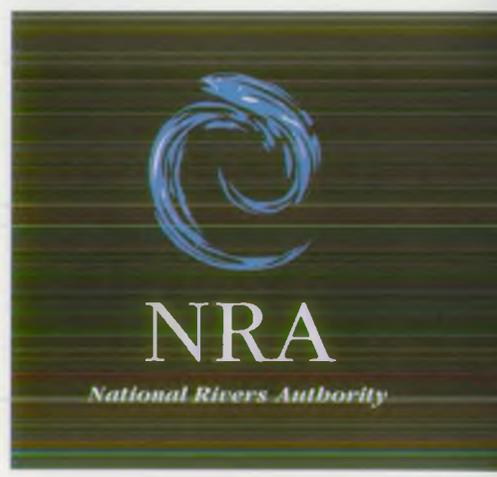


# SCOPING GUIDANCE FOR THE ENVIRONMENTAL ASSESSMENT OF PROJECTS



Scoping guidance for the environmental assessment of projects

This manual contains scoping guidance notes for the following development types in Section 4:

- |  |   |
|--|---|
| 1. Generic Impacts of Construction Work                      | 31. Fluvial dredging                              |
| 2. Reservoirs  | 32. Bank protection                               |
| 3. Marinas   | 33. Flood storage area                            |
| 4. Barrages  | 34. Flood embankment                              |
| 5. Fish farms  | 35. Culverts and tunnels                          |
| 6. Pipelines   | 36. Barriers/bridges/weirs                        |
| 7. Sea outfalls  | 37. Off-line ponds and reservoirs                 |
| 8. Points of large abstraction                               | 38. Coastal protection                            |
| 9. Points of large discharge                                 | 39. Beach nourishment                             |
| 10. Sewage treatment works - extension and installation      | 40. Suction dredging                              |
| 11. Large residential developments                           | 41. Restoration and enhancement of river channels |
| 12. Large industry/manufacturing developments and operations | 42. Conservation enhancements                     |
| 13. Golf courses   | 43. Water-based recreation                        |
| 14. Power stations   | 44. Off-road recreation activities                |
| 15. Wind farms   | 45. Vegetation management                         |
| 16. Hydroelectric power                                      | 46. Deliberate introduction of species            |
| 17. Oil refineries/oil exploration                           | 47. Groundwater abstraction                       |
| 18. Forestry   | 48. Interbasin transfer of flow                   |
| 19. Redevelopment of contaminated land                       | 49. Agriculture                                   |
| 20. Waste management   | 50. Kennels catteries and stables                 |
| 21. Mineral extraction - mining and quarrying                | 51. Intensive livestock/poultry units             |
| 22. Restoration of mineral extraction sites                  | 52. Tipping/dumping                               |
| 23. Roads and road widening                                  | 53. Camping and caravan sites                     |
| 24. Railways   | 54. Septic tanks/cesspits etc                     |
| 25. Airports   | 55. Vehicle plants/plant hire                     |
| 26. Cemeteries   | 56. Swimming pools                                |
| 27. Navigation issues  | 57. Chemical storage units                        |
| 28. Navigation works   | 58. Petrol stations                               |
| 29. Channel works  | 59. Peat extraction                               |
| 30. Flood diversion channels                                 | 60. Bait digging                                  |
|  | 61. Pest species control                          |

Further guidance is available for development types 1-27.

Regional EA Contacts

Region	Contact	Tel No.	Fax No.
Anglian	Gerard Stewart	01733 371811	01733 231840
Northumbria & Yorkshire	Simon Keys	01132 440191	01132 461889
North West	Peter Fox	01925 653999	01925 415961
Severn-Trent	David Hickie	0121 7112324	0121 7225824
Southern	Tony Owen/ Robin Crawshore	01903 820692	01903 821832
South Western	Peter Nicholson	01392 444000	01392 444238
Thames	Andrew Brookes/ Sue Rood	01734 535000	01734 500388
Welsh	Richard Howell	01222 770088	01222 798555
Head Office	Paul Raven	01454 624400	01454 624409

N.B. Area EA/Planning Liaison contacts are given in Appendix C.

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## **Introduction**

This manual has been produced primarily to provide scoping guidance to developers and/or their consultants on the general concerns of the National Rivers Authority (NRA) for a number of specific types of development and, also for general development issues.

It comprises four sections and three appendices. Sections 1 and 2 provide a summary of the roles of the NRA in environmental assessment and appraisal and the procedures which it adopts. A final draft copy of the NRA's Scoping Handbook has been included in Section 3, for information and guidance. This also has been produced as a stand-alone report, which has been circulated to external organisations for comment (June 1995) and a final version is due to be published by HMSO in 1996.

The notes presented in Section 4 complement the more detailed further guidance provided in an associated manual. They are intended to convey issues within the NRA's statutory responsibilities that may commonly arise in connection with certain types of development. They are not intended to replace consultations with the NRA and/or other organisations, nor are they intended to cover all environmental issues. The notes are necessarily of a general advisory nature and they should only be used without prejudice in considering individual development proposals. More detailed and possibly alternative recommendations will arise in discussions and negotiations with the NRA on specific proposals.

The appendices (A-C) contain a useful summary of legal requirements and contacts within the NRA.

It is intended that this manual will serve several purposes and audiences. The manual will act as a useful source of reference and guidance for NRA staff. The individual guidance notes can usefully be supplied to developers or their consultants to initiate discussions over a scheme and to demonstrate how the NRA's interests can potentially be affected, at a stage when changes can be made. This might be, for example, as part of a response to an initial inquiry. Further guidance could be supplied at an intermediate stage as a basis for more detailed negotiations. The optimal timing for issuing these notes will be case specific and at the discretion of the planning liaison officer or other officer dealing with the project.

This manual is intended to provide guidance relevant to current NRA responsibilities. With the formation of the Environment Agency, this manual will need to be extended as appropriate to encompass a broader range of responsibilities.

## Section 1 Introduction to Environmental Assessment in the NRA

The concept of environmental impact assessment or Environmental Assessment (EA) was formally introduced into the UK by the Town and Country Planning (Assessment of Environmental Effects) Regulations 1988 (SI 1988 No. 1199), which implemented much of EC Directive on the assessment of the environmental effects of certain public and private projects on the environment (85/337/EEC).

General guidance on the environmental assessment process has been provided by the Department of the Environment/Welsh Office (DoE/WO) publication *Environmental assessment: a guide to the procedures*, otherwise known as the "blue book", first published in 1989, but since updated. The guidance indicates which developments should be subject to statutory EA. The process of identifying whether a project requires EA may also be termed "screening". The guidance indicates which broad issues should be covered in an EA; defining the particular issues relating to a development proposal and the studies required to assess potential impacts, known as "scoping".

Subsequent to the "blue book", the DoE has produced guidance on best practice in the production of Environmental Statements (ESs); ESs being the published output from the process of EA.

For the purposes of this manual, Environmental Assessment in the NRA is taken in a broader sense than that of the legislation and takes on a variety of forms, depending on the nature of the development proposal. (Development itself is taken to have a broad meaning from abstraction/discharge proposals to major schemes such as airports).

The NRA comments on a variety of development proposals from external sources. The form of information received, upon which the NRA comment, is generally one of three types:

- a planning application with Environmental Statement (ES);
- planning applications without an ES, but possibly with some supports environmental information; and
- applications for consents or licences, often associated with development proposals (before or after a decision on planning permission).

In addition, there may be presubmission enquiries relating to each of the above from developers and/or local planning authorities (LPAs).

In effect, there is a continuum of the scale and/or environmental significance of applications from relatively minor consent or licence applications to large-scale development proposals. Although the term "Environmental Assessment" (EA) in its strictest sense may be restricted to larger-scale development, the principles apply to smaller-scale development for which the term "environmental appraisal" (ea) is generally applied. (The term environmental appraisal may also be used to describe the assessment of the environmental implications of strategic plans, eg regional development plans). No distinction between the two terms is made, except in consideration of the statutory need for formal environmental assessment (formal EA).

The NRA has a variety of environmental responsibilities as set out in the Water Resources

Act 1991 (see Section 4). As such, there may be issues of relevance to the NRA in the majority of development proposals. Early involvement of the NRA is essential to avoid confrontation at an advanced stage of planning. For example, planning permission may be granted for a proposed development, with the NRA first becoming aware of the proposal when applications for discharge or other consents are subsequently sought. The NRA may wish to refuse such applications for discharges, thus compromising the development, or may be under economic pressure to give consent, possibly compromising the environment. Clearly, such situations are avoidable if developers and LPAs make early contact with the NRA. Early notification of proposed development will enable the identification of sensitive areas or issues before detailed planning occurs and will permit the NRA to have an input into the scoping of environmental studies conducted in connection with the proposed development.

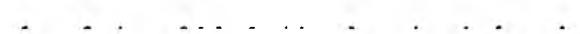
Contact with the NRA at an early stage is recommended for a wider variety of development types than those for which the NRA is a statutory consultee. Under the Town and Country Planning (General Development Procedure) Order 1995 (SI 1995 No. 419; formally the General Development Order) the LPA is obliged to consult with the NRA prior to granting planning permission for the following development types:-

- development involving or including mining operations;
- development involving the carrying out of works or operations in the bed of or on the banks of a river or stream;
- development for the purpose of refining or storing mineral oils and their derivatives;
- development involving the use of land for the deposit of refuse or waste;
- development involving sewage, slurry or sludge treatment or disposal;
- development relating to the use of land as a cemetery; and
- development for the purposes of fish farming.

