Defence and more particularly its Operational Management is well stated in the Topic Investment Appraisal (TIA). This sets the context of the R&D in relation to the aims of NRA and the justification for spending public funds. NRA expenditure on flood defence maintenance is around £45 million annually. This maintenance concerns NRA flood defence assets such as river channels, flood embankments, pumping stations, control structures, storage reservoirs, navigation and flood defence locks and weirs, and a range of gauging and telemetry communication systems.

3.1.3 For historical reasons NRA Regions have developed their own approaches in this area but none is comprehensive. The Operational Management Topic in Flood Defence therefore aims to produce a nationally agreed framework for maintenance of flood defences in NRA. This is a convincing and appropriate rationale for the R&D.

3.1.4 The objectives for the R&D are stated less satisfactorily. They tend to emphasize continuing activity rather than particular goals whose achievement can be tested. The goals of the R&D Topic should be stated to be "consistent, prioritised, adequately justified and cost effective maintenance procedures" rather than "developing the framework for management" of them.

3.1.5 The subdivisions within the objectives can be similarly criticised as they tend to depend on a continuum of action ("to develop procedures and techniques, to develop improved understanding, to categorise and describe methods, to assess benefits") rather than denoting specific goals whose achievement can be assessed. The subdivision goals therefore should be stated to be:

- procedures and techniques for surveying and classifying the condition of assets
- flood defence maintenance work quantified and monitored to achieve better programming and prioritisation of such activity

- maintenance programmes on flood defence assets categorised
- the benefits of different river maintenance strategies specified

3.1.6 The process of appraisal, in which project origination is identified in order to satisfy the rationale and objectives of the Topic Programme, is structured at the user end. This is done to derive input primarily from business manager groups who consider suggestions from the Topic Leader who himself would usually have a strong user orientation. In practice however the user-orientated input appears to be somewhat top-down. There is evidence that to staff at the technical or field level some projects lack credibility (see also 3.3.3; 3.3.7).

3.1.7 Though commendable, this strong management-user orientation may put at risk the usual process of assimilating inputs in the appraisal stage of a programme from a variety of sources. In particular, it is possible that the innovative scientific or technical aspects that need to be taken into account are not well represented in the appraisal process. The impact of this deficiency may have given rise to the view expressed that the Topic requires "more science".

3.1.8 Another aspect of appraisal which does not seem to be given significant attention concerns collaborative endeavour, and even an appropriate state of awareness in relation to scientific and technical progress in the subject of the Topic Area outside the UK, whether in Europe or more widely overseas. Although this was identified as important in the Topic Investment Appraisal, it does not figure significantly in the appraisal process itself.

3.1.9 In general the process of contractor tendering for projects and the diversity of contractors considered appears to be satisfactory. Particular contractors of choice might be recognised as centres of expertise for which single tender action can be seen as attractive and good value for money. This is not an unusual situation in contracted R&D in general. It is however important that the justification for single tender action is both scientifically robust and logically argued so that value for money rather than price alone is the obvious criterion for selection.

3.2 TECHNICAL AND PROFESSIONAL QUALITY

3.2.1 The scores awarded for a range of parameters grouped under three broad criteria are tabulated project by project in Appendix 10 together with supporting notes. A Programme overview tabulation is also provided.

3.2.2 Against the scoring system adopted, a number of projects are given relatively low scores. To some extent this is due to the nature of the project, rather than its value or contractor performance. For instance, added value, innovative contribution and similar parameters would not feature strongly within some projects.

3.2.3 The subjects covered by the projects all fell appropriately within the overall objectives of Topic C 4 - Operational Management. This covered areas of financial, operational and environmental interest which were being addressed as a matter of NRA policy, at the same time responding to external scrutiny. The objectives of each report were almost without exception precisely defined, but full delivery by the contractor was rarely achieved.

3.2.4 The projects considered fell into two categories, which were basically "reviews" and "developments". Reviews required an appraisal of existing practices to be undertaken, which is invariably a first step to providing guidenotes on best practices in terms of both effectiveness and cost. The "developments" included projects where the objective was to formulate an approach and to produce a practical methodological application which would benefit the management/execution of flood defence activities.

3.2.5 For both types of project, a common factor has invariably been the high demand on information from NRA Regions in order to progress the work. When this, for whatever reason, has not been available, the reports have been downgraded. In some cases the information, due to data collation systems, has simply not been available. In many, additional work has, or would have been, necessary to produce it in the required format. No doubt in other cases it was unavailable due simply to a lack of response. The following factors are relevant to addressing this problem:

- continuous and unrealistic demands for data requested from Regions
- inconsistencies in the format in which data is available
- lack of Regional initiatives by which data collection and analysis becomes an ongoing process

- different approaches to activities in terms of definition, costings, and similar matters

3.2.6 In awarding research contracts, NRA should pay particular attention to the qualification of individuals engaged on the project. It is suspected that on some projects, and for understandable reasons, the data collection work is allocated to less junior personnel. It is often at this stage where the impression of the potential end-user is formed, and during discussion an appreciation of the significance or otherwise of information, comment and so on is important.

3.3 APPLICATION USEFULNESS AND IMPACT

3.3.1 From the point of view of dissemination, many of the outputs did not receive high markings. More consideration needs to be given to the way in which new information can be disseminated in a practically relevant way. This could possibly be achieved through novel measures such as demonstration projects or specifically-located implementation initiatives. Other tools are already available such as the R&D Digest format. Information on the dissemination of reports, obtained as a result of the use of a questionnaire, is provided in Appendix 11.

3.3.2 Dissemination of the reports was variable, poor in some cases, for very good reason, but it was surprising that some managers with a key operational interest in a particular project had not had sight of a relevant report. It is suspected that this was due either to distribution within the Regions, rather than the report failing to be sent, or to the report being held back from release to operational staff pending its incorporation into function operational guidelines. Only limited implementation by Regions had followed the publication of reports and there was no evidence to suggest that the findings of any had been introduced comprehensively throughout NRA. For some reports the reasons are readily appreciated, but for the condition assessment, certainly over a number of asset types, it is surprising that this has not been more universally adopted.

3.3.3 The reports generally were too long - in some cases exceptionally so - and as such reader interest, particularly among senior staff, would be impaired. Reports of this nature are competing with a constant flow of material across the manager's desk and will suffer badly if the reader cannot focus attention readily on the salient points, accepting that others may wish to consider the matter in more detail. The response from managers contacted supports this observation and their lack of excitement for the report is not what is needed in an attempt to develop new approaches. Lessons here

are that the contractors themselves should be aware of who will have interest in the report and for what reason, and that a clearer understanding should exist at the outset as to how the R&D outputs are incorporated into the final function policy documents or guidance manuals.

- 3.3.4 The format of any reports for the end user could be improved and the contractor should be given better guidelines on this. The readers of the report fall into basically two categories; managers (who will consider principles and the implications of implementation) and implementors. The latter needs a detailed understanding and depth of information; the former will have neither the time nor the need to fully digest this. There is a case for the report itself to be of limited size, and dictated by NRA, with any supporting data, tabulations and so forth forming appendices.
- 3.3.5 Some reports could become of 'reference book' significance and as such statements within them may assume a factual status. This being the case, any statements which are incorrect should be removed prior to publication or circulation. Even when some disclaimer by NRA is made, such reports are considered to be of an official nature. Unnecessary, and often unrelated, comments and information should not be included within the reports as they detract from the main issues and can significantly add to the size of the report.
- 3.3.6 There are two distinct but related issues to be considered therefore in relation to the communication of R&D findings. One is distribution to and the targetting of the relevant audiences. The other is the form of the communication vehicle which needs to be decided with the target audience in mind. NRA has appropriate formats available for use which ought to be more readily and widely adopted. There have been some notable examples (see 4.2.8). The communication of R&D outputs certainly merits further analysis if take-up is to be maximised.
- 3.3.7 It is commendable that several R&D projects support directly the Flood Defence Management Manual which the area flood defence managers are responsible for implementing. There is a perception however that the sharp end of flood defence operational management remains remote from innovation - though the design teams are closer to it. The operational issues tend to be driven by the need to get the job done and it is important to get these skills supported by the R&D. Certainly much of the work needs to be operationally based - a lot of generic knowledge is said to be already available. There is still the feeling that even though a lot is known technically, it is difficult in this area to get it put into

practice. This has been the reasoning behind the Standards of Service and asset management approaches.

3.3.8 Despite the clearly defined procedures, for example in the R&D Project Management Manual, for project closure and dissemination and uptake of R&D outputs, this aspect remains problematical. There would be merit in studying in depth the value for money aspect of some R&D outputs by tracking the development of new technology or new practice from its origination through the undertaking of the R&D project to its output dissemination, implementation and impact on NRA at the operational level. Lessons could be learned from such a study that would inform the efficacy of take-up and the bridging of the gap between the termination of the R&D project and the implementation of new procedures within the business area of NRA as a whole.

3.4 PAST AND CURRENT POSITION - FUTURE DIRECTION

3.4.1 The striking feature of the research done in this Topic Area is its strong operational dimension and its attempt to achieve some coherence of practice and procedure throughout NRA where, at the outset, significant Regional differences occurred. The Topic R&D is itself achieving more convergence. Projects contributing to Standards of Service, management systems, asset surveys, and so forth are increasingly recognisable. The approach to commissioning projects is good in that, whilst being specific, they fit within a framework of operational management.

3.4.2 Now that a number of projects have been completed the Topic objectives need to be reviewed and updated. Any revised objectives should seek to build on work carried out so far and focus attention on projects which are both widely supported and attainable.

3.4.3 For instance, frequency of operations is referenced against standards of service with an implication that some 'national' guidelines should be developed. In the past this has been considered in depth, only to discover that the range of frequencies for some operations was so variable that guidelines would at best have to be very flexible and at worst meaningless.

