

Risk Assessment for Sea and Tidal
Defence Schemes

Progress Report for period
to December 1993

Report No 459/4/Y

HR Wallingford
Sir William Halcrow & Partners
January 1994



NRA

National Rivers Authority

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ENVIRONMENT AGENCY



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1. INTRODUCTION

This quarterly progress report covers the period to the end of December 1993.

2. PROGRESS

Scheduled and actual progress is illustrated on the attached Activity Charts.

TASK 1 : CLASSIFICATION SYSTEM

The work on classification systems presented in the first technical report (August 1993) has been expanded to produce a more definitive classification system for use in this study. The system will adopt a tiered format with a first level based upon generic type, a second level defining the general form of construction, and a third level identifying the individual elements. This system structure will enable failure mechanisms to be attributed at different levels and integration of the classification into the probability model.

Event trees have been constructed to illustrate the failure modes at each of the three levels of detail.

Task 1 is 100% complete as first envisaged, but it is now clear that definitions for systems and structures may need to be modified as the project proceeds.

TASK 2 : ANALYSIS OF FAILURES

As part of another ongoing project, visits were made to each NRA region head office to collect data on flooding. This collection of data included any reports on flood events and their causes. The visits indicated that little information is readily available. The data that are available relate mainly to the consequences rather than detailed description of the cause. Other data sources investigated included researching historic records, reviewing past HR and Halcrow experiences, and investigating the feasibility of using newspaper archives. Whilst these searches have not been exhaustive, it is apparent that existing records are unlikely to give adequate description of the failure mechanisms to be of significant use in this project.

Data on previous failures has been organised into a standard format and are held on a computer database. Headings include 'Date', 'Location', 'Mechanism', 'Damage severity' and the source of the data. The database will be expanded as additional information becomes available.

Task 2 is approximately 80% complete.

TASK 3 : RISK ASSESSMENT METHODS

Work has continued to develop the risk assessment procedures. The first Technical Progress Report introduced the concept of a procedure with several stages, of increasing complexity. Recent work has developed this theme by devising a series of screening tests. These will initially evaluate structures and eliminate those considered to have a 'Low Risk' categorisation. This will then reduce the number of structures to which a further risk evaluation procedures would need to be applied. Initial assessment of this approach indicated

the screening may take the form of tests applied to specific fields in the SDS database, visual tests recorded during site inspection, or a combination of both.

The knowledge gained during the screening process will be used to identify the failure modes most likely to contribute the greatest risk to the structure. For structures not already eliminated, these failure modes will be analyzed using probabilistic risk assessment methods. The procedures being developed will need to take account of the availability of data and resources, which will inevitably limit the scope of probabilistic modelling which can be carried out. Nevertheless, it is intended to found the procedure on a firm theoretical basis, so that studies can be refined in important cases.

Overall we consider Task 3 to be on schedule compared with the Project Activity Chart.

TASK 4 : FLOOD AREA MODELLING

Much of the work on task 4 has continued to be suspended pending the outcome of discussions regarding what direction the research should take. Some time has been spent searching for related work ie risk mapping using GIS. One paper from the Delft University of Technology reinforced the view that topographic information collected for cartographic purposes was entirely different from the data required to map flood severity. The papers found to date confirm that there has been only limited work by other teams in this area with many of the studies being rudimentary in nature.

The re-definition of Task 4 has inevitably lead to a delay compared to the original Project Activity Chart. Once a revised programme has been agreed, a revised Activity Chart will be produced against which future progress can be judged.

3. COSTS

The total cost incurred to date is £57567. This is less than proposed, as shown on the attached spending profile. The underspend is partly due to the delayed start date to the project, and partly reflects the lack of progress on Task 4. The rate of spending during the quarter was in line with the proposed rate.

4. PLAN FOR NEXT QUARTER (up to the end March 1994)

- Continue to collect information on previous failures, and add to the database.
- Refine failure modes and fault trees
- Refine the classification system which has been devised
- Refine the screening tests which have been devised
- Continue development of detailed methods. Specify detailed procedure for an example failure mode.
- Identify criteria for selection of example study sites. Select suitable example study sites.

NRA Risk Assessment

Cumulative spend