In practice, LPAs are generally requested by the NRA to consult on a wider range of development types by means of Town and Country Planning Liaison documents issued by the NRA. Regions vary, but typically these development types include:-

- development which departs significantly from published Development Plans;
- development within or adjacent to any water course on floodplains including coastal plains and tidal lengths of rivers, washlands and in areas where there may be drainage problems;
- development on, under or adjacent to or protected by any flood bank, sea defence or other flood control structure;
- development which may affect an aquatic/wetland site of conservation interest;
- development of contaminated land;
- development involving the disposal of sewage (other than to a public sewer) including the use of septic tanks, cesspits, sewage treatment plants and private sewers;
- development which could affect groundwater protection zones;
- development which could exacerbate existing sewerage or sewage disposal problems;
- petrol filling stations or other storage facilities for petroleum products, chemicals, etc., including fertilizers and pesticides (above or below ground);
- timber treatment plants;
- intensive livestock and poultry units;

- kennels, catteries, stables etc;
- mineral works and exploratory works including restoration;
- waste disposal operations (including landfill, waste transfer stations, incinerators, scrap yards, bailing and recycling plants and solvent recovery plants);
- burial grounds;
- development of water based recreation facilities;
- vehicle parks and plant hire depots;
- major residential, industrial and commercial developments;
- fish farming activities including fish stocking or relocation of fish or works which will restrict the movement of fish;
- camping and caravan sites;
- golf courses;
- swimming pools;
- water reservoirs and conservation lakes;
- development requiring an environmental assessment; and
- highways, railways, power stations, airports and tunnels and any associated facilities.



## Section 2 Environmental Assessment Procedures in the NRA

The NRA will seek to assess the environmental impacts of all presubmission enquiries, planning applications brought to its attention and applications for NRA licences/consents. The nature of such assessments and the procedures involved will vary depending on the likely significance of impacts and local staffing arrangements. In general, planning applications will be received by planning liaison staff. The procedures are set out below in more detail. In general, it is important that documentation is kept on all correspondence in easily accessible information systems with suitable coding/cross-referencing systems.

**Presubmission enquiries** - Presubmission enquiries will generally be dealt with by a variety of staff, but in general should be dealt with by Area planning liaison staff in the first instance. Planning liaison may refer enquiries to relevant functional staff. Where appropriate, planning liaison staff should send copies of relevant scoping guidance; the level of guidance issued will be at the discretion of the NRA staff member and depend on the nature of the scheme and how advanced the development proposal is.

**Planning applications** - Planning applications should be dealt with by planning liaison staff, who should disseminate the application (in its entirety) to relevant functional staff for comment. Comments should be returned to the planning liaison staff member assigned to the project within the time period specified by that officer. In turn, a coordinated response should then be made to the planning authority within the statutory timeframe. Recommendations should be made, including requests for further information, if appropriate. Such recommendations should be clearly and, if appropriate, strongly worded; LPAs may be reluctant to adopt "woolly" comments. It may be relevant to issue scoping guidance to put requests for further environmental information into context.

Note that some NRA Regions rely on LPAs to assess which planning applications the NRA should be asked to comment upon; the LPAs can use the NRA-produced Town and Country Planning document for guidance. Other NRA Regions operate a visitor system, whereby NRA staff visit LPA offices to review lists of planning applications received to assess which should be referred to the NRA.

**Environmental Statements** - If a planning application is accompanied by an environmental statement (ES), this too should be disseminated by planning liaison along with the planning application. Where it is known that an ES is to be carried out, eg at the direction of the LPA, the NRA should issue relevant scoping information. The quality of ESs received should be assessed using one or more of a variety of tools. In instances where scoping guidance has been provided the guidance itself may be used as a checklist to ensure that issues have been addressed. More generally, however, the review criteria presented in the manual associated with this should be applied. These tools may also be applied (at the discretion of the NRA officer concerned) to other environmental information supplied in connection with development proposals not requiring formal EA and production of an ES.



**Section 3**

**Scoping Handbook**

**NATIONAL RIVERS AUTHORITY PUBLICATION**

**SCOPING HANDBOOK**

**National Rivers Authority  
Rivers House  
Waterside Drive  
Aztec West  
Almondsbury  
Bristol  
BS12 4UD**

**NATIONAL RIVERS AUTHORITY PUBLICATION**

**SCOPING HANDBOOK**

**FOR PROJECTS**

**National Rivers Authority  
Rivers House  
Waterside Drive  
Aztec West  
Almondsbury  
Bristol  
BS12 4UD**

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## SUMMARY

This handbook has been produced for National Rivers Authority (NRA) staff; developers and their consultants; local planning authorities and others who are involved in promoting and appraising projects and activities which are likely to affect the water environment. It has been produced, in combination with guidance notes, to encourage consultation and liaison with the NRA at an early stage in the evaluation and design of proposals. This is now widely termed the "scoping" stage.

Environmental Assessment is a process to ensure that the environmental impacts of projects are identified before a decision is taken on whether a proposal should proceed. This means that the most environmentally-favourable option can be identified at an early stage and the best practicable environmental option can then be selected. Projects can then be designed to avoid or minimise environmental impacts. It also provides an opportunity to incorporate positive environmental enhancements into projects. The Environmental Statement (ES) is a statutory document, produced by the developer to explain this process to the decision-maker, the public and statutory consultees. Undertaking a scoping exercise prior to this is recognised as good practice of EA and involves identifying important environmental issues. Those with an interest in the project should be consulted and provided with an opportunity to voice concerns and to make suggestions.

The NRA is the Guardian of the Water Environment in England and Wales and scoping and EA are both integral to its work. A legal requirement for environmental assessment for major projects has existed in the UK since 1988 and, for the NRA, this EA requirement is reinforced by specific legislation which requires it to take into account and minimise environmental impacts for all projects and to promote conservation. It also has powers to request environmental information from developers who apply for licences and consents. This can be a mini environmental appraisal, undertaken in an appropriate level of detail.

As part of a five year research project into EA, guidance notes have been produced for a range of projects which affect NRA interests. These are in the form of scoping guidance notes which have been produced for 61 project types and further detailed guidance which has been produced for 27 of these. These include projects where either formal EAs or smaller scale appraisals may be carried out. The guidance notes have been published separately and are available from the EA Contacts listed at the back of this report and from staff at Area level.

Each Scoping Guidance Note is a checklist of issues which are NRA responsibilities, such as surface water quality and aquatic biology. For each issue, there are a number of sources of impact, which are project activities, such as groundwater abstraction or surface water runoff. Finally, potential impacts are listed. These notes are intended for wide distribution and to initiate discussions with the NRA. They are advisory and are not intended to be prescriptive or to replace consultation on individual proposals and site-specific issues. The second set of guidance notes (Further Guidance) are more detailed indicating NRA licences which may be required and recommendations for baseline surveys and mitigation measures. These will be distributed at the discretion of NRA Officers.

The NRA have other useful information and advice which is essential for those considering proposals which may affect the water environment. This includes baseline survey data on the catchment *and* standards and targets for improvement which will be contained in Catchment Management Plans. The NRA is also in the process of developing standard methodologies for surveys.

## CHAPTER 1 - INTRODUCTION

### 1.1 Introduction

Environmental Assessment is a process designed to identify adverse impacts of proposals and to mitigate them through appropriate site selection, design and working practice. Scoping is a crucial part of the EA process which helps to identify key issues at an early stage, primarily through consultation with interested parties. The Environmental Statement is a document which summarises the results of the assessment and is produced by the project proponent to inform the public, statutory consultees and decision-making bodies about the effects of the proposal.

This handbook contains an introduction to the importance of scoping and consultations in Chapter 1, including the advantages and limitations of using checklists for scoping. Chapter 2 explains why the NRA has produced guidance notes to assist with scoping and contains caveats on how these are intended to be used. Finally, Chapter 3 provides a more detailed explanation of what environmental assessment is and the NRA's role in this. A reference list is also provided at the end of Chapter 3 for further reading.

### 1.2 Target Audience

This handbook is targeted at NRA staff, developers, their consultants and local planning authorities and others who are involved in promoting and appraising projects and activities which are likely to affect the water environment. This includes the NRA in its operational, advisory and regulatory roles.

### 1.3 Aims of this handbook

Scoping is a crucial part of the environmental assessment (EA) process and has been highlighted as an area of weakness in the practice of EA (Centre for Environmental Management and Planning, 1994). This handbook and accompanying guidance notes have been produced as a tool to help remedy this situation by promoting full and early involvement of the NRA in the environmental assessment of proposals which affect the water environment. This is summarised in Box 1. It aims to encourage good practice of environmental assessment at the scheme or project level and, therefore, does not address strategic issues, such as the environmental appraisal of development or coastal management plans and policies.

#### **Box 1- Handbook Aims**

- \* To explain the role and importance of scoping in environmental assessment;
- \* To introduce the guidance material which has been produced by the NRA to assist in the scoping process;
- \* To outline the intended uses and limitations of this material.

### 1.4 What is Scoping?

Scoping provides a focus for environmental assessment by identifying key issues of concern at an early stage and ensuring that they are subject to assessment at an appropriate level. This may be formal Environmental Assessment as required by law, or smaller-scale appraisals and reports. For simplicity, these are all referred to as "environmental assessments" in this document.

Scoping is a multi-functional activity designed to identify key concerns at a stage when alternatives are still being considered and mitigation measures can be incorporated into project designs. Scoping also provides an opportunity to highlight the benefits of projects and, in many cases, opportunities for environmental enhancement measures can be identified. Initial scoping should be carried out as part of site selection, to appraise alternatives. At this stage, the objective should be to ensure that no realistic alternative has been overlooked and that the chosen site and project option is environmentally defensible. These aims are summarised in Box 2.

Following site selection, scoping should progressively consider a decreasing range of issues, but in increasing detail. It should ensure that a balance is struck between incorporating all significant effects and eliminating insignificant impacts from further study. An effective scoping exercise should ensure that detailed surveys and assessments are focused on the key issues and that resources are not squandered on collecting and evaluating large amounts of information concerning minor issues. Scoping should be an ongoing activity undertaken throughout the course of the project. The way in which this fits into the environmental assessment process is explained further in Chapter 3.

#### **Box 2 - Why carry out scoping?**

Scoping a proposal involves identifying key issues to focus the EA upon. To do this, interested parties should be invited at an early stage to identify:

- \* their concerns;
- \* the most environmentally favourable site and scheme option;
- \* sources of and gaps in information.

The opportunity should be used as a basis for deciding:

- \* ways in which project designs can be modified prior to major resource investment;
- \* other mitigation measures;
- \* whether there is a need for formal EA (screening).

Scoping and associated early consultations lead to time and cost savings.

If a formal EA is to be carried out, then the scoping exercise will be useful in producing a terms of reference for the EA and a scoping report which identifies key issues for the EA.