3.4.4 Managing a river system is a highly complex business, albeit comprised of simple operational components. This is due to the large number of variables, most of them weather influenced, which can affect need, frequency and the extent of both annual and other operations. Also the system cannot be divided into independent sections for assessment, due to the interaction of one part of the system with another. The overall Topic objectives should recognise

this, accepting that some desirable goals will either not be achievable or, if so, will be of a quality which will be difficult to implement. Having said that, the scope for R&D within Topic C 4 is considerable and there are valuable projects to pursue.

3.4.5

Reviews on their own have limited value as a stand-alone projects. If the initial exercise is to be worthwhile, it is inevitable that a follow-up will take place. Reviews of this type should therefore be seen as scoping studies. In view of the input into such reviews of existing practices, it would be prudent to extend the brief to include the ultimate objective, guideline or whatever is sought so emphasising the scoping study concept. With such an approach, cost savings should be made and, as importantly, the report when circulated will be considered with much more enthusiasm than a first phase report, released for information, which merely confirms a current position and so is received with little more than passing interest. The brief to contractors could be such that any reduction in the work content could be made without penalty, if early indicators suggest that the final objective is not achievable.

3.4.6

There is a perception that reports are getting sharper and the need to support the very real operational issues with R&D is now better addressed. Interestingly there is also a perception that the Programme needs enhanced scientific content. These two facets might be seen by some to sit uncomfortably together. There is a danger however that the Programme could become so operationally and specifically directed that it was insufficiently innovative or creative conceptually to catalyse significant leaps forward.

3.4.7

In addition to the three themes of user interest recently identified (see 2.4.9), there is a need to think strategically about the type of research being undertaken. For example, is there a case for a certain amount of longer term underpinning research in addition to the preponderance of tactical work with operational objectives that is currently undertaken. At the other end of the spectrum it may well be necessary to devise innovative implementation projects (or adaptive R&D projects) to ensure that new prototype practice can truly be transferred into improved operational procedures. The new project closure guidance referred to in para 2.3.5 should assist this process.

3.5

MANAGEMENT ISSUES

3.5.1

The R&D project cycle in NRA is somewhat mechanistic in style. The Topic under review suffers as much from that as other Topics within the R&D endeavour. One purpose of the heavy procedural approach allegedly is to integrate the R&D projects within the business areas and so satisfy the business needs of the component

parts of NRA - in this case operational management needs in flood defence. There are those who feel that the procedure delivers this aim effectively. There are others who feel that it inhibits research endeavour and the commitment of those involved. However, it also has to be recognised that elements of the mechanistic process laid down reflect procedures intrinsic to NRA administration overall and do not arise solely as result of the R&D project cycle.

3.5.2 Within the Topic it is not surprising that it is people who are more effective in making things happen than administrative processes. Not surprisingly there have been both successes and failures. A key factor is the selection of the Project Leader. The Topic is fortunate that a number of people involved are often self-selecting as Project Leaders and so have a very real interest in the R&D objectives of the project. It is important that considerable attention continues to be given to the selection of the Project Leader in order to achieve the right sort of R&D output and the correct monitoring and management of the project contractor. With a heavily specified process orientation there is always the danger that individuals may take on the task and fulfil the step by step management process requirements without having their "heart and soul" entirely in the achievement of the project objectives. It is particularly important that this does not occur with R&D projects and it was not usually a problem in this Topic. The real problem was rather time availability for the Project Leader and conflict of interest with other responsibilities.

3.5.3 The project initiation document (PID) is an important component in the specification of the project and the efficiency with which it is delivered. Producing it is also an unwelcome task and in the past the practice has been to task the successfully tendering contractor with the job of finalising the document, in conjunction with the Project Leader. Although not an unreasonable approach care has to be taken here that the contractor does not achieve the specification of his own project to the detriment of NRA interests. For this reason the practice is not recommended and has already been discontinued.

3.5.4 In research not all projects succeed. Although this is widely recognised those involved with them naturally prefer to achieve successful outcomes. For a body such as NRA which does not fund science for its own sake, the successful outcome of R&D projects in flood defence operational management must mean creating a beneficial impact on the organisation as a result of a better way of doing things. It is at this stage that those involved will recognise the success of their effort.

- 3.5.5 Success criteria need to be monitored more carefully, possibly through some model project studies. Even without such studies there would be merit in taking initiatives to attempt to maximise the impact of the R&D. This has already been alluded to suggesting adaptive research projects or implementation initiatives for which at the moment R&D staff seem to have no involvement or responsibility. This could be re-thought for example so that a proportion of the budget of every R&D project was devoted towards the take-up of the successful outputs. New project closure procedures have recently been devised and it remains to be seen whether such process specification is instrumental in achieving what is required. Early involvement of identified users during the R&D projects life may be a more dynamic approach to take-up.
- 3.5.6 It is in this area where the Commissioner perhaps has a particular responsibility in the role of representing the customer requirement on the one hand, and channelling the research supply on the other. It is not simply sufficient just to create this match, there have to be tangible benefits at the end. If initiatives have to be taken to achieve this, that has to be recognised and responsibility and accountability demarcated.
- 3.5.7 There is evidence within the Topic of different things being done in different ways in different Regions. This is not unusual within NRA or indeed other comparable bodies. Commendably the Topic is endeavouring to achieve much better coherence in this regard. That is to be applauded. R&D activity itself is a way of breaking down such barriers and achieving coherence.
- 3.5.8 However the question of interfaces both between Regions, between R&D administrators both centrally and Regionally, between Topic Leaders, between Commissioners and between Project Leaders, many of whom have dual responsibilities is a difficult one. The R&D endeavour is certainly diluted by the part-time nature of the responsibilities, of many of its operatives. R&D is not normally seen as a part-time activity, but one that requires considerable personal commitment if new knowledge is to be acquired and difficult problems tackled and solved. It is not generally an activity that can be picked up and put down very easily if it is to be successful. Both within this Topic and more widely, NRA will need to consider whether the current management of its R&D maximises the achievement of the ends that it desires and what alternatives are available.

3.6 EXTERNAL PROFESSIONAL INPUT

- 3.6.1 A specific element already noted relates to the professional commitment and state of the art awareness of the R&D endeavour within the Topic and indeed more widely. This is not an implied criticism of Flood Defence Operational Management alone but perhaps a generic issue in NRA.
- 3.6.2 Nevertheless within this Topic there could be merit in having external advice or internal professional support for the Commissioner to whom the Topic Leader can relate and so hopefully enhance the research integrity of the Topic area. It is understood that this has already been recommended.
- 3.6.3 Such ideas should not be seen as a criticism but rather a supportive concept bearing in mind the dual roles that many concerned with R&D projects have to play, often involving very real operational pressures from other aspects of their responsibilities. Good quality administrative R&D support is provided, but sufficient professional R&D support is not - certainly within the specific area of endeavour of this Topic. The availability of a professional "sounding board" in the form of an external advisor, the commissioning of advice on the status of research activity in a particular area internationally (or at least within Europe) or an analysis of the state of the art in a particularly contentious area must be seen as valuable initiatives which could save time and enhance the calibre and ultimate impact of the research. It is suggested that for this Topic, as indeed others, NRA considers such ways of enhancing professional awareness and supportive capability.

4. CONCLUSIONS AND RECOMMENDATIONS

4.1 SCIENCE AND TECHNOLOGY

4.1.1 The completed projects have focussed attention on important aspects of the flood defence operations and provide useful guidance to managers in many areas. This represents a significant achievement for the R&D Topic programme. However, it has not sold itself well enough to those involved with flood defence in NRA. Where the full potential benefit of the project has not been realised, clear lessons can be learned. Whilst the deficiencies in, for example, data availability are hardly positive gains, these have been highlighted, and as such are useful findings which will assist NRA in developing a uniformity of approach where this is desirable.

4.1.2 Projects which sought to identify present practices in themselves provided little added value in terms of innovation. But they clearly identified the base position of best practice to which all Regions can aspire, and against which changes could be introduced following the implementation of the guidelines or simply flagging up practices which should be considered. Either way a development beyond identifying present practices is necessary to secure value and can usually be recognised from the outset. In view of this, the approach to separate the two requirements is doubtful and significant duplication of effort must take place. There is also a risk of losing the initial contractor which could result in furthering the retracing of footsteps. Overall, there is a case for more professional R&D input to the Topic programme and some underpinning and longer term strategic research. The proposed involvement of an external advisor will help to address both of these aspects.

4.1.3 The majority of flood defence projects will require significant data and information input by NRA. It is essential to eliminate references from future reports that this has not been forthcoming, other than for the very best reasons when this in itself will be a point of interest. The problems which manifest themselves in the projects reviewed can be substantially overcome by:

- pursuing projects which have broad-based support
- ensuring that the input from NRA can be delivered
- providers of data and information are made fully aware as to the purpose for which it is required
- approaches to NRA are made by appropriately qualified contractor personnel

- 4.1.4 The value of R&D should be saleable within NRA. Support can be won for basing decisions and judgements on investigation and analysis rather than folklore. To achieve this though it will be necessary to publicise the benefits of R&D more actively. The necessity of scientific analysis underpinning the responsibilities of an organisation like NRA needs constant reinforcement from a senior management position.
- 4.1.5 The Flood Defence Management Manual is now available. It represents the ultimate outcome of much previous R&D effort in the Topic. Now is a good time to pause and reflect on future research requirements in the Topic programme. Appraisal of research projects requires knowledge not only of needs but also of supply. Furthermore the balance between bottom-up and top-down inputs requires careful consideration. At present, both Topic and project origination is too top-down loaded. Means must be found of increasing the bottom-up information channels in a positive and supportive way, not least to improve take-up. The recommended steering group addressing the whole business area of flood defence operational management will have an important contribution to make here.
- 4.1.6 The identification of future R&D projects should take into account the client/contractor split and hence provide more emphasis on specification by the client of tasks to be required of the contractor. Overall the general value to the NRA of identification of 'best practice' among different Regions and elsewhere now needs to be assessed in relation to specifying R&D projects.