#### **1.5 Terms of Reference For an EA**

The terms of reference for an EA provides the mechanism for a developer to indicate to the consultant which issues should be addressed in the EA. Widespread concerns have been raised over terms of references which restrict the scope of the EA too early in the process and are not sufficiently flexible to incorporate additional impacts which are identified at a later stage or which are considered to be important by other parties. Although it is the developer's responsibility to produce the terms of reference, the NRA wishes its opinions and suggestions to be included at this stage to ensure protection and, if possible, enhancement of the water environment.

#### **1.6 Scoping Report**

As a matter of good practice, some developers, such as the Highways Agency, currently produce a scoping report as a basis for discussion prior to the final Environmental

Statement (ES). A free standing scoping report will focus on feasible alternatives, key impacts, gaps in information and proposed further surveys and mitigation measures. Its structure will normally be the same as an ES but its contents will be less detailed. This provides an indication of the proposed coverage of the EA and uncertainties which have been identified. In this way, it acts as a basis for future studies and public participation. It should be clearly linked with the ES through cross referencing. It has also been suggested that the scoping report should be appended to the final ES, along with a summary of responses from consultees. This exercise could be used to demonstrate how the developer has responded positively to earlier comments.

### **1.7 Consultation and Public Participation**

An essential part of scoping is consultation between both the project manager and team, relevant experts, interested parties, (not only the NRA), and the public in order to identify concerns and potential opportunities for enhancement. These consultations should start at the outset, ideally before the "preferred option" has been selected. It is essentially a voluntary process, but is becoming widely accepted as part of good EA practice.

The level of consultation should be proportional to the potential significance of the project's impacts. This will be related to the nature, scale, location and perceived importance of the project. In some cases, initial consultations may simply involve contacting a handful of interested parties to see if there are likely to be concerns.

#### **Good Practice**

Pre-application consultations are part of good practice and involve identifying key personnel within organisations whose interests are likely to be affected by the proposals. These are widely termed "stakeholders" in the process. These are likely to include the local planning authority and environmental organisations, such as English Nature, the Royal Society for the Protection of Birds (RSPB) and the Countryside Commission. Community and interest groups should also be involved to ensure that a wide range of local interests are also represented.

Early consultations and keeping stakeholders informed of progress and any proposed changes are essential. This is a positive approach of encouraging participation in influencing decisions which have yet to be made. Involvement of the general public via leaflets and exhibitions, usually takes place at a later stage.

#### **Confidentiality**

Consultation during the early stages of project design and appraisal is likely to be a sensitive issue as there are frequently concerns about placing information in the public domain before the project is finalised.

In addition, public authorities may not wish to pre-empt decisions required at later authorisation stages. A distinction must also be made between projects which are promoted by public bodies, such as the NRA, and those promoted by private developers. In the case of public bodies, there should be no issue of confidentiality preventing open discussion of project scoping. The NRA recognises the benefits of early consultation with private bodies and wishes to be involved, in confidence if necessary, in such consultations.

#### **Formal consultation process**

Once an application has been submitted for either planning permission or for NRA licences and consents, there is a more formal process for notifying statutory consultees and the public for providing them with an opportunity to comment. This will usually involve advertisements in local newspapers, a public register of applications, or posting

statutory notices on site. Such statutory notification procedures are distinct from informal consultations which are recommended as part of the scoping exercise.

### **Benefits of Consultation**

Early and informal consultations with interested parties, such as the NRA, can enable the developer to identify concerns and measures for rectifying them at a stage when changes can easily be incorporated in project designs. Adopting such a pro-active approach should allow for more smooth-running projects and limit objections at a later stage, if it can be demonstrated that concerns have already been identified and addressed.

### **1.8 Checklists for Scoping**

A more formal way of scoping and impact identification is by adopting simple environmental assessment tools. One of these is the checklist which, in its simplest form, is a list of either project activities or aspects of the environment likely to be affected by a given project. The NRA has developed simple checklists as a tool for scoping impacts to the water environment. These have been produced for 61 types of projects and are described in Chapter 3. Such EA methods ensure that the environment is considered in a systematic way, but have been criticised as being inflexible or complex. The main advantages and limitations of checklists, such as the NRA's Scoping Guidance, are summarised in Box 3.

<b>Box 3 - Advantages and Limitations of Using Checklists for Scoping</b>	
<b>Advantages</b> <ul style="list-style-type: none"><li>* Good for identifying a wide range of issues to be considered.</li><li>* Useful for inexperienced staff.</li><li>* Ensures a systematic approach.</li><li>* Ensures a consistent approach.</li></ul>	<b>Limitations</b> <ul style="list-style-type: none"><li>* May be used too mechanically - if it is not on the list it is not considered.</li><li>* Does not indicate impact significance.</li><li>* Does not consider the location of the development and site-specific details.</li><li>* Cannot address cumulative or indirect impacts</li></ul>

### **1.9 Benefits of Scoping**

Experience has shown that early consultation between the project manager, interested parties and the public will lead to better designed projects with savings in terms of time and cost to all concerned. A failure to scope a project effectively can also affect the chances of a successful siting by not identifying fundamental deficiencies in project design or by omitting potentially significant issues from the study.

Proposed revisions to the EA Directive include involving the decision-making authority and statutory consultees in determining the scope of formal EAs in conjunction with the developer, rather than simply reviewing the quality of ESs once the application is submitted (Commission of the European Communities, 1994). At the time of writing it is not known whether or not these recommendations will be adopted. However, it does seem likely that scoping will become more of a key issue in the UK.

## 1.10 References

Centre for Environmental Management and Planning (1994) Proceedings of a Policy Think Tank on the Effectiveness of Environmental Assessment. Aberdeen University Research and Industrial Services Ltd. Scotland.

Commission of the European Communities (1994) Proposal for amending Council Directive 85/337 on the assessment of the effects of certain public and private projects on the environment. COM(93)575 final. Office for Official Publications of the European Communities, Luxembourg. 25pp.

## CHAPTER 2 - NRA GUIDANCE NOTES

### **2.1 Why Have We Produced Guidance Notes?**

Guidance notes have been produced to encourage a consistent approach to scoping in the NRA Regions for projects and activities which may affect the NRA's responsibilities. Offering guidance and advice at the scoping stage is more effective and efficient approach than waiting for final designs to be submitted.

Two types of guidance notes have been produced as part of a five year research programme into the operation of environmental assessment within the NRA. Scoping Guidance Notes are checklists for wide dissemination. Notes providing further detailed guidance will be supplied at the discretion of NRA staff to developers and their consultants as discussions over a scheme develop. These incorporate licensing requirements and suggested baseline information and mitigation measures.

These guidance notes are not intended to replace consultation with specialists from the NRA, nor are they intended to cover all environmental issues. They are of a general advisory nature and should be used without prejudice in considering project proposals. They cover both the NRA's own projects and external projects, where the NRA is either a statutory consultee or competent authority for issuing licences and consents, to ensure a consistent approach. Both types of guidance are described below.

### **2.2 Scoping Guidance**

Scoping guidance has been produced for 61 types of development or activities which are likely to affect NRA interests. This range may be extended depending on the success of "road testing". It is equally applicable to projects requiring formal EA as well as for smaller projects. Its main aims are to raise the profile of the water environment, in particular to highlight the NRA's multi-functional responsibilities. The checklist format should also ensure that impacts are considered in a systematic way and should provide a framework for discussions. A summary of this is given in Box 4.

#### **Box 4 - Aims of Scoping Guidance**

- \* To raise the profile of the water environment as an issue in EA;
- \* To ensure that those involved in EA appreciate that the NRA's concerns are multi-functional issues which need to be systematically addressed;
- \* To provide a framework for initiating initial discussion with the NRA .

A list of the types of developments or activities covered by this guidance is given in Figure 1 and an example for reservoir developments is given in Figure 2.

#### **Format of checklists**

Each checklist has three columns of information. The left column lists issues which are broad aspects of the environment which are likely to be affected by the project and which are NRA concerns. Surface Water Quality, in Figure 2, will be affected by impounding.

**Figure 1: Development Types for Which Scoping Guidance Notes Have Been Produced**

- |     |   |     |  |
|-----|---|-----|--|
| 1.  | Generic Impacts of Construction Work                          | 31. | Fluvial Dredging                                 |
| 2.  | Reservoirs  | 32. | Bank Protection                                  |
| 3.  | Marinas   | 33. | Flood Storage Area                               |
| 4.  | Barrages  | 34. | Flood Embankment                                 |
| 5.  | Fish Farms  | 35. | Culverts and Tunnels                             |
| 6.  | Pipelines   | 36. | Barriers/Bridges/Weirs                           |
| 7.  | Sea Outfalls  | 37. | Off Line Ponds and Reservoirs                    |
| 8.  | Points of Large Abstraction                                   | 38. | Coastal Protection                               |
| 9.  | Points of Large Discharge                                     | 39. | Beach Nourishment                                |
| 10. | Sewage Treatment Works<br>- extension & installation          | 40. | Suction Dredging                                 |
| 11. | Large Residential Developments                                | 41. | Restoration and Enhancement of<br>River Channels |
| 12. | Large Industrial/Manufacturing Developments<br>and Operations | 42. | Conservation Enhancements                        |
| 13. | Golf Courses  | 43. | Water-Based Recreation                           |
| 14. | Power Stations  | 44. | Off Road Recreation Activities                   |
| 15. | Wind Farms  | 45. | Vegetation Management                            |
| 16. | Hydroelectric Power   | 46. | Deliberate Introduction of Species               |
| 17. | Old Refineries/Oil Exploration                                | 47. | Groundwater Abstraction                          |
| 18. | Forestry  | 48. | Interbasin Transfer of Flow                      |
| 19. | Redevelopment of Contaminated Land                            | 49. | Agriculture                                      |
| 20. | Waste Management  | 50. | Kennels, Catteries and Stables                   |
| 21. | Mineral Extraction - Mining and Quarrying                     | 51. | Intensive Livestock/Poultry Units                |
| 22. | Restoration of Mineral Extraction Sites                       | 52. | Tipping/Dumping                                  |
| 23. | Roads and Road Widening                                       | 53. | Camping and Caravan Sites                        |
| 24. | Railways  | 54. | Septic Tanks/Cesspits etc                        |
| 25. | Airports  | 55. | Vehicle Parks/Plant Hire                         |
| 26. | Cemeteries  | 56. | Swimming Pools                                   |
| 27. | Navigation Issues   | 57. | Chemical Storage Units                           |
| 28. | Navigation Works  | 58. | Petrol Stations                                  |
| 29. | Channel Works   | 59. | Peat Extraction                                  |
| 30. | Flood Diversion Channels                                      | 60. | Bait Digging                                     |
|     |   | 61. | Pest Species Control                             |

Further Guidance Notes have been produced for development types 1-27.