4.2 MANAGEMENT AND APPLICATION

- 4.2.1 Appointed Project Leaders must see the role as one of significance and one which can enjoy a high priority amongst other workload. Most of the projects are costly in terms of contractor fees and in-house time and to maximise value adequate input during the contract period is highly desirable. R&D is not just a part-time activity if new and meaningful knowledge is to be generated.
- 4.2.2 The general view of Project Leaders was that they had not been able to commit sufficient time to the project and to liaison with the contractor. This admission does not so much reflect on the individuals concerned but more on the position held and the wide range of other commitments. This no doubt results in the contractor being less influenced by NRA on matters such as report format, data selection and so forth.

4.2.3 Where shortfalls in the reasonably expected standard of report have occurred, there is no case where the appointment of a particular contractor could be questioned. All the contractors engaged were entirely appropriate in terms of their experience and the only aspect to be addressed is whether the individual deployment of sub-contractors fully reflected contractor reputation.

4.2.4 Lack of enthusiasm for the project by NRA regional staff required to produce information could develop as a result of:

- belief that the project will not provide any direct operational benefit
- low ranking in terms of work priorities
- reluctance to change present practices which are viewed as long-standing and proven
- limited confidence in the data collector's knowledge of the operations and requirements

4.2.5 There should be a greater realisation in NRA that R&D management is a skill which requires experience and that it cannot simply be added successfully to other responsibilities. There is both a need for training in R&D management to be available for inexperienced staff and a realisation by functional managers that R&D responsibilities are important to NRA and require time if they are to be undertaken in a meaningful way.

4.2.6 The procedures involved in initiating R&D projects are a cause of frustration. The process is especially constrained by the inherent bureaucracy associated with NRA apparently as a result of its status as a non-departmental public body. Nevertheless, the length of time required to get projects operational is at times unacceptable and demotivates Project Leaders who might anyway be difficult to identify for other valid reasons such as workload. The management procedures relating to R&D projects should be reassessed by those with particular hands-on experience of the process. The R&D Section along with the R&D Co-ordinators who have been of significant benefit in easing the frustrations, should undertake a review of the mechanics and value of the procedures in place and suggest improvements.

4.2.7 Improved input to the origination of projects and more intelligent management awareness of their value would greatly enhance the esteem in which R&D is held in the flood defence business area. However, there is no simple solution to an almost national UK reluctance to embrace and implement new technology and scientific

advances. The Flood Defence Management Manual has, for example, not been seen universally as a valuable R&D product nor has its adoption been easy or automatic across NRA Regions. It needs to be relaunched in a more attractive and assimilable format.

4.2.8

Much more analysis is required of the constraints and supportive factors that relate to the take-up of R&D in the flood defence business area so that a 'checklist' approach to possible take-up options can be developed throughout the life of a R&D project. The communication of R&D information is a contributory influence to eventual take-up and it needs more thought. It probably was never intended that R&D project reports should be a principal vehicle for communication. However, they have often been used in such a rather untargetted way when better tools are available. In specific instances such other tools have been made good use of (Guidance for the control of invasive plants near watercourses; Interim guidance notes on the design and operation of trash screens). There is scope for more innovation along these lines in communicating R&D findings and recommendations. A more in-depth study and analysis of this area would be valuable.

4.2.9

The take-up of new R&D findings may fall into limbo between research supply and business need if specific resourcing of implementation is not provided and an implementation strategy executed. Such an approach is an extension of the research activity into real usage. It can be thought of as adaptive research that identifies and rectifies those problems encountered in bringing the research to practical application. This process needs more active recognition and resourcing as an important component of achieving value from R&D.

4.2.10

In terms of fulfilling the objectives provided for this R&D Review it is concluded that:

- (a) Overall, this Topic Programme effectively achieved its Programme objectives. However, its anticipated benefits, through, primarily, the compilation of the Flood Defence Management Manual, have not yet had a sufficient or consistent impact on NRA flood defence responsibilities.
- (b) Effectiveness of targetting the programme in relation to the NRA actual needs could have been better if more care had been taken to canvas a wider portfolio of the needs appreciated at a range of levels within NRA both horizontally (geographically) and vertically (at various levels of

the staff hierarchy). Targetting of the programme in relation to the base of existing scientific knowledge was largely satisfactory.

- (c) The quality of the scientific innovation in the Programme was not of a high order and can be improved on in future. This will be helped by better strategic definition of the Programme's objectives, purposes and approaches, as is currently being developed.
- (d) The Programme was conducted reasonably efficiently though supervision of contractors was not always sufficiently close and data required were not always readily available. On a project by project basis reasonable value for money was obtained and overall the expenditure on the R&D programme was not excessive in comparison to the scale of the problems being addressed.

4.2.11 The following **RECOMMENDATIONS** are made as a result of this Review. For convenience, follow up action areas are italicised.

- (1) **Origination of research projects must be improved. This must specifically include *asking the real end-users what their needs are* so that there is both a better sense of ownership and a better perception of R&D application and benefit at all levels. (3.1.6, 4.1.5, 4.2.7) (Action: Function)**
- (2) **More professional R&D input to the Topic is required both technically and managerially so that technical content and its delivery are increasingly effective in meeting flood defence needs. To assist in this *an external Topic advisor with the requisite professional background should be appointed.* (3.1.7, 3.6.1, 3.6.2, 4.1.2) (Action: R&D)**
- (3) **The Operational Management Topic needs to *develop a framework embracing further well thought-out R&D themes of endeavour driven by business needs*, as suggested recently by the Topic Leader, to which R&D projects clearly contribute so that a whole greater than the sum of the parts is apparent to all. The choice and specification of the individual projects is the key to achieving this. (2.4.9, 3.4.2, 3.4.7) (Action: Function)**
- (4) **To enhance take-up, less reliance must be placed on standard R&D reports for communicating R&D information. *Report***

distribution should be more carefully targetted, greater awareness created of other forms of R&D output that are presently available, and other user-orientated procedures such as videos and roadshows explored. As part of such an approach the Flood Defence Management Manual should be re-launched as a tangible R&D product and particular initiatives taken to measure and, if necessary, adjust its take-up. (3.3.6, 3.3.8, 4.2.7, 4.2.8) (Action: Function; R&D)

- (5) To address and implement a number of the recommendations of the review relating to the appropriateness of the Topic R&D, its technical development, communication of its findings, and means of implementation, *a steering group addressing the overall business context of flood defence should be formed drawing its membership along a vertical axis in NRA in order to involve flood defence personnel ranging from policy-makers to field operatives. Regional variation and geographical emphasis should also be reflected in the group. The external Topic advisor appointed should be a member of such a group. (4.1.5) (Appendix 12) (Action: Function)*

WIDER R&D IMPLICATIONS

- (6) The *management procedures* through which R&D has to be carried out are too mechanistic and *need reassessment* so that necessary elements are retained and appreciated and unnecessary procedures such as re-authorising work at Regional level are abandoned. It must be clear to everybody involved who takes decisions, where responsibility lies, and what the responsibility is. *The R&D Co-ordinators have a crucial on-the-job function in this respect so they should be fully involved in any reassessment. (3.5.1, 4.2.6) (Action: R&D)*
- (7) R&D projects in this Topic must have obvious operational relevance. Time availability is often a key constraint for Project Leaders so it is important that demarcations between operational and R&D responsibilities are not so marked nor should one activity proceed at an incompatible pace with the other. The commendable principle of a *matrix approach to delivering R&D project management needs to be actively supported by constantly reinforcing at senior levels of management an awareness of R&D and its intrinsic value to NRA function activities. (3.5.2, 4.2.2) (Action: Function; R&D; Board)*
- (8) In certain instances the take-up of R&D project outputs requires the *undertaking of an adaptive research project the aim of which is to bring about operational use of a new methodology or product. Much greater use should be made of such an*

approach in particular when field operators and researchers need to be brought together and additional short-term resources are needed to implement the results in a particular location or Region. (3.5.5, 4.2.9) (Action: Function; R&D)

- (9) Certain R&D themes should have a longer-term flavour, perhaps up to 20% of resources, and this will *require greater professional R&D input* than is available now. Early consideration should be given to providing this by:-

- *use of external advisors*
- *increased R&D professional, rather than administrative, support to the Head of R&D and the Commissioner*
- *developing the concept of 'core contractors' on longer term contracts tasked with the paramount research role but sub-contracting a designated proportion of available resourcing*

Such provisions can be made available either alone or in combination. (3.4.6, 3.4.6, 3.6.3) (Action: R&D, Function, Board)

- (10) Carefully specified *studies should be undertaken on the operational, scientific/technological, and financial benefits* of Topic R&D projects so that model procedures can be derived for assessing impact and value for money. Studies of this type will help to underpin and endorse the importance of the R&D effort to the objectives of NRA overall. (3.3.8, 4.2.8) (Action: R&D)

- 4.2.12 A practical programme for implementing these recommendations should be agreed with the Flood Defence function and R&D Committee taking into account the opportunities and requirements for reorganisation of the R&D function with the development of the Environment Agency.

APPENDICES

APPENDIX 1

EXTRACT FROM TERMS OF REFERENCE - POINTS TO BE ADDRESSED IN REVIEW

Annex A - Points Arising at Project and Programme Level

(a) Project Level

1.0 Effectiveness

- Were the R&D objectives achieved and the specified outputs produced?
- Have the anticipated benefits been achieved? If not are they still desirable?
- Is the output likely to bring these anticipated benefits?
- What was the quality of the R&D in terms of its contribution to scientific knowledge?
- What would have happened if the project had not been done?

2.0 Efficiency

2.1 R&D efficiency

- Was the R&D well managed:
 - (a) by the NRA in processing and supervising the R&D?
 - (b) by the contractor undertaking the R&D?
- Did the R&D work build effectively on the available base of present knowledge?
- Were the R&D objectives achieved in the most cost-effective (including use of collaborative funding) and direct manner?

2. Uptake efficiency

- Has the uptake process been well managed?
- Has uptake been (or is it being) achieved in the most cost-effective and/or appropriate manner?

2.3 Overall cost-effectiveness

- Has the NRA achieved (or is it likely to achieve) value for money from the overall project?

3.0 Follow-up

- Identify/confirm any necessary actions to improve effectiveness.
- Identify/confirm requirements for uptake of R&D output to achieve overall project objectives and intended benefits.
- Identify lessons to be learnt and actions needed to disseminate these.

Not all of the above would need to be covered on any one project.

(b) Points Arising at Programme Area Level

1.0 Effectiveness

- Have the programme objectives been achieved (or are they being achieved), and the specified outputs produced?
- Have the anticipated benefits been achieved (or to what extent are they in process of being achieved)?
- How well is the programme targeted to the NRA's corporate objectives related to this area?
- What is the scientific quality of the programme (in terms of both utilising up-to-date scientific understanding and being well structured and managed)?

2.0 Efficiency

- How efficient has the programme been as a means of achieving the objectives (and how well have the rationale and objectives been defined)? Consider:
 - (a) appropriateness of selected projects;
 - (b) R&D management issues (including project planning);
 - (c) Research Contractor procurement and performance;
 - (d) Uptake activities
- Is the NRA achieving reasonable value for money from the overall programme?

3.0 Follow-up

- Identify any further actions to achieve effectiveness of existing programme. Consider:
 - (a) additional R&D stages to existing projects;
 - (b) new projects;
 - (c) additional uptake of existing/past project outputs;
 - (d) changes in management or procurement strategy.
- Identify any desirable major shift in the programme objectives to improve targeting towards NRA corporate objectives or other opportunities.
- Identify any generic lessons to be learnt from 1.0 or 2.0 above, and actions needed to disseminate these.

PROFORMA FOR SCORING R&D PROJECT OUTPUTS

RATING

+2 +1 -1 -2

Title:

Quality of Research

Policy link or statutory requ:

Relevance to policy or requ:

Objectives: - clear
- attainable

Objectives realised

Execution of project - overall
- management
- monitoring/milestones
- reports
- facilities
- quality of team**Usefulness of Research**

Results used by:

Aims fulfilled

Innovative contribution

Relevance to current concerns

User orientation/quality of outputs

Effectiveness of technology transfer

Ease/affordability of implementation

Other impacts/take-up

Dissemination of findings

Value for Money

Overall:

Other factors - maintaining timescale
- use of prior/supporting information
- adherence to budget
- added value achieved
- other features

Notes

+2 = Excellent or high
+1 = Good or sound
-1 = Fair, some doubts or flaws
-2 = Poor or seriously flawed

APPENDIX 3

DOCUMENTATION REVIEWED

Aquatic weed control operations existing practices (project no 344) - R&D Note 189

Review of existing practices for fluvial grass management (project no 213 - Project Record 213/1/Y

Prioritisation and programming of flood defence works (project no 209) - R&D Note 122

Asset management planning for flood defences (project no 341)

Review of existing practices for fluvial maintenance operations (project no 200) - R&D Note 14

Manual for condition assessment of flood defences (project no 033) - Project Record 0331/ST

Flood defence levels of service stage 2 (project number 262/289) - R&D Note 127

Annual Review of R&D (1990, 1991, 1992, 1993)

NRA Annual Report and Accounts (1990/91 - 1991/92)

NRA Corporate Plans (1991-92)

NRA Flood Defence Strategy

NRA R&D Strategy

Improving Efficiency and Effectiveness in Flood Defence Operational Management. Review of R&D (1990-93) R&D Report 7, NRA (and leaflet)

Schedules of Ongoing Projects and New Starts (1992-1994)

Topic Investment Appraisal - R&D Commission C, Flood Defence (Topic C4 - Operational Management)

Review of Fluvial R&D Related to Flood Defence - consultations with senior staff - briefing note

Memo G Lane to L Pickles (18 August 1994) - C4 Topic Programme

Summary structure of R&D Topic Appraisal - with guidance notes - flood defence

R&D Project Lists

NRA R&D Management Manual

NRA Flood Defence Management Manual

Guidance for the control of invasive plants near watercourses

Design and Operation of Trash Screens - interim guidance notes



David Noble and Associates

Management and Technical Services
Flood Protection and Land Drainage
River and Coastal Engineering
Water and Civil Engineering

Our Ref: DN/CMH/94/112
Your Ref:

The Mews
3 Royal Oak Passage
High Street
Huntingdon
Cambs PE18 6EA
Telephone (0480) 411123
Fax No. (0480) 431107

2nd August 1994

Dear

REVIEW OF NRA R & D PROJECTS

I am engaged as a sub-contractor, nominated by the Authority, to SCL Consultancy, to provide technical input on a number of flood defence R & D projects.

A number of issues are being addressed in the review, which include the performance of the contractor in managing and organising the project. Some of these are clearly best known to yourself as the project leader, and I would be grateful if you would appropriately tick the attached form and return it to me as soon as you are able. In the main I would expect an almost 'gut' reaction to the question, thereby minimising the time spent on your part, but on the costs of the project you may need to refer. For your guidance you may find the following comments useful in clarifying the questions:-

1. Did you feel that sufficient of your own time and that of NRA colleagues was available to adequately monitor the project?
2. Was reference back and reporting to you in compliance with initial requirements or identified needs?
3. How did the contractor's submissions match the agreed timescale? - I would suggest the following:-

More than 1 week early	-	Excellent
Within 1 week	-	Good
1 to 2 weeks late	-	Fair
More than 2 weeks late	-	Poor

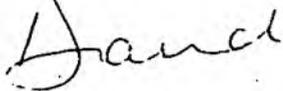
cont...

4. In accepting the Tender the Authority did not necessarily approve the individuals assigned to the contract. In the event, how did those engaged on the project match up in terms of relevant experience, grasp of the subject and establishing relationships with authority employees?

5 & 6. Self explanatory.

If you require further comment from me, do not hesitate in giving me a call.

Yours sincerely

A handwritten signature in cursive script that reads "David Noble". The signature is written in dark ink and is positioned below the typed name.

DAVID NOBLE

THE NATIONAL RIVERS AUTHORITY

REVIEW OF R & D PROJECTS

PROJECT: Response to Emergencies (Project 289)

CONTRACTOR:

		EXCELLENT	GOOD	FAIR	POOR
1.	MONITORING OF PROJECT BY NRA	.....	.....	.....	.....
2.	INTERIM REPORTING BY CONTRACTOR	.....	.....	.....	.....
3.	ADHERENCE TO TIMESCALE	.....	.....	.....	.....
4.	QUALITY OF RESEARCHERS	.....	.....	.....	.....
5.	OVERALL PERFORMANCE OF CONTRACTOR	.....	.....	.....	.....
		ABOVE TENDER	TENDER	BELOW TENDER	
6.	WHAT WAS THE COST OF THE PROJECT?	.....	.....	.....



David Noble and Associates

Management and Technical Services
Flood Protection and Land Drainage
River and Coastal Engineering
Water and Civil Engineering

Our Ref: DN/CMH/94/112
Your Ref:

The Mews
3 Royal Oak Passage
High Street
Huntingdon
Cambs PE18 6EA
Telephone (0480) 411123
Fax No. (0480) 431107

3rd August 1994

Dear

REVIEW OF NRA R & D PROJECTS

I am engaged as a sub-contractor, nominated by the Authority, to SCL Consultancy, to provide technical input on a number of flood defence R & D projects.

As part of the review, I am seeking to determine to what extent the information gained from various projects has been disseminated and, where appropriate, used. I would be most grateful if I could use yourself as a sounding board among colleagues in other regions to get some feel of this.

I have enclosed a brief pro-forma for you to merely tick your answers which should be given, as it were, from your desk, rather than having to research anything too deeply.

I look forward to receiving your return, which will only be used by me in formulating a general view.

Yours sincerely

DAVID NOBLE

Enc.

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Suffolk IP3 9JE

Ian Hart Esq
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NE3 3UD

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NRA Severn Trent Region
Corringham Road
GAINSBOROUGH
Lincs DN21 1QH

P Borrows Esq
NRA Thames Region
Kings Meadow House
Kings Meadow Road
READING RG1 8DQ

NATIONAL RIVERS AUTHORITY

REVIEW OF R & D PROJECTS

PROJECT

1. **Aquatic Weed Control Operations Existing Practices (Note 189).**
Contractor: AWRU.

	YES	NO
HAVE YOU HEARD OF THIS PROJECT?
IF YES:		
HAVE YOU RECEIVED A COPY?
WAS IT OF VALUE?
DID ANY IMPLEMENTATION FOLLOW?

PROJECT

2. **Review of Existing Practices for Fluvial Maintenance Operations (Note 14).**
Contractor: CIRIA.

HAVE YOU HEARD OF THIS PROJECT?	....	....
IF YES:		
HAVE YOU RECEIVED A COPY?	....	....
WAS IT OF VALUE?	....	....
DID ANY IMPLEMENTATION FOLLOW?	....	....

PROJECT

3. **Prioritising and Programming of Flood Defence Work (Note 122).**
Contractor: Mott Macdonald.

	YES	NO
HAVE YOU HEARD OF THIS PROJECT?
IF YES:		
HAVE YOU RECEIVED A COPY?
WAS IT OF VALUE?
DID ANY IMPLEMENTATION FOLLOW?