**Figure 2: Sample Scoping Guidance**

**Development Type: Reservoirs**

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further guidance notes are available to provide greater detail where required.

<b>Issues</b>	<b>Sources of impact</b>	<b>Potential Impacts</b>
<b>Surface Water Hydrology/Hydraulics</b>	<b>Impoundment</b>	<ul style="list-style-type: none"> <li>Changed flow velocities</li> <li>Riparian drainage affected</li> <li>Changed surface water runoff</li> </ul>
	<b>Release regime</b>	<ul style="list-style-type: none"> <li>Changed flow regime</li> <li>Regulated flow</li> <li>Changed magnitude of flooding</li> <li>Changed flow velocities</li> <li>Changed frequency of flooding</li> <li>Changed duration of flooding</li> </ul>
<b>Channel Morphology/Sediments</b>	<b>Impoundment</b>	<ul style="list-style-type: none"> <li>Changed bank/bed stability</li> <li>Change of bed slope</li> <li>Change of planform/pattern</li> <li>Changed channel size</li> <li>Changed suspended sediment load</li> <li>Changed bed load</li> <li>Degradation/erosion of bed and/or banks</li> </ul>
	<b>Release regime</b>	<ul style="list-style-type: none"> <li>Changed suspended sediment load</li> <li>Change of planform/pattern</li> <li>Degradation/erosion of bed and/or banks</li> <li>Changed suspended sediment load</li> </ul>
<b>Groundwater Hydraulics</b>	<b>Impoundment</b>	<ul style="list-style-type: none"> <li>Changed direction of flow</li> <li>Change in water-table (level)</li> </ul>
<b>Surface Water Quality</b>	<b>Impoundment</b>	<ul style="list-style-type: none"> <li>Change in oxygen content</li> <li>Organic pollution</li> <li>Nutrient enrichment</li> <li>Microbial contamination (roosting birds)</li> <li>Changed suspended sediment load</li> <li>Stratification</li> <li>Re-suspension of contaminated sediments</li> <li>Change dilution capacity</li> <li>Change in quality</li> </ul>
	<b>Release regime</b>	<ul style="list-style-type: none"> <li>Changed dilution capacity</li> <li>Changed suspended sediment load</li> </ul>
	<b>Associated afforestation (conifers)</b>	<ul style="list-style-type: none"> <li>Change in pH (acidification)</li> <li>Chemical pollution</li> <li>Nutrient enrichment</li> <li>Changed hydrological cycle</li> </ul>

A standard range of twelve issues have been adopted for NRA concerns. These are surface water hydrology/hydraulics, channel morphology/sediments, groundwater hydraulics, surface water quality, groundwater quality, aquatic ecology, terrestrial ecology, human land use changes, recreation, heritage and archaeology. An explanation of each of these issues is given in Appendix 1. For each development, there will be a number of specific activities which will give rise to impacts. These are called sources of impact. For a reservoir development, impoundment is one example of such an activity. These activities are given in middle column.

Finally, potential impacts are given in the right column. This includes both direct and indirect impacts occurring as a result of the activity. In this example, the surface water quality is likely to be affected by a change in the oxygen regime as a result of impoundment. Potential impacts are shown as changes which may be positive or negative, depending upon individual circumstances. No attempt has been made to suggest mitigation measures as it is assumed that this will be a matter for discussion at a later stage. A standard list of all issues and impacts which have been considered is given in Figure 3.

#### **Using scoping guidance**

The scoping guidance notes are intended to be used as a tool to help identify impacts which may occur as a result of implementing a particular project. They are not intended to be prescriptive, but to provide a structured approach to scoping. Guidance notes should be used with discretion - see the limitations of checklists in Box 3. Judgement will still need to be applied to determine the potential significance of impacts in each case. It will also be necessary to decide whether there are any additional impacts or benefits from the proposal, perhaps due to the particulars of the site or local circumstances, which are not listed in the guidance.

As with all assessments, the developer, in consultation with relevant specialists, will need to determine where the boundaries lie in setting limits to the nature and amount of information included in the assessment and which impacts should be assessed. A balance needs to be achieved between limiting costs and the consequences of excluding potentially significant impacts from the study at an early stage.

#### **Uncertainty and gaps in information**

There is inevitably **some level of uncertainty** in impact predictions as well as gaps in information which it may not be possible or realistically practicable to fill. In such cases, the NRA must **apply professional judgement**, given the individual circumstances and, in cases of doubt adopt a precautionary approach.

### **2.3 Checklists for Environmental Statement Review**

An advantage of a **checklist approach** is that an agreed list of **key impacts and issues** may be used as a basis for reviewing a draft or final ES. Those responsible for review should be in a position to assess whether or not impacts which were considered significant at the scoping stage have been incorporated into the ES.

### **2.4 Further Guidance Notes**

Further Guidance Notes on the Environmental Assessment of projects have been produced to provide an immediate response to those who specifically enquire about the impacts of

a given type of project. They are targeted at major projects where a formal EA may be required and have the following aims:

- \* to provide a quick response by the NRA to queries;
- \* to indicate in general terms likely NRA requirements.

Each note is about ten pages long and one has been produced for each of the first 27 development types which are listed in Figure 1. They can be obtained from EA Contacts in each NRA Region or from Area Planning Staff (contact addresses are given in Appendix 2). The structure of the further guidance is given in Figure 4. It is intended that this will provide additional information for developers and their consultants and will encourage and not replace advice from NRA personnel.

**Figure 3: Issues and Impacts which Scoping Guidance Notes are Based on.**

<b>ISSUE</b>	<b>POTENTIAL IMPACTS</b>
<p>Surface Water Hydrology/Hydraulics</p>	<p>Changed surface water runoff            Changed flow velocities            Changed magnitude of flooding            Changed frequency of flooding            Changed duration of flooding            Convergence/divergence of flow            Changed hydraulics roughness            Regulated flow            Low flows            Wave - generation            Reduce tidal flow/flushing/mixing            Riparian drainage affected            Changed flow regime</p>
<p>Channel Morphology/ Sediments</p>	<p>Changed bank/bed stability            Degradation/erosion of bed or banks            Deposition/siltation            Change of bed slope            Change of planform/pattern            Disturbance to bed forms (pools, riffles)            Downstream erosion            Changed channel size            Changed suspended sediment load            Changed bed load            Contaminated sediment</p>
<p>Groundwater Hydraulics</p>	<p>Changed flow            Changed infiltration            Changed direction of flow            Change in water-table (level)            Barrier to flow            Change in pressure potential            Changed storage capacity</p>
<p>Surface Water Quality</p>	<p>Altered salinity            Change in quality            Chemical pollution            Eutrophication            Changed turbidity</p>

<b>Surface Water Quality cont...</b>	<ul style="list-style-type: none"> <li>Microbial contamination</li> <li>Stratification</li> <li>Re-suspension of contaminated sediments</li> <li>Rubbish/trash</li> <li>Changed dilution capacity</li> <li>Organic pollution</li> <li>Change in residence/flushing time</li> <li>Change in oxygen content</li> <li>Change in electrical conductivity/pH/acidification</li> <li>Change in temperature</li> </ul>
<b>Groundwater Quality</b>	<ul style="list-style-type: none"> <li>Movement of contaminated water</li> <li>Change in quality</li> <li>Saline intrusion</li> <li>Chemical pollution</li> <li>Organic pollution</li> </ul>
<b>Aquatic Ecology</b>	<ul style="list-style-type: none"> <li>Altered habitat</li> <li>Changed fish biomass</li> <li>Changed invertebrate biomass</li> <li>Changed plant biomass</li> <li>Changed species diversity</li> <li>Effect on fish behaviour</li> <li>Change in the fish community</li> <li>Barrier to fish migration</li> <li>Fish kill</li> <li>Effects on fish spawning</li> <li>Disturbance of sensitive species</li> <li>Loss of rheophilic flora and fauna</li> <li>Barrier to mammals</li> <li>Loss of sensitive species</li> </ul>
<b>Terrestrial Ecology</b>	<ul style="list-style-type: none"> <li>Altered habitat</li> <li>Tree removal</li> <li>Loss of wildlife habitat</li> <li>Wetland changes</li> <li>Change in plant biomass</li> <li>Change in animal biomass</li> <li>Changed riparian habitat</li> <li>Disturbance of sensitive species</li> <li>Changed species diversity</li> </ul>
<b>Human-Related</b>	<ul style="list-style-type: none"> <li>Change in noise levels</li> <li>Increased vibration</li> <li>Adverse odour</li> <li>Disrupted access</li> <li>Safety risks</li> <li>Health risks</li> <li>Nuisances</li> <li>Changed flood risk</li> <li>Changed water resource</li> <li>Change in the commercial nature of fisheries</li> <li>Disruption to commercial navigation</li> <li>Flooding</li> </ul>
<b>Land Use Change</b>	<ul style="list-style-type: none"> <li>Arable intensification</li> <li>Increased urban area</li> <li>Deforestation</li> <li>Afforestation</li> <li>Loss of riparian land</li> </ul>

Land Use Change cont...	Change in grade of agricultural land Restriction to future developments Development of floodplain
Visual Amenity	Altered aesthetic value Altered landscape
Recreation-Related	Alterations to access Altered facilities Change in fishing quality Disruption to users of water environment Changed boat use
Heritage & Archaeology	Disturbance and damage of known/unknown features Change to historic landscape

**Figure 4: Format of Further Guidance**

1. Introduction
2. Development Control
3. Environmental Assessment
4. NRA Licences
5. Major Potential Impacts
6. Mitigation Measures
7. Baseline Surveys
8. Monitoring
9. General Guidance and References

## **2.5 Relationship to Other EA Guidance**

This guidance builds upon and implements recommendations of earlier EA research. The principal source document was produced in 1992 by the Environmental Impact Assessment (EIA) Unit, University of Wales Aberystwyth and has now been "road tested" in Thames, Anglian, Welsh and Severn Trent Regions. A second phase of the research by WRC has further developed and extended the range of guidance notes. A similar, but not identical approach is being taken up to identify potential impacts of water resources options and baseline data requirements. The scoping checklists are intended to promote awareness of issues and impacts and not to replace existing function-specific development control and pollution prevention guidance notes.