PROJECT

4. **Asset Management Planning for Flood Defence (Project 341).**
Contractor: Binnie & Partners.

HAVE YOU HEARD OF THIS PROJECT?	....	....
IF YES:		
HAVE YOU RECEIVED A COPY?	....	....
WAS IT OF VALUE?	....	....
DID ANY IMPLEMENTATION FOLLOW?	....	....

PROJECT

5. **Review of Existing Practices for Fluvial Grass Management (Project Record 213/1/Y)**
Contractor: CIRIA.

HAVE YOU HEARD OF THIS PROJECT?	....	....
IF YES:		
HAVE YOU RECEIVED A COPY?	....	....
WAS IT OF VALUE?	....	....
DID ANY IMPLEMENTATION FOLLOW?	....	....

PROJECT

6. **Manual for Condition Assessment of Flood Defences throughout the NRA. (Project Record 033/1/ST).**
Contractor: WRC.

	YES	NO
HAVE YOU HEARD OF THIS PROJECT?
IF YES:		
HAVE YOU RECEIVED A COPY?
WAS IT OF VALUE?
DID ANY IMPLEMENTATION FOLLOW?

PROJECT

7. **Flood Defence Levels of Service (Note 127).**
Contractor:

HAVE YOU HEARD OF THIS PROJECT?	....	....
IF YES:		
HAVE YOU RECEIVED A COPY?	....	....
WAS IT OF VALUE?	....	....
DID ANY IMPLEMENTATION FOLLOW?	....	....

PROJECT

8. **Economic Defence Levels of Service (Note 127)**
Contractor: Mott Macdonald.

HAVE YOU HEARD OF THIS PROJECT?	....	....
IF YES:		
HAVE YOU RECEIVED A COPY?	....	....
WAS IT OF VALUE?	....	....
DID ANY IMPLEMENTATION FOLLOW?	....	....

PROJECT

9. **Evaluation of Alternative River Maintenance Strategies (Project 317)**
Contractor: Silsoe College

	YES	NO
HAVE YOU HEARD OF THIS PROJECT?
IF YES:		
HAVE YOU RECEIVED A COPY?
WAS IT OF VALUE?
DID ANY IMPLEMENTATION FOLLOW?

PROJECT

10. **Response to Emergencies (Project 289)**
Contractor: Middlesex Polytechnic

HAVE YOU HEARD OF THIS PROJECT?	....	....
IF YES:		
HAVE YOU RECEIVED A COPY?	....	....
WAS IT OF VALUE?	....	....
DID ANY IMPLEMENTATION FOLLOW?	....	....

PERSONS INTERVIEWED

Mervyn Bramley	R&D Head Office Rivers House Waterside Drive Aztec West Almondsbury BRISTOL BS12 4UD
John Dalton	R&D Head Office, Bristol
Gareth Llewellyn	R&D Head Office, Bristol
Gary Lane	Topic Leader, NRA Severn Trent Region Sapphire East 550 Streetsbrook Road Solihull, B91 1QT
Lindsay Pickles	Flood Defence Officer (and R&D Commissioner) Head Office, Bristol
Ken Barton	Project Leader, NRA Northumbria & Yorkshire 21 Park Square South Leeds LS1 2QG
David Woodcock	Project Leader, NRA Severn Trent Corringham Road Gainsborough Lincs DN21 1QH
Stuart Powers	Project Leader, NRA Severn-Trent, Solihull

INTERVIEW STRUCTURE

Topic LeadersRationale and Appraisal

1. The appraisal process and pertinent questions re project identification
2. Rationale and objectives for the area
3. The questions addressed in Annex A of the TORs
4. Discuss the Topic Investment Appraisal
5. Rationale and objectives for each project

Information

6. Key persons to talk to
7. Recommended candidates for in-depth study
8. Any reviews undertaken of the area
9. Previous Topic Leader

The Future

10. Potential work for the future
11. Missed opportunities to be corrected

What is the programme like

12. Who are good contractors for quality and vfm
13. Discuss project examples that are past or present
14. Effectiveness
15. Quality of science and innovation - scope and emphasis
16. Problems

End Result and Uptake

17. How good is take-up and what are the success measures
18. What are the outputs for take-up
19. Benefits from take up
20. Targetting of needs and the knowledge base
21. Efficiency and value for money

Management

22. How is the overall commissioning process specified
23. What is the management structure - now and previously
24. Contact with project leaders, R&D staff, research contractors, and end users

Supplementary Questions (where necessary)

- Who is the customer and what is the customer's requirement
- What is this work to be funded
- What is the underlying rationale for the requirement. Is it valid
- What assumptions are made in formulating the requirements. Are they valid
- Are the proposals consistent with the customer's R&D strategy
- What other means of satisfying the requirement have been examined; for example international collaboration
- What are the objectives
- What are the outputs and on what timescale
- What related work has been done previously and what was its outcome
- What is the existing level of investment affected by this issue
- What is the customer's priority
- What are the likely benefits

- What are the risks of unrealised benefits or excessive costs
- What is the effect of doing nothing
- How will we measure success
- How good is the researcher and his track record
- How good is the parent organisation
- How will the Programme be monitored, reviewed and evaluated
- How will projects be selected

Commissioner

1. The origination of R&D projects to meet identified needs in FD
2. The way in which FD R&D findings are taken up within the NRA organisation (especially C4)
3. The degree of importance attached to operational management in FD
4. The role of MAFF in relation to NRA FD responsibilities
5. The interface between R&D and the Commission overall

PROJECT OUTPUTS AND PROJECTS REVIEWED

Flood Defence Operational Management

Topic objective

To develop the framework for management of NRA flood defence maintenance, to ensure that work programmes through the NRA are consistent, prioritised adequately, justified and cost-effective, and that the interests of other functions are recognised.

033	Project Record 033/1/ST	Manual for condition assessment of flood defences throughout the NRA - Preliminary study	Operational	1991
200	Note 14	Review of existing practices for fluvial maintenance operations	Operational	1991
209	Note 122	Prioritisation and programming of Flood Defence work - Phase 1 report	Operational	1991
213	Project Record 213/1/Y	Review of existing practices for fluvial grass management throughout the NRA	Operational	1992
262	Note 127	Flood Defence levels of service - Final recommendations (7 vols including Annex A to E and summary)	Policy	1990
344	Note 189	Aquatic weed control operations - Phase 1 report: existing practice	Operational	1993

Projects due to complete in near future

341	Asset management planning for flood defence - Phase 2
435	Economic appraisal of non-grant aided scheme
317	Evaluation of alternative river maintenance strategies

PROPOSAL /PROJECT NUMBER	PROJECT TITLE OBJECTIVES	START END	PROJECT COSTS £K								CONTRACTOR PROJECT LEADER	COMMENTS
			1993/94		1994/95		1995/96		1996/97			
			Ext	Int	Ext	Int	Ext	Int	Ext	Int		
C04(92)1 516	Management of shoaling/desilting operations To review guidance on the safe, economic and effective disposal and management of dredgings in order to develop best practice guidelines	2/94 10/94	2	-	8	-					CIRIA N Bray	Output - o. Liaison with Project 384 (Topic C1). T Follows CIRIA project on Dredging Operations. Supports Developmental Initiative - Flood Defence Management Ref No FD 10. Need to confirm Phase 3 Project Leader.
Total on-going projects, including contingent budgets, C4			72	0	158	0	56	0				
C04(94)1	Proposed new starts C4 Quality assurance for survey techniques To determine what quality of survey work the NRA should specify	94/95 95/96			30	-	50	-			D Greenaway	Output - m & O. T Supports Continuing Activity - Operational Management. Ground detail survey links, where appropriate, into Project G01(92)3 and use of CASI scanner. Priority 1.
Total proposed new starts (1994/95), C4					30	0	50	0				
C6 - Coastal and Tidal Defences and Processes To ensure that cost-effective and environmentally sympathetic engineering options are adopted for coastal and estuarine flood defence through a better understanding of processes in the coastal zone. To improve the planning and execution of coastal defences by adopting coastal management techniques and developing defence strategy to compensate for sea level rise											Topic Leader:	Robert Runcle, A
C06(92)1 459	On-going projects C6.(1993/94) Risk assessment for sea and tidal defence structures To define and indicate the use and understanding of probabilistic design of sea and tidal defence structures and to develop methods for assessing areas at risk for coastal and tidal flooding	2/93 3/96	72	-	62	-	34	-			HR Wallingford J Cross	Output - O, M & U. N/Y Supports Developmental Initiative - Flood Defence Management, Ref No FD 10.
C06(90)4 279	Use of timber in sea defence schemes To review available information on different types of timber and preservative, and to carry out site trials on their effectiveness	1/91 6/93	6	-		-					Timber Research & Development Association. P Monk	Output - e & O. Contract to be extended with TRADA to provide more on sustainability. SW
		94/95 94/95			5	-						

COMMISSION C - FLOOD DEFENCE

Commissioner: Lindsay Pickles, Head Office

PROPOSAL PROJECT NUMBER	PROJECT TITLE OBJECTIVES	START END	PROJECT COSTS £K								CONTRACTOR PROJECT LEADER	COMMENTS
			1993/94		1994/95		1995/96		1996/97			
			Ext	Int	Ext	Int	Ext	Int	Ext	Int		
G04(92)1 S16	Management of shoring/desilting operations To review guidance on the safe, economic and effective disposal and management of dredgings in order to develop best practice guidelines	2/94 10/94	2	0	8	0					CIRIA N Bray	Output - o. Liaison with Project 384 (Topic C1). T Follows CIRIA project on Dredging Operations. Supports Developmental Initiative - Flood Defence Management Ref No FD 10. Need to confirm Phase 3 Project Leader.
	Total on-going projects, including contingent budgets, C4		72	0	158	0	56	0				
	Proposed new starts C4											
G04(94)1	Quality assurance for survey techniques To determine what quality of survey work the NRA should specify	94/95 95/96			30	0	50	0			D Greenaway	Output - m & O. Supports Continuing Activity - Operational Management. Ground detail survey links, where appropriate, into Project G01(92)3 and use of CASI scanner. Priority 1.
	Total proposed new starts (1994/95), C4				30	0	50	0				