## **2.6 Road Testing**

The scoping guidance notes have been produced by a combination of specialists within the NRA and by external consultants. They have also been widely distributed to 700 staff in the NRA and to external organisations for comments and amendments. Although they have already been used in draft form, they have yet to be fully "road tested". For this reason, a proforma has been included in Appendix 3 for comments to the NRA on either the effectiveness of the guidance or for changes and revisions.

## **2.7 Future Developments**

The NRA is scheduled to join forces with Her Majesty's Inspectorate of Pollution (HMIP) and the waste regulatory authorities to become a new environmental protection agency in

April 1996 with responsibilities for air, water and land. As such, its remit will broaden to encompass, not only the water environment, but also issues of air quality and waste disposal. As a consequence, the contents of this guidance note will need to be revised and broadened.

## **2.8 Guidance Note References**

**NRA (1996) Further Guidance Notes.** NRA, Head Office, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 4UD.

**NRA (1996) Scoping Guidance Notes.** NRA, Head Office, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 4UD.

## **CHAPTER 3 - ENVIRONMENTAL ASSESSMENT - THE WIDER CONTEXT**

### **3.1 Introduction**

This section puts scoping in the wider context of environmental assessment and shows how and when the NRA is involved in this. It briefly covers both the EA process, baseline data requirements and the need to adopt standard methodologies for surveys.

### **3.2 What is Environmental Assessment**

Environmental Assessment is a process to ensure that the environmental impacts of schemes are identified before a decision is taken on whether a proposal should proceed. This means that the most environmentally favourable option can be identified at an early stage and the best practicable environmental option selected. Projects can then be designed to avoid or to minimise environmental impacts.

Formal Environmental Assessment is required by law for certain types of project which, by virtue of their nature, size or location, are likely to give rise to significant impacts. A list of these projects and guidance on special procedures required has been issued by the DoE (1989). Formal Environmental Assessment is required for major projects and can only be requested for projects specified by the EA Regulations.

Nevertheless, the principle of environmental appraisal and assessment needs to be applied to all activities which impinge upon the NRA's statutory responsibilities. It has been agreed nationally within the NRA that environmental assessment should be integral to its work and not an "add on". The NRA has adopted a good practice approach for its own EAs for Flood Defence, Water Resources developments and for environmental enhancement projects. It also encourages both public and private developers to do the same.

The key steps in the environmental assessment process are given in Figure 5. The process is iterative which means that many of the stages will be repeated in light of new information discovered at a later stage. Consultation and Scoping are ongoing activities throughout the process. Also of note, is that the process does not stop once the ES or other report is produced, but continues throughout scheme implementation and beyond.

### **3.3 The NRA and Environmental Assessment**

The NRA has advisory, operational and regulatory roles in environmental assessment. This means that it can be a consultee for some projects, a developer for others, as well as having powers to issue or refuse licences and consents for certain activities. These different roles are explained below and summarised in Box 5.

#### **Box 5 - The NRA and Environmental Assessment**

- \* **Advisory** - statutory consultee in planning law (Town and Country Planning (General Development Procedure) Order 1995 (SI 1995 No. 419) and makes recommendations to Local Planning Authority on EAs.
- \* **Developer** - carries out formal EAs for Flood Defence and Water Resources developments. Environmental and Recreational Duties of the Water Resources Act 1991 apply to all NRA projects.
- \* **Competent authority** - can ask for environmental information from applicant as part of licensing & consenting procedure.

#### **Advisory: NRA as a Statutory Consultee**

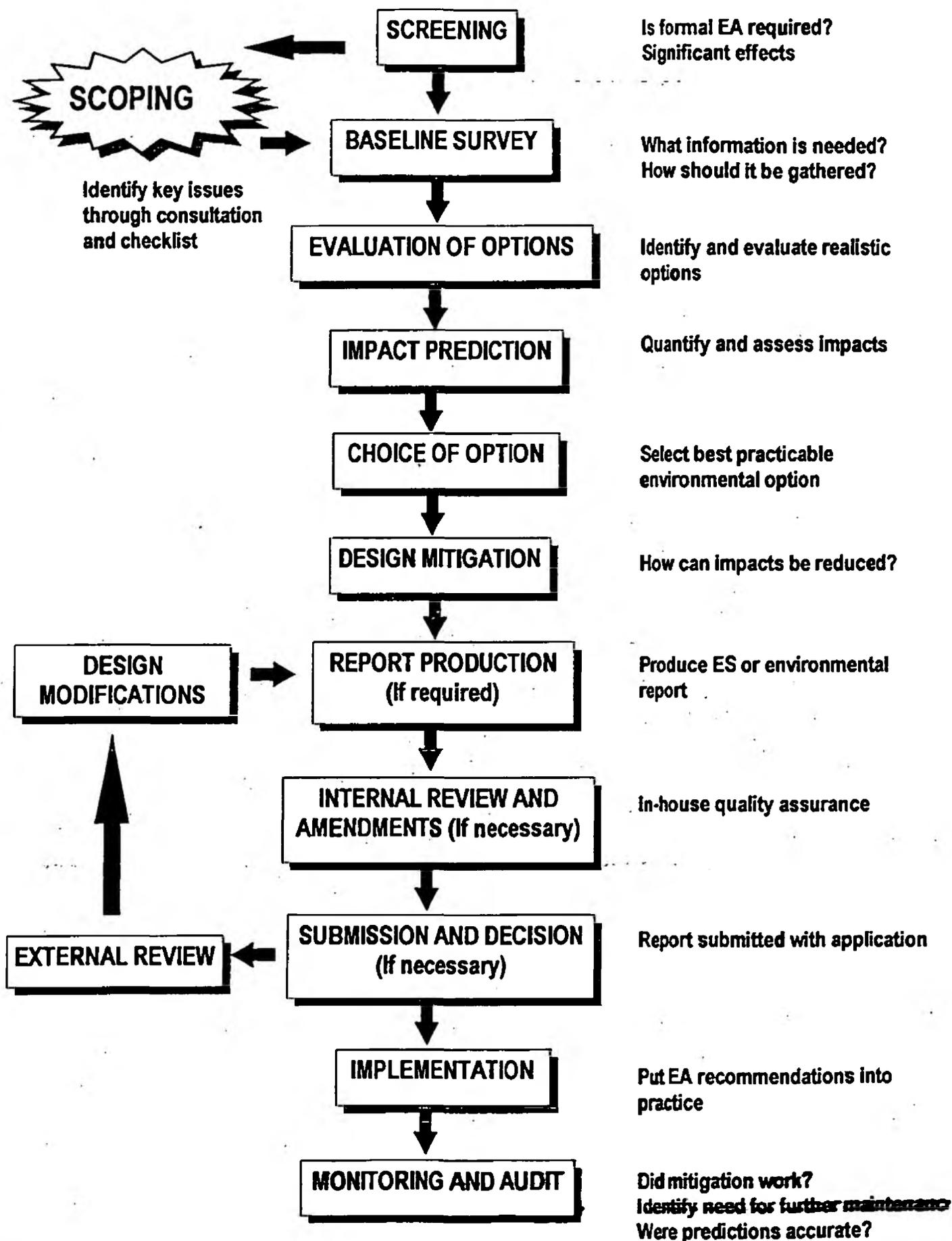
EC Directive 85/337 requires developers to carry out formal EA for projects likely to have a significant effect upon the environment. The Town & Country Planning (Assessment of Environmental Effects) Regulations 1988 No.1199 (SI 1199) implements this Directive and requires a formal EA to be carried out for these projects if planning permission is to be granted. Permitted development and activities which do not require planning permission are exempt from SI 1199, but may be covered by other sets of regulations with similar requirements. These include land drainage improvement works, trunk roads and motorways, afforestation projects and projects in simplified planning zones.

The NRA is a statutory consultee for certain types of development specified by the Town and Country Planning (General Development Procedure) Order 1995 (SI 1995 No. 419), which was formerly the General Development Order. However, in practice, the NRA generally requests that the Local Planning Authority consults on a wider range of development types which affect its functions. It can recommend to the Local Planning Authority that an ES is likely to be required for a given project and it is in a position to comment on the quality of the ES when it is submitted and to request further information.

#### **Operational: NRA as a Developer**

The **general environmental and recreational duties** imposed on the NRA by Section 16 of the Water Resources Act 1991 require that the environmental effects of proposals are taken into account and that adverse effects should be minimised. This can be regarded as a requirement for an informal EA procedure for all Flood Defence, Water Resources and Navigation Projects which will be documented by the NRA. In addition, formal Environmental Assessment can be required by SI 1199 for new works requiring planning permission and by SI 1217, the Land Drainage (Assessment of Environmental Effects) Regulations 1988. The latter are for flood defence works which are likely to give rise to significant effects and were amended by the Land Drainage Improvement Works (Assessment of Environmental Effects) (Amendment) Regulations 1995 (SI 2195).

Figure 5 - Key steps in the Environmental Assessment Process



## **Regulatory: NRA as a Competent Authority**

As a licensing body, the NRA is in a position to request "reasonable" information from an applicant prior to considering applications for discharge consents (Schedule 10 Water Resource Act, 1991). This provides a route to obtaining information for projects which are not covered by the EA Regulations, yet may still have a detrimental effect upon NRA responsibilities. In this respect the NRA is acting as a competent authority and may require some form of informal environmental appraisal or environmental report from a developer.

### **3.4 Baseline Data for Environmental Assessments**

In order to determine the extent and likely significance of environmental impacts, information needs to be collected on the sensitivity and uses of the catchment. Some of this information will be contained in Catchment Management Plans, where they are available, or will already have been collected by the NRA and should be available for a small charge. Gaps in information should be identified by a desk study exercise and in most cases the developer will be required to supplement this with additional survey data. The general information requirements are given in Box 6. This type of information will need to be collated in parallel with scoping. Of particular concern are locations which are sensitive to development. In addition to designated sites, any development in the locations given in Box 7 are likely to give rise to significant effects, unless suitable mitigation measures are adopted and are of concern to the NRA.

#### **Box 6 - Baseline Information Available from the NRA**

<b>Issue</b>	<b>Information</b>
Water Quality	Fisheries ecosystem class; potable supply; discharges
Water Resources	Public water supply, industrial/agricultural supply, abstractions
Flood Defence	Flood storage area, flood protection/sea defence structure, tidal barrier, floodplain
Fisheries	Salmonid, mixed, coarse, commercial fishery/no life
Recreation	Boating, walking, fishing, immersion watersports, bird-watching
Conservation	Habitat value, conservation interest, landscape type, archaeological interest
Navigation	Commercial, leisure, non-navigable

**Source:** Catchment Management Plans

### Box 7 - Sites where the NRA should be Involved

- Adjacent to rivers (freshwater and tidal) and floodplains
- Areas of poor/impaired drainage
- Adjacent to flood control structure (lock, weir, barrier)
- Enclosed water bodies and canals
- Land protected by flood bank/sea defence
- Coastal waters
- Wetlands
- Contaminated land
- Groundwater Protection Zones
- Nitrate Sensitive Areas

### 3.5 Standard Methodologies for Data Collection

Review of Environmental Statements will be eased if baseline surveys are undertaken by standard methodologies which are compatible with current and future NRA records. The NRA is currently developing standard methodologies for assessing the status of various aspects of the water environment and seeks to encourage others to adopt these where practicable. Use of standard methodologies should enable impacts to be quantified and impact predictions to be audited in a systematic way.

The range of standard surveys which are being developed at the time of writing are given in Box 8. The NRA Area Office should be contacted to determine the current status of methodologies and any changes which have been made.

### Box 8 - Standard Methodologies for Data Collection

Issue	Methodology	Status
Water Quality	Fisheries ecosystem classification Special ecosystem classification	being developed
Water Resources	Hydrometric Survey Abstraction Licence Data Base	in place being developed
Flood Defence	NRA flood defence surveys	standard
Fisheries	NRA fisheries surveys Fisheries classification	being developed
Recreation	No standard methodology	-
Conservation	River Corridor Survey River Landscape Assessment River Habitat Survey System for Evaluating Rivers for Conservation (SERCON)	published (NRA 1992a) published (NRA 1993) being published being finalised
Navigation	No standard methodology	-

### **3.6 Useful References**

Good practice guides produced by the Department of the Environment (DOE) emphasise the need for more stringent scoping and involvement of interested parties and the public at an early stage (DOE, 1994 a,b). A further good practice guide on evaluating environmental information has also been produced (DOE, 1994c). In addition, the following provide a general introduction to EA, scoping or issues affecting the water environment.

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## APPENDIX 1 ISSUES USED IN SCOPING GUIDELINES

Issue	Description
Surface Water Hydrology/Hydraulics	Water movement on the surface of the land, including rivers and streams, and the factors affecting runoff. For example, floods may be defined as unusually high rates of flow often leading to the inundation of adjacent land.
Channel Morphology/ Sediments	The process of water and sediment movement in channels and the channel forms produced by these processes.
Groundwater Hydraulics	Includes the storage and movement of subsurface water within the saturation zone of an aquifer. Includes consideration of inflow and abstraction (removal) of water.
Surface Water Quality	Relates principally to the chemical quality of surface waters. A primary aim of the NRA is to achieve a continuing overall improvement in the quality of rivers through the control of pollution.
Groundwater Quality	Concerns the chemical quality of groundwaters, ranging from wholesome potable waters to polluted water. These are not exclusive to groundwaters and affect a number of surface waters. Groundwaters are often a neglected resource and subject to the same pollutants as surface waters.
Aquatic Ecology	The variety and abundance of animals (including fish) and plant life that inhabit river channels. These are dependent on water quality and habitat conditions available within the river ecosystem.
Terrestrial Ecology	Relates to those aspects of the flora and fauna which inhabit the adjacent river corridor.
Human-Related	Covers a variety of issues, including the number of people or properties at risk from flooding, changed water resources and nuisances.
Land Use Change	Involves identifying the type and location of both urban and rural land uses within a catchment or adjacent to a specific length of river and determining the pressures.
Visual Amenity	Relates to the conservation and enhancement of the natural beauty of inland and coastal waters and associated land. The landscape of an area reflects a complex interplay between the natural environment and man's activities.
Recreation-Related	Involves the promotion of the use of inland and coastal waters and associated land for recreational purposes (eg boat use, angling facilities, access).
Heritage and Archaeology	Concerns sites and areas which are deemed to be of historical or archaeological importance (both above and below ground).

**APPENDIX 2  
NATIONAL RIVERS AUTHORITY  
ENVIRONMENTAL ASSESSMENT CONTACTS**

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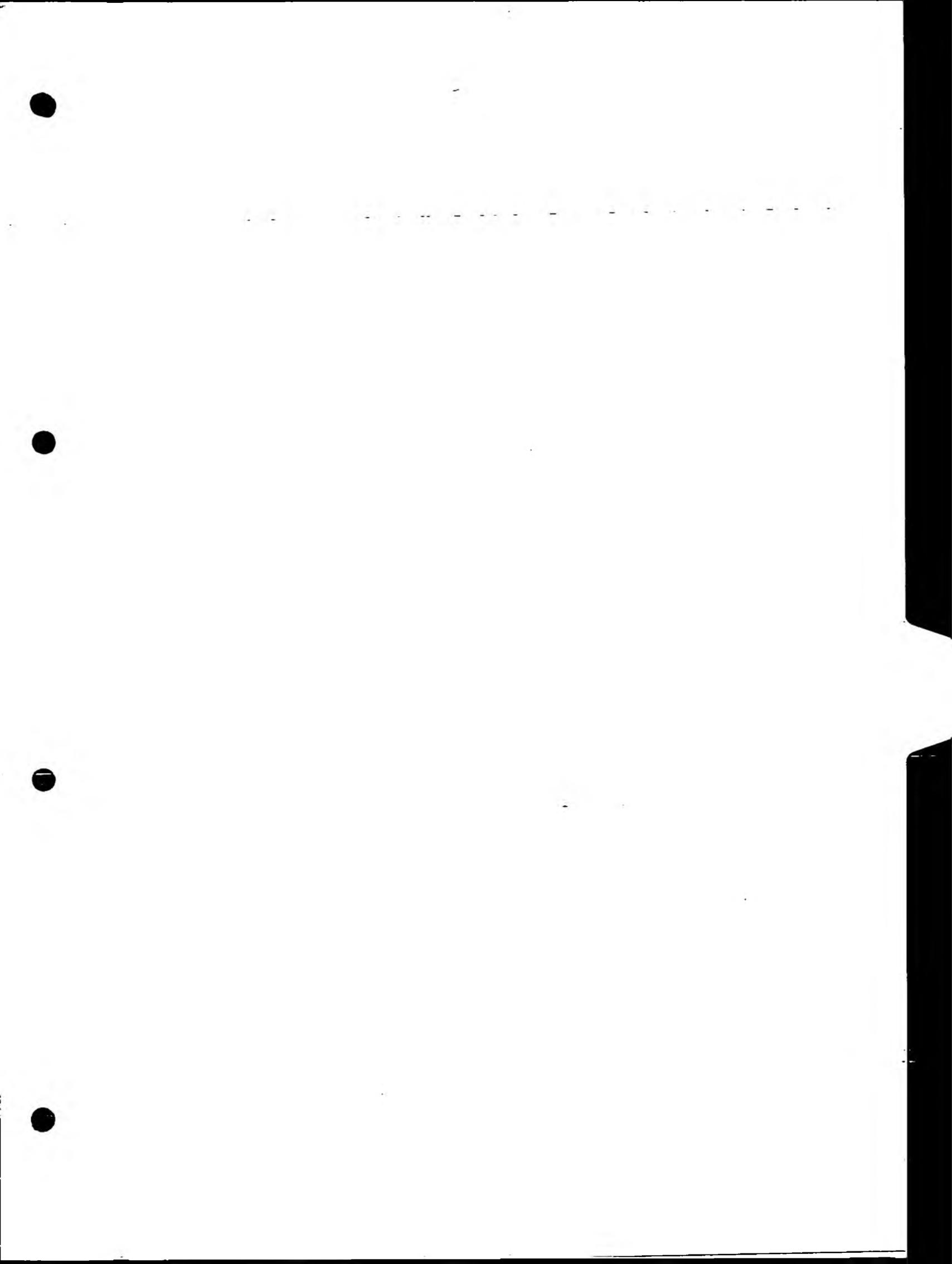
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**APPENDIX 3 - PROFORMA FOR COMMENTS**

Comments to:

Andrew Brookes, Environmental Assessment Manager  
NRA Thames Region  
Kings Meadow House  
Kings Meadow Road  
Reading RG1 8DQ

<b>Name:</b>	
<b>Date:</b>	
<b>Organisation and Address:</b>	<b>Telephone Number:</b>
<b>Comment on:</b>	
SCOPING HANDBOOK FOR PROJECTS	<input type="checkbox"/>
SCOPING GUIDANCE	<input type="checkbox"/>
FURTHER GUIDANCE	<input type="checkbox"/>
<b>Comment:</b>	