**PROJECTS IN OTHER TOPIC AREAS RELEVANT TO FLOOD DEFENCE
OPERATIONAL MANAGEMENT TOPIC**

C1/C05(90)3 Project 300 PL - Martin Whiting (T)	Establishment of Best Practice for design and operation of trash screens on flood defence water courses
C/C05(91)1 Project 384 PL - Andrew Brookes (T)	Study and monitoring of selected sites to improve management practice in river sediment movement
C1/C1(94)1 (not yet started)	Determination of what fluvial parameters should be monitored, and how, to meet broad needs of NRA Flood Defence
C8/C08(91)3 Project 431 PL - Andrew Bullivant (A)	Investigation and development of alternative methods and materials for sealing beaches in NRA flood defences
G/G01(94)6 (not yet started) PL - Andrew Brookes (T)	Develop guiding principles relating to hydrology, ecology, and morphology into a framework applicable to sediment and bank erosion management

NRA R & D PROJECT EVALUATION SUMMARY - FLOOD DEFENCE OPERATIONAL MANAGEMENT.

Short title/project number:	Aquatic weed control operations existing practices proj. No. 344	Review of existing practices for fluvial grass management proj. No. 213	Prioritisation and programming of flood defence works proj. No. 209	Asset management planning for flood defences proj. No. 341	Review of existing practices for fluvial maintenance operations proj. No. 200	Manual for condition assessment of flood defences. Proj. No. 033	Flood defence levels of service stage 2 proj. No. 262/289
Type:	Aquatic Weeds Research unit	CIRIA	Mott Macdonald	Binnie and partners	CIRIA	Water research centre	Robert Gould
Duration (years):							
Contractor:							
External/Internal contract (E/I):							
Tender: Single/Competitive (S/C):							
Budget (£K):							
QUALITY OF RESEARCH							
Policy link or statutory requirement:	PL	PL	PL	PL	PL	PL	PL
Relevance to policy or requirement:	+1	+1	+2	+1	+1	+1	+2
Objectives							
-Clear:	+2	+1	+1	+1	+2	+1	+1
-Attainable:	+1	-1	+1	+1	-1	+1	+1
-Realised:	-1	-2	+1	+1	-2	+1	+1
Execution							
-Overall:	+1	-1	+1	+1	-1	-1	+1
-Managment:	+1	-1	+1	+1	-1	-1	+1
-Monitoring / milestones	+1	-1	-1	+1	+1	+1	
-Reports:	-1	-1	+1	-1	-2	+1	-1
-Facilities:	+1	+1	+1	+1	+1	-1	+1
-Quality of team:	+1	-1	+2	-1	+1	-1	+1
USEFULNESS OF RESEARCH							
Results used by:	Commission of phase II	Phase 2 suspended	Implemented in some Regions	Not implemented	Further research	Operational staff. Led to further commission	Used as cornerstone for Regional application
Aims fulfilled:	-1	-2	+1	+1	-2	+1	+1
Innovative contribution:	-1	-1	+1	-1	-2	+1	+1
Relevance to current concerns:	+1	+1	+1	+1	+1	+1	+1
User orientation / quality of outputs:	+1	-1	-1	-1	-1	+1	+1
Effectiveness of technology transfer:	-1	-1	+1	-1	-1	+1	+1
Ease / affordability of implementation:	-1	+1	+1	-1	-1	+1	+1
Other impacts / take-up:	-1	-1	+1	-1	-1	+1	+1
Dissemination of findings:	-1	-1	+1	+1	+1	-2	-1
VALUE FOR MONEY							
Overall:	-1	-2	+1	-2	-2	+1	
Other factors							
-Maintaining timescale:	-1	-1	-1	+1	+1	-1	
-Use of prior / supporting information:	-1	-1	+1	+1	-1	-1	
-Adherence to budget:	+1	+1	+1	-1	+1	+1	
-Added value achieved:	+1	+1	-1	-1	-1	-1	
-Other factors							

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PROJECT ASSESSMENT.

TITLE	Aquatic weed control operations existing practices
PROJECT No.	344
NRA CONTACT	David Woodcock (Seven Trent)
RESEARCHER/CONTRACTOR	Aquatic weed research unit
QUALITY OF RESEARCH	
Relevance to policy	+1
Policy links or statutory requirements	PL
Objectives	
Clear	+2
Attainable	+1
Realised	-1
Execution	
Overall	+1
Management	+1
Monitoring/milestones	+1
Reports	-1
Facilities	+1
Quality of team	+1
USEFULNESS OF RESEARCH	
Results used by	Commission of Phase II
Aims fulfilled	-1
Innovative contribution	-1
Relevance to current concern	+1
User orientation	+1
Effectiveness of technology transfer	-1
Ease/affordability of implementation	-1
Other impacts/take-up	-1
Dissemination of findings	-1
VALUE FOR MONEY	
Overall	-1
Other Factors	
Maintaining timescale	-1
Use of prior/supporting information	-1
Adherence to budget	+1
Added value achieved	+1
Other factors	

NATIONAL RIVERS AUTHORITY

REVIEW OF FLOOD DEFENCE R & D PROJECTS

PROJECT - **AQUATIC WEED CONTROL OPERATIONS EXISTING PRACTICES
NOTE 189 CONTRACTOR - AQUATIC WEEDS RESEARCH UNIT**

BRIEF - To assess aquatic weed control practice throughout the NRA and to identify best practice.

REPORT - The Report has limited value as a stand-a-lone Report and the intention has always been that this would be the first of a two stage approach. As the second stage was inevitable if value for money was to be obtained, the question arises as to whether it would have been an advantage to have approached the project as a single exercise. This point is made in view of the forty visits made in Phase I to NRA officers when with possibly a modest extension in time, further information could have been obtained. The comment is particularly pertinent when both phases are undertaken by the same contractor.

Despite the large number of visits and a detailed questionnaire, the contractor had considerable difficulty in obtaining information resulting in gaps in the text and tabulations. In establishing what becomes the base line for the activity, the lack of particular data for individual regions seriously undermines the quality of the Report. It is necessary to consider why information has not been forthcoming and whilst in some cases it is simply not available in an appropriate format, in others it will be the demands on the NRA personnel's time and their perceived priorities which will provide the answer.

Accepting the reduction in the quality of the Report arising from lack of data, the present range of aquatic weed control methods is clearly established and that there is, for good reasons, different solutions for different situations. In view of the breadth of the survey which had been carried out on what is a relatively 'narrow' activity an opportunity was lost in that the Report failed to identify whether aquatic vegetation problems and hence the need for management were increasing, declining or constant. That position is, of course, fundamental to future research and operational planning.

The recommendations in the Report are very good and confirm the contractor has a thorough understanding of where he has been and where he needs to get. The question of determining any general trends in vegetation growth could usefully be incorporated within the recommendations. Whilst, as mentioned, its value as a stand-a-lone report is not high, it does enable operational staff to readily review what the practices are in other regions in terms of both methods and frequencies which is useful. Further information including costings will, of course, be considered with acute interest.

Dissemination of the Report and its findings has not been good, with operations staff responsible for aquatic vegetation management having not accessed the information. It therefore follows that value from this Phase can only be confirmed when Phase II is successfully completed which is understood to be in May 1995.

PROJECT ASSESSMENT.

TITLE	Review of existing practices for fluvial grass management
PROJECT No.	213
NRA CONTACT	Ken Barton (Northumbria & Yorkshire)
RESEARCHER/CONTRACTOR	CIRIA
QUALITY OF RESEARCH	
Relevance to policy	+1
Policy links or statutory requirements	PL
Objectives	
Clear	+1
Attainable	-1
Realised	-2
Execution	
Overall	-1
Management	-1
Monitoring/milestones	-1
Reports	-1
Facilities	+1
Quality of team	-1
USEFULNESS OF RESEARCH	
Results used by	Phase 2 suspended
Aims fulfilled	-2
Innovative contribution	-1
Relevance to current concern	+1
User orientation	-1
Effectiveness of technology transfer	-1
Ease/affordability of implementation	+1
Other impacts/take-up	-1
Dissemination of findings	-1
VALUE FOR MONEY	
Overall	-2
Other Factors	
Maintaining timescale	-1
Use of prior/supporting information	-1
Adherence to budget	+1
Added value achieved	+1
Other factors	

NATIONAL RIVERS AUTHORITY

REVIEW OF FLOOD DEFENCE R & D PROJECTS

PROJECT - REVIEW OF EXISTING PRACTICES FOR FLUVIAL GRASS
MANAGEMENT
PROJECT 213/1/Y CONTRACTOR - CIRIA

BRIEF - To produce guidance notes on the best practice for riverbank grass
mowing throughout the NRA.

REPORT - Prior to reading the Report, the limitation of the project to fluvial grass
management was questioned and why tidal and sea bank requirements
had been excluded. The potential value of the Report is the guidance
notes on best practice which it fails to deliver, and had this been
incorporated, the Report would have received wide interest. As it is, it
is limited to a review of current practice, drawing no practical or cost
conclusions for the reader.

The lack of this guidance was substantially due to the inability of the
contractor to extract information on quantity, quality and cost in a format
consistent across the regions.

The review of existing practices is good and the appendix covering
grass mixes provides a useful reference document. Tabulations in the
report are of varying value with some, potentially of greatest interest,
downgraded due to lack of data. Difficulty in obtaining information via
a questionnaire and direct contract approach is a significant feature of
the Report.