**Section 4**

**Guidance Notes**

## GENERIC IMPACTS OF CONSTRUCTION WORK

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further guidance notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Surface Water Hydrology/Hydraulics	Soil excavation, removal, storage	Changed surface water runoff Riparian drainage affected
	Soil compaction	Changed surface water runoff Changed magnitude of flooding Changed duration of flooding
	Laying of impervious surfaces (incl. roads)	Changed surface water runoff Changed flow velocities Changed magnitude of flooding Changed frequency of flooding Changed duration of flooding Changed flow regime Riparian drainage affected
	Drainage	Changed flow velocities
Channel Morphology/ Sediments	In-channel works/channel diversion	Changed flow velocities
	Riparian soil excavation/ movement/loss of trees	Changed bank/bed stability Degradation/erosion of bed or banks Change of planform/siltation Deposition/siltation Changed suspended sediment load Changed bed load Sediment contamination
	In-channel works - piling, piers, bridges, vehicle movements	Degradation/erosion of bed or banks Disturbance to bed forms (pools, riffles) Deposition/siltation Changed channel size Changed suspended sediment load Changed bed load
	Channel realignment/diversion	Changed bank/bed stability Degradation/erosion of bed or banks Deposition/siltation Change of bed slope Change of planform/pattern Disturbance to bed forms (pools, riffles) Changed channel size

Issues	Sources of impact	Potential Impacts
	Laying of impervious surfaces	Deposition/siltation; Degradation/erosion of bed or banks Changed bank/bed stability Changed suspended sediment load Changed bed load
Estuarine/Coastal Morphology	Structures and groynes	Changed erosion/sedimentation patterns
Groundwater Hydraulics	Excavation	Changed flow
	Dewatering	Changed flow Change in water-table (level)
	Laying of impervious surfaces	Changed infiltration Change in water-table (level) Barrier to flow Change in pressure potential
	Structure	Changed flow Changed direction of flow
Surface Water Quality	Storage and use of chemicals, fuel/oil, cement etc., accidental spillage, vandalism and unauthorised use, site management including sanitation and sewerage	Changed in quality Chemical pollution Rubbish/trash Organic pollution Change in oxygen content Microbial contamination Changed turbidity Changed dilution capacity Nutrient enrichment Change in electrical conductivity/pH/acidification
	Earthworks	Changed turbidity Re-suspension of contaminated sediments
	Disturbance of contaminated land	Chemical pollution Organic pollution Rubbish/trash
	Laying of impervious surfaces	Changed turbidity
	Tree removal	Change in quality Nutrient enrichment
	In-channel works	Changed turbidity Organic pollution
	Channel realignment/diversion	Changed dilution capacity upstream
	Dewatering	Changed dilution capacity Changed turbidity Change in residence/flushing time

Issues	Sources of impact	Potential Impacts
	Balancing ponds	Change in quality Changed turbidity
Groundwater Quality	Soil excavation, removal, storage	Change in quality
	Concrete below water table, piling works for foundations	Change in quality Chemical pollution Organic pollution
	Storage and use of chemicals fuel/oil etc.	Change in quality Chemical pollution Organic pollution
	Pumping	Chemical pollution Movement of contaminated water
	Disturbance of contaminated land	Chemical pollution Organic pollution
Aquatic Ecology	Construction (including in-channel works) and associated works/ Laying of impervious surfaces	Altered habitat Loss of habitat Changed fish biomass Changed animal biomass Changed plant biomass Changed invertebrate biomass Changed species diversity Loss of sensitive species Effect on fish behaviour Change in fish community Effects on fish spawning Fish kill
	Channel realignment/culverting/diversion	Altered habitat Changed invertebrate biomass Changed plant biomass Effects on fish spawning Loss of sensitive species Changed species diversity
	Dewatering	Altered habitat Changed plant biomass Changed invertebrate biomass Changed species diversity Loss of sensitive species
	Balancing ponds	Altered habitat Changed invertebrate biomass Loss of sensitive species

Issues	Sources of impact	Potential Impacts
Terrestrial Ecology	Fuel and chemical usage, site preparation and land take (including access roads, car parks, disposal/storage of soil, and other associated works)	Pollution through food chain Changed habitat Loss of wildlife habitat Tree removal Disturbance of sensitive species Changed species diversity Wetland change Illegal species imported
Human-Related	In-channel structures	Changed flood risk Disruption to commercial navigation
	Dewatering	Changed water resource
	Channel realignment	Changed flood risk Changed abstraction rights
	Machinery operation, piling	Change in noise levels Increased vibration
	Traffic	Safety risk Change in noise level Disrupted access
	Site security & safety restrictions	Alterations to access
Land Use Change	Land take	Loss of riparian land
	Construction of buildings, car parks etc.	Increased urban area Restriction to future developments
	Tree clearance	Deforestation
Visual Amenity	Earthworks, construction	Altered aesthetic value
Recreation-Related	Site security and safety restrictions, permanent works	Alterations to access Disruption to users of water environment
	In-channel works and structures	Disruption to users of water environment
Heritage & Archaeology	Site preparation, excavation & land take	Disturbance and damage of known/unknown features Change to historic landscape

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### NRA Documents

NRA (1992) Policy and Practice for the protection of groundwater. NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 2UD.

NRA (1994) Contaminated land and the water environment. Water Quality Series N°15. NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 2UD.

Pollution Prevention Guidance 1, General Guide to the Prevention of Pollution of Controlled Waters. NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 2UD

Pollution Prevention Guidance 6, Working at Demolition and Construction Sites. NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 2UD

### External Publications

English Nature (1994) Roads and nature conservation. Guidance on impacts, mitigation and enhancement. English Nature, Peterborough.

Forestry Commission Bulletin 112, Creating New Native Woodlands. Rodwell & Patterson, HMSO, £8195.75pp.

Larkin, P.A. "A commentary on Environmental Impact Assessment for large projects affecting lakes and streams", in Canadian Journal of Fisheries and Aquatic Science, 1984, 41, No. 7, pp 1121-1127.

Ministry of Agriculture Fisheries & Food : Scoping review of future research related to environmentally preferred channels. MAFF, London.

Renger, M. (1994) Built Environment, in Environmental Assessment: a guide to the identification, evaluation and mitigation of environmental issues in construction schemes. Construction Industry Research and Information Association (CIRIA), 6 Storey's Gate, Westminster, London.

Department of the Environment (1994) PPG23 Planning and Pollution Control. HMSO, London.

English Nature (1994) Nature Conservation in Environmental Assessment. English Nature, Peterborough.

### Other relevant scoping guidance

Channel Works

Culverts and Tunnels

Pipelines

Roads and Road Widening

Barriers, Bridges, Weirs

**Development Type: Reservoirs**

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further Guidance Notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Surface Water Hydrology/Hydraulics	Impoundment	Changed flow velocities Riparian drainage affected Changed surface water runoff
	Release regime	Changed Flow Regime Regulated flow Changed magnitude of flooding Changed flow velocities Changed frequency of flooding Changed duration of flooding
Channel Morphology/ Sediments	Impoundment	Changed bank/bed stability Change of bed slope Change of planform/pattern Changed channel size Changed suspended sediment load Changed bed load Degradation/erosion of bed and/or banks
	Release regime	Changed suspended sediment load Change of planform/pattern Degradation/erosion of bed and/or banks  Changed suspended sediment load
Groundwater Hydraulics	Impoundment	Changed direction of flow Change in water-table (level)
Surface Water Quality	Impoundment	Change in oxygen content Organic pollution Nutrient enrichment Microbial contamination (roosting birds) Changed suspended sediment load Stratification Re-suspension of contaminated sediments Changed dilution capacity Change in quality
	Release regime	Changed dilution capacity Changed suspended sediment load

Issues	Sources of impact	Potential Impacts
	Associated afforestation (conifers)	Change in pH (acidification) Chemical pollution Nutrient enrichment Changed hydrological cycle
Aquatic Ecology	Impoundment and/or Release regime	Altered habitat Changed fish biomass Changed invertebrate biomass Loss of sensitive species Loss of rheophilic flora and fauna Disturbance of sensitive species Effect on fish behaviour Change in fish community Effects on fish spawning Changed species diversity
	Dam wall	Barrier to fish migration Barrier to mammals Changed invertebrate biomass Loss of sensitive species
	Release structure	Loss of sensitive species Effect on fish behaviour Altered habitat Change in the fish community Changed invertebrate biomass Changed plant biomass Changed species diversity
Terrestrial Ecology	Impoundment	Wetland changes Changed habitat (loss of terrestrial) Disturbance of sensitive species
	Associated pipelines	Changed habitat Disturbance of sensitive species
	Flood meadows	Wet land changes Changed habitat
Human-Related	Impoundment	Changed flood risk Changed water resource Adverse odour Health risk Nuisances
Land Use Change	Impoundment	Restriction to future development

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<b>Issues</b>	<b>Sources of impact</b>	<b>Potential Impacts</b>
Visual Amenity	Impoundment	Altered aesthetic value Altered landscape
Recreation-Related	Impoundment	Alterations to access Change in angling quality Disruption to users of the water environment Altered facilities
Heritage & Archaeology	Impoundment	Change to historic landscape

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## REFERENCES

### NRA Documents

### External Publications

MAFF/NWC (Ministry of Agriculture, Fisheries and Food and National Water Council) (1976) The fisheries implications of water transfers between catchments, MAFF, London.

Brooker, M.P. (1981) The impact of impoundments on the downstream fisheries and general ecology of rivers. Applied Biology, 6, 91-152.

Milner, N.J., Scullion, J., Carling, P.A. and Crisp, D.T. (1981) The effects of discharge on sediment dynamics and consequent effects on invertebrates and salmonids in upland rivers. Applied Biology, 6, 153-220.

Rees, C.P. (1981) Guidelines for environmental impact assessment of dam and reservoir projects, in Water Science and Technology, 13, pp 57-71.

Lawson, J.D., Sambrook, H.T., Solomon, D.J. and Weilding, G. (1991) The Roadford Scheme: minimising impact on affected catchments. Journal of the Institute of Water and Environmental Management, 5, 671-681.

Hendry, M. (1992) "Environmental Assessment of a Reservoir: Testwood Lake, Hampshire", in Advances in EA. Conference Documentation 29/30 Oct 1992 organized by IBC Technical Services Ltd, Oilmoora House, 57-61 Mortimer Street, London WIN 7TD.

Mawdsley, J.A. (1994) "Control rules for regulating reservoirs", in The Rivers Handbook, Vol. 2, (1994), Blackwell.

Howard Humphreys Consultants. (1994) National Water Resources Strategy: strategic overview. Brown Root Limited, 150 The Broadway, Wimbledon SW19 1RX.