With the failure of this project to provide the platform from which Phase
II was to be launched, it is not surprising, and most sensible, that any
further work has been suspended.

PROJECT ASSESSMENT.

TITLE	Prioritisation and programming of flood defence works
PROJECT No.	209
NRA CONTACT	Colin Candish (Thames)
RESEARCHER/CONTRACTOR	Mott Macdonald
QUALITY OF RESEARCH	
Relevance to policy	+2
Policy links or statutory requirements	PL
Objectives	
Clear	+1
Attainable	+1
Realised	+1
Execution	
Overall	+1
Management	+1
Monitoring/milestones	-1
Reports	+1
Facilities	+1
Quality of team	+2
USEFULNESS OF RESEARCH	
Results used by	Implemented in some regions
Aims fulfilled	+1
Innovative contribution	+1
Relevance to current concern	+1
User orientation	-1
Effectiveness of technology transfer	+1
Ease/affordability of implementation	+1
Other impacts/take-up	+1
Dissemination of findings	+1
VALUE FOR MONEY	
Overall	+1
Other Factors	
Maintaining timescale	-1
Use of prior/supporting information	+1
Adherence to budget	+1
Added value achieved	-1
Other factors	

NATIONAL RIVERS AUTHORITY

REVIEW OF FLOOD DEFENCE R & D PROJECTS

PROJECT - **PRIORITISING AND PROGRAMMING OF FLOOD DEFENCE WORK
NOTE 122 CONTRACTOR - MOTT MACDONALD**

BRIEF - To review the current practice and then develop methods of prioritising and the programming of Flood Defence Works.

REPORT - It was quickly realised during the project that to consider all aspects of flood defence operations, capital and revenue, was an enormous task, and beyond that envisaged within this commission. The contractor therefore whilst commenting upon revenue work focused attention on capital improvements and it is understood that the former has been addressed in a subsequent commission by the same contractor.

Within the Report there is particularly good coverage of the existing practices and whilst the contractor had some difficulty in obtaining information, this was pursued and it does not detract from the findings. It is concluded that no region have in place a system whereby a wide range of criteria is considered against which the ranking of projects can be made.

The system developed is based upon seven criteria, against which each project is scored, enabling a schedule of priorities to be prepared. Whilst it is a complicated approach, simplification, which will be a temptation, will only be achieved with a reduction in the sensitivity of the ranking process. Capital Schemes for many years have been the subject of MAFF detailed cost/benefit procedures and no doubt the view will prevail that this more straightforward approach and one which, already a requirement, could equally be used to determine priorities. Whilst that is the case it would rank them on the basis of investment alone, discounting any considerations of urgency, social and environment, issues etc.

Since publication of the report, two regions have introduced the method or prioritisation for capital schemes and it is found to work. Due to the considerable input some initial analysis takes place to identify any projects which are unlikely to meet economic targets and these are sidelined.

There is a view that, whilst the methodology can be applied to capital projects, it is too complicated for maintenances activities and its application would only be practical with some modification.

PROJECT ASSESSMENT.

TITLE	Asset management planning for flood defence
PROJECT No.	341
NRA CONTACT	Gary Lane (Seven Trent)
RESEARCHER/CONTRACTOR	Binnie and partners
QUALITY OF RESEARCH	
Relevance to policy	+1
Policy links or statutory requirements	PL
Objectives	
Clear	+1
Attainable	+1
Realised	+1
Execution	
Overall	+1
Management	+1
Monitoring/milestones	+1
Reports	-1
Facilities	+1
Quality of team	-1
USEFULNESS OF RESEARCH	
Results used by	Not Implemented
Aims fulfilled	+1
Innovative contribution	-1
Relevance to current concern	+1
User orientation	-1
Effectiveness of technology transfer	-1
Ease/affordability of implementation	-1
Other impacts/take-up	-1
Dissemination of findings	+1
VALUE FOR MONEY	
Overall	-2
Other Factors	
Maintaining timescale	+1
Use of prior/supporting information	+1
Adherence to budget	-1
Added value achieved	-1
Other factors	

NATIONAL RIVERS AUTHORITY

REVIEW OF FLOOD DEFENCE R & D PROJECTS

PROJECT - **ASSET MANAGEMENT PLANNING FOR FLOOD DEFENCES
PROJECT 341 - CONTRACTOR - BINNIE AND PARTNERS**

BRIEF - To develop a manual which identifies the variety of flood defences in existence, their strengths, failings and relative vulnerability, the management of their maintenance and, where appropriate, the methods available for rehabilitation.

REPORT - The commission to the contractor followed up work produced by the Water Research Centre under the project 'Manual For Condition Assessment of Flood Defence Works'. As a follow-up and with knowledge of the readership, the contractor both surprisingly, and unnecessarily, enters into considerable detail in the descriptions of river systems and the functions of their components. The reader would be forgiven if, believing in the first few sections, that he was digesting a text book introducing him to the subject. Whilst to some extent this is invited in the broad objective, the contractor should have appreciated that this was not necessary in a manual which could only be used by people with a fundamental knowledge of river engineering matters.

A key aspect of asset management lies in the inspection arrangements both in terms of frequency and quality, and the manual sets out requirements extremely well. It is particularly strong on the matters to address when carrying out inspections over a range of assets and this is a valuable component in the manual. Both in the general and detailed approach, the recommendations for inspections is good. Whilst the objective covering inspections is fully met a significant omission is reference to the programme of annual expenditure on flood defence assets to achieve the target standards of service: this would have been a most significant contribution within the project and it is not readily appreciated why it has not been covered.

The best elements of the report are almost overwhelmed by detail, much of which makes little or no contribution to the objective of the project. The inclusion of seventeen pages of definitions confirms that the contractor has had access to other material which was felt to be of sufficient relevance to incorporate.

It would appear that the two phases of work could be combined using the Water Research Centres' work as the cornerstone and combining with that the approach to inspections and the more pertinent information derived from this project.

PROJECT ASSESSMENT.

TITLE	Review of existing practices for fluvial maintenance operations
PROJECT No.	200
NRA CONTACT	Chris Birks (Formerly Wessex)
RESEARCHER/CONTRACTOR	CIRIA
QUALITY OF RESEARCH	
Relevance to policy	+1
Policy links or statutory requirements	PL
Objectives	
Clear	+2
Attainable	-1
Realised	-2
Execution	
Overall	-1
Management	-1
Monitoring/milestones	+1
Reports	-2
Facilities	+1
Quality of team	+1
USEFULNESS OF RESEARCH	
Results used by	Further research
Aims fulfilled	-2
Innovative contribution	-2
Relevance to current concern	+1
User orientation	-1
Effectiveness of technology transfer	-1
Ease/affordability of implementation	-1
Other impacts/take-up	-1
Dissemination of findings	+1
VALUE FOR MONEY	
Overall	-2
Other Factors	
Maintaining timescale	+1
Use of prior/supporting information	-1
Adherence to budget	+1
Added value achieved	-1
Other factors	

NATIONAL RIVERS AUTHORITY

REVIEW OF FLOOD DEFENCE R & D PROJECTS

PROJECT - REVIEW OF EXISTING PRACTICES FOR FLUVIAL MAINTENANCE OPERATIONS
NOTE 14 CONTRACTOR - CIRIA

BRIEF - To carry out a State-of-the-Art survey of fluvial maintenance practices throughout the NRA to identify existing practices, and future research needs.

REPORT - If the brief was as broad as outlined above, it would be concluded that the report addressed the issues and, as such, the objectives had been realised. This is not the case and the contractor was required to comment on a number of specific issues which he has failed to do. There is little reference to frequency of maintenance work, environmental and economic factors, consideration of links into related research projects and broadly assessing the scope for improvements in maintenance practices. Whilst some of the above are briefly referenced, it is by nature of a passing remark rather than a purposeful commentary. As these are matters specifically flagged up in the brief, they should have commanded more attention and been readily located within the Report.

The document extends to some 122 pages, but only 25 of these are in effect the Report, the remaining pages covering appendices, many of which have little relevance to the project objectives.

The criticism of the Report must be tempered against the difficulty experienced by the contractor to obtain data. The need for this data was discussed with regional NRA representatives, but then found difficult to obtain when requested. It is doubtful whether a 250 point questionnaire is the best approach and, not surprisingly, many of these questions were of secondary importance and should have been excluded.

As mentioned, the 25 page Report fails to address many of the issues and whilst the reader can wade through the appendices, these are poorly referenced in the Report and is hence left to interpret the significance of them.

The recommendations of further considerations are good, although for some, which are supported, it is not obvious how these emanate from the Report itself.

During the project it was recognised that some of the specific objectives would be difficult to achieve, but there was not a formal amendment to the brief, or indeed, adjustment in the contract fee.

PROJECT ASSESSMENT.

TITLE	Manual for condition assessment of flood defences
PROJECT No.	033
NRA CONTACT	Gary Lane (Severn Trent)
RESEARCHER/CONTRACTOR	Water research centre
QUALITY OF RESEARCH	
Relevance to policy	+1
Policy links or statutory requirements	PL
Objectives	
Clear	+1
Attainable	+1
Realised	+1
Execution	
Overall	-1
Management	-1
Monitoring/milestones	+1
Reports	+1
Facilities	-1
Quality of team	-1
USEFULNESS OF RESEARCH	
Results used by	Operational staff. Led to further commission
Aims fulfilled	+1
Innovative contribution	+1
Relevance to current concern	+1
User orientation	+1
Effectiveness of technology transfer	+1
Ease/affordability of implementation	+1
Other impacts/take-up	+1
Dissemination of findings	-2
VALUE FOR MONEY	
Overall	+1
Other Factors	
Maintaining timescale	-1
Use of prior/supporting information	-1
Adherence to budget	+1
Added value achieved	-1
Other factors	

NATIONAL RIVERS AUTHORITY

REVIEW OF FLOOD DEFENCE R & D PROJECTS

PROJECT - **MANUAL FOR CONDITION ASSESSMENT OF FLOOD DEFENCES
PROJECT 033/1/57 CONTRACTOR - WATER RESEARCH CENTRE**

BRIEF - To improve methods of assessing the condition of flood defences, so reducing the subjectivity in measuring levels of service.

REPORT - The contents on the Report are confined to the relevant issues in addressing the brief which it covers well. In developing the proposals considerable liaison has clearly taken place in an attempt to produce a methodology which has an appropriate balance of detail and complexity. Whilst the initial reaction of readers will be to consider the condition recording as being complicated upon analysis, they may form the view that this could only be simplified with an accompanying devaluation of the information derived.

The Report is very much enhanced by the inclusion of colour photographs which admirably illustrate the range of conditions which is fundamental to the approach. In promoting the case, the contractor is very aware of the practicalities for data processing and collection in particular and for the latter the options are clearly flagged-up and cost implications noted

Subsequent to the Report's publication, the method developed has been fully tested by the NRA and the Severn Trent Region has undertaken extensive asset surveys based on the system, as a result of which refinements have been made to the original details. The amended document appears as an appendix in a subsequent project 'Asset Management Planning for Flood Defences'.

Whilst the Report is very good and met the objectives, the contractor, WRC, did not, at the time, have a notable track record in flood defence, the commission was residual on the separation of the water industry with whom they enjoyed 'special' arrangements. It is therefore highly likely that the quality of the Report has been achieved as a result of considerable and possibly an over-input from the Authority.

PROJECT ASSESSMENT.

TITLE	Flood defence levels of service stage 2
PROJECT No.	262/289
NRA CONTACT	Peter Borrowes (Thames)
RESEARCHER/CONTRACTOR	Robert Gould/Middlesex Polytechnic
QUALITY OF RESEARCH	
Relevance to policy	+2
Policy links or statutory requirements	PL
Objectives	
Clear	+1
Attainable	+1
Realised	+1
Execution	
Overall	+1
Management	+1
Monitoring/milestones	
Reports	-1
Facilities	+1
Quality of team	+1
USEFULNESS OF RESEARCH	
Results used by	Used as cornerstone for regional applications
Aims fulfilled	+1
Innovative contribution	+1
Relevance to current concern	+1
User orientation	+1
Effectiveness of technology transfer	+1
Ease/affordability of implementation	+1
Other impacts/take-up	+1
Dissemination of findings	-1
VALUE FOR MONEY	
Overall	
Other Factors	
Maintaining timescale	
Use of prior/supporting information	
Adherence to budget	
Added value achieved	
Other factors	

NATIONAL RIVERS AUTHORITY

REVIEW OF FLOOD DEFENCE R & D PROJECTS

PROJECT - FLOOD DEFENCE LEVELS OF SERVICE
NOTE 127 CONTRACTOR - ROBERT GOULD

BRIEF

REPORT

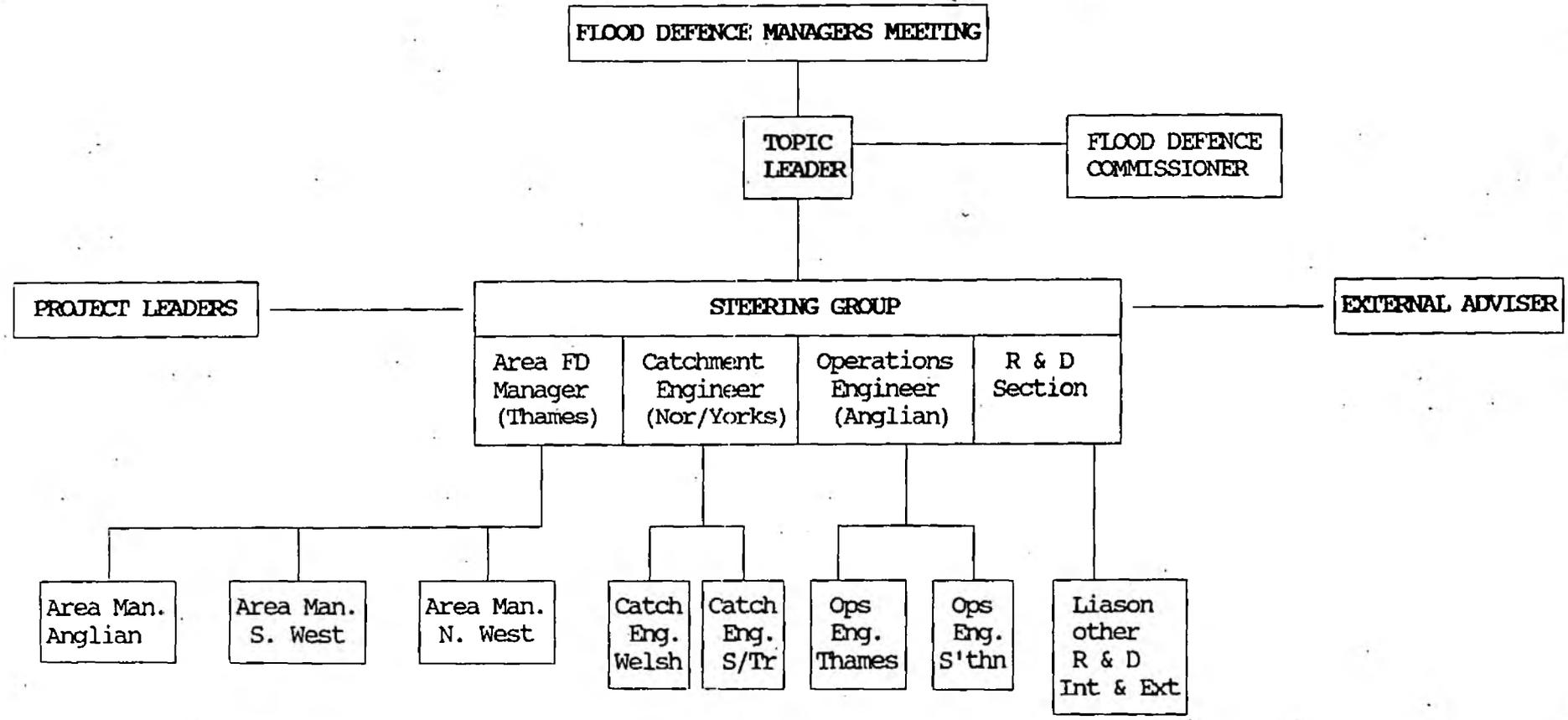
The project was initiated following similar work carried out by the then Laurence Gould and Partners for the former Anglian Water and therefore the contractors had already gained some experience in considering what has been long held as a difficult area within flood defence. Against that backcloth, the contractor has developed an approach, the fundamental principles of which are widely accepted, but there will clearly be some reservations on the conversion of elements at risk into House Equivalents. A major flaw with the approach is that the degree of flooding is not incorporated within the assessment and modest motorway flooding, not restricting the passage of vehicles, could score the same as flooding which caused major disruption.

To a large extent this deficiency will be addressed in further work commissioned by the Regions in implementing a level of service system. This Report will be used as the cornerstone for such work with refinements made to reflect more accurately the nature of particular areas, risk factors, etc. To this extent the Report has confirmed the practicality of introducing such a system where the relative flooding consequences can be identified and appropriate levels of service applied.

Whilst the 'Final Report' and 'Summary Report' were readily digested, the reference to seven appendices was tedious, and as they have little significance as independent documents, integration within the body of the Report of the more salient matters would have been beneficial.

SURVEY OF DISSEMINATION OF REPORTS

		Reg FD Man	Reg FD Man	Reg FD Man	Reg FD Man	Area FD Man	Area FD Man	Area FD Man	Dist Ops Eng
A. HEARD OF PROJECT									
Project									
1.	Aquatic Weed Control Operations Existing Practices Note 189	✓	x	x	✓	✓	✓	✓	✓
2.	Review of Existing Practices for Fluvial Maintenance Ops, Note 14	✓	✓	✓	✓	✓	✓	x	✓
3.	Prioritising and Programming of Flood Defence Work, Note 122	✓	✓	✓	✓	✓	✓	✓	✓
4.	Asset Management Planning for Flood Defence, Project 341	✓	✓	x	✓	✓	✓	✓	✓
5.	Review of Existing Practices for Fluvial Grass Management, Project 213/1/Y	✓	✓	✓	✓	✓	✓	x	✓
6.	Manual for Condition Assessment of Flood Defences, Project 033/1/57	✓	✓	x	✓	x	x	x	x
7.	Flood Defence Levels of Service, Note 127	✓	✓	x	✓	✓	✓	✓	x
B. RECEIVED REPORT									
Project									
1.	Aquatic Weed Control Operations Existing Practices, Note 189	✓	x	x	✓	x	✓	x	✓
2.	Review of Existing Practices for Fluvial Maintenance Ops, Note 14	✓	✓	x	✓	✓	✓	x	x
3.	Prioritising and Programming of Flood Defence Work, Note 122	✓	✓	✓	✓	x	x	✓	x
4.	Asset Management Planning for Flood Defence, Project 341	✓	✓	x	✓	✓	x	✓	x
5.	Review of Existing Practices for Fluvial Grass Management, Project 213/1/Y	✓	✓	✓	✓	x	✓	x	x
6.	Manual for Condition Assessment of Flood Defences, Project 033/1/57	✓	✓	x	✓	x	x	x	x
7.	Flood Defence Levels of Service, Note 127	✓	✓	x	✓	x	x	x	x



12.1

Note The reference to regions is indicative only as to how the network achieves an input from all regions.