### Other relevant scoping guidance

Flood Diversion Channel  
Flood Storage Areas  
Channel Works  
Off-line Ponds and Reservoirs  
Pipelines  
Water Based Recreation  
Generic Impacts of Construction

**Development Type: Marinas**

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further Guidance Notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Surface Water Hydrology/Hydraulics	Marina/lockage	Changed flow velocities Reduced tidal flow/flushing/mixing
	Boat/pedestrian/vehicle movements	Wave generation
Channel Morphology/ Sediments	Marina	Changed bank/bed stability Changed channel size Changed suspended sediment load Changed bed load
	Lockage	Change of bed slope
	Boat movements	Degradation/erosion of bed and/or banks
	Dredging	Changed bank/bed stability Disturbance of bed forms (pools, riffles) Changed suspended sediment load Changed bed load
Groundwater Hydraulics	Marina/lockage	Change in water-table (level)
Surface Water Quality	Boats (including oil and chemical storage, boat hull washing, sanitary stations and sewage disposal)	Chemical pollution Organic pollution Nutrient enrichment Re-suspension of contaminated sediments Changed turbidity Microbial contamination Rubbish/trash
	Marina/lockage	Altered salinity Change in oxygen content Changed turbidity (suspended solids) Stratification Rubbish/trash
	Dredging	Nutrient enrichment Re-suspension of contaminated sediments Changed turbidity

Issues	Sources of impact	Potential Impacts
Groundwater Quality	<p>Marina/lockage</p> <p>Boats (including oil and chemical storage, boat hull washing, sanitary stations and sewage disposal)</p>	<p>Movement of contaminated water</p> <p>Saline intrusion</p> <p>Chemical pollution</p> <p>Organic pollution</p> <p>Change in quality</p>
Aquatic Ecology	<p>Marina and associated development</p> <p>Boat/pedestrian/vehicle movements</p> <p>Lockage</p>	<p>Altered habitat</p> <p>Changed fish biomass</p> <p>Changed invertebrate biomass</p> <p>Loss of sensitive species</p> <p>Effect on fish behaviour</p> <p>Change in fish community</p> <p>Effect on fish spawning</p> <p>Fish kill</p> <p>Loss of sensitive species</p> <p>Changed species diversity</p> <p>Disturbance/loss of sensitive species</p> <p>Changed invertebrate biomass</p> <p>Barrier to fish migration</p> <p>Changed invertebrate biomass</p> <p>Disturbance/loss of sensitive species</p>
Terrestrial Ecology	<p>Marina and associated developments</p>	<p>Loss of wildlife habitat</p> <p>Wetland changes</p> <p>Changed riparian habitat</p>
Human-Related	<p>Marina and associated developments</p> <p>Boats/lockage</p>	<p>Changed water resource</p> <p>Health risk</p> <p>Nuisances</p> <p>Disruption to Commercial Navigation</p>
Land Use Change	<p>Marina and associated development</p>	<p>Increased urban area</p>
Visual Amenity	<p>Marina and associated development</p>	<p>Altered landscape</p>
Recreation-Related	<p>Marina</p> <p>Lockage</p>	<p>Altered facilities</p> <p>Changed boat use</p> <p>Change in angling quality</p> <p>Disruption to users of the water environment</p>
Heritage & Archaeology	<p>Marina</p>	<p>Change to historic landscape</p>

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## REFERENCES

### NRA Documents

Pollution Prevention Guidance 14, Boats and Marinas, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 2UD.

Humphreys, H. (1994) National Water Resources Strategy - strategic overview. NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol.

### External Publications

Waggoner, J.P., and Feldmeth, C.R. (1971) Sequential mortality of the fish fauna impounded in construction of a marina at Dana Point, California, in Fish Game, 57, pp 167-176.

Mack, W.N., and D'Itri, F.M. (1973) Pollution of a marina area by water craft use, in Water Pollution Control Federation, 45, pp 97-104.

Construction Industry Research and Information Association (CIRIA), 6 Storey's Gate, Westminster, London. (1994) River & Coastal Engineering, in Environmental Assessment: a guide to the identification and mitigation of environmental issues in construction schemes.

### Other relevant scoping guidance

Suction Dredging  
Water-Based Recreation  
Generic Impacts of Construction  
Channel Works

**Development Type: Barrages**

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further Guidance Notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Surface Water Hydrology/Hydraulics	Impoundment	<ul style="list-style-type: none"> <li>Changed flow velocities (upstream)</li> <li>Regulated flow</li> <li>Changed magnitude of flooding</li> <li>Riparian drainage affected</li> </ul>
	Impounding structure	<ul style="list-style-type: none"> <li>Reduced tidal flow/flushing/mixing</li> <li>Wave generation</li> </ul>
Channel Morphology/ Sediments	Impoundment	<ul style="list-style-type: none"> <li>Changed bank/bed stability</li> <li>Change of bed slope</li> <li>Change of planform/pattern</li> <li>Changed channel size</li> <li>Changed suspended sediment load</li> <li>Changed bed load</li> </ul>
	Dredging	<ul style="list-style-type: none"> <li>Changed bank/bed stability</li> <li>Disturbance of bed forms (pools, riffles)</li> <li>Changed suspended sediment load</li> <li>Changed bed load</li> </ul>
Groundwater Hydraulics	Impoundment	<ul style="list-style-type: none"> <li>Changed flow</li> <li>Change in water-table (level)</li> </ul>
Surface Water Quality	Impoundment	<ul style="list-style-type: none"> <li>Chemical pollution</li> <li>Organic pollution</li> <li>Eutrophication</li> <li>Changed turbidity</li> <li>Microbial contamination</li> <li>Rubbish/trash</li> <li>Altered salinity</li> <li>Change in oxygen content</li> <li>Stratification</li> <li>Re-suspension of contaminated sediments</li> <li>Changed dilution capacity</li> </ul>
	Dredging	<ul style="list-style-type: none"> <li>Increased suspended solids</li> <li>Re-suspension of contaminated sediments</li> </ul>
Groundwater Quality	Impoundment	<ul style="list-style-type: none"> <li>Movement of contaminated water</li> <li>Saline intrusion</li> </ul>

Issues	Sources of impact	Potential Impacts
Aquatic Ecology	Impoundment	Altered habitat Changed fish biomass Changed invertebrate biomass Loss of sensitive species Effect on fish behaviour Change in fish community Effect on fish spawning Fish kill Loss of sensitive species
	Impounding structure	Barrier to fish migration Barrier to mammals Changed invertebrate biomass Loss of sensitive species
Human-Related	Impoundment	Changed flood risk Changed water resource Adverse odour Health risk Nuisances
	Impounding structure	Disruption to water users
Land Use Change	Impoundment	Increase urban area
Visual Amenity	Impoundment	Altered landscape Altered aesthetic value
Recreation-Related	Impoundment	Altered facilities Changed boat use Change in angling quality Alterations to access
	Release structure	Loss of sensitive species Effect on fish behaviour Altered habitat Change in fish community Change in invertebrate biomass Change in plant biomass
Terrestrial Ecology	Impoundment	Loss of wildlife habitat Wetland changes
	Associated pipelines	Various impacts
Human-Related	Impoundment	Changed flood risk Changed water resource Adverse odour Health risk Nuisances

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<b>Issues</b>	<b>Sources of impact</b>	<b>Potential Impacts</b>
Land Use Change	Impoundment	Restriction to future developments
Visual Amenity	Impoundment	Altered landscape
Recreation-Related	Impoundment	Altered facilities Altered access for water users Change in angling quality
Heritage & Archaeology	Impoundment	Change to historic landscape

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## REFERENCES

### NRA Documents

NRA Draft Document 1994: Estuarine Barrages: Guidelines for the Protection of the NRA's Interests, NRA, Welsh Region, Newport.

### External Publications

Institution of Civil Engineers (1981) The Severn Barrage. Proceedings of a Symposium, Thomas Telford Ltd, London, 1982.

Corlett, J. (1984) Tidal Power from the Severn Estuary, in Water Science and Technology, 1984, 16, No. 1/2, pp 253-268.

Severn Tidal Power Group (1989) The Severn Barrage Project, HMSO Energy Paper, No. 57.

Robson, A. (1994) Electricity Generation, in Environmental Assessment: a guide to the identification and mitigation of environmental issues in construction schemes. Construction Industry Research and Information Association (CIRIA), 6 Storey's Gate, Westminster, London.

### Other relevant scoping guidance

Dredging, Fluvial and Suction  
General Construction Works  
Bank Protection  
Pipelines

## Development Type: Fish Farms

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further guidance notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Surface Water Hydrology/Hydraulics	Abstraction	Changed flow velocities Low flows (deprived reaches)
	Discharge	Changed flow velocities
Channel Morphology/ Sediments	Construction of fish ponds	Change of planform/pattern
	Abstraction	Changed wetland area Deposition/siltation
	Discharge	Deposition/siltation Changed turbidity Changed bed load
	Fish cages	Deposition/siltation Changed bed load
Groundwater Hydraulics	Groundwater abstraction	Change in water-table (level)
Surface Water Quality	Discharge	Chemical pollution Change in oxygen content Nutrient enrichment Changed turbidity Microbial contamination (incl. disease/parasitic/antibiotic resistant organisms) Changed dilution capacity
	Accidental releases	Chemical pollution Change in oxygen content
	Fish cages	Chemical pollution Change in oxygen content Nutrient enrichment Changed turbidity Microbial contamination (incl. disease/parasitic/antibiotic resistant organisms) Organic pollution Changed dilution capacity
	Shellfish ropes/bags	Organic pollution
Groundwater Quality	Burial of fish carcasses	Microbial contamination Organic pollution Chemical pollution

Issues	Sources of impact	Potential Impacts
Aquatic Ecology	Construction of fish/crayfish ponds	Altered habitat Changed invertebrate biomass Disturbance of sensitive species
	Discharge	Altered habitat Changed fish biomass Change in fish community Change in invertebrate biomass Changed plant biomass Effects on fish spawning Disturbance of sensitive species
	Fish escapes	Changed fish biomass Change in fish community Changed invertebrate biomass Disturbance of sensitive species
	Abstraction/low river flow/weirs/flow diversion	Barrier to fish migration Effects on fish spawning Fish kill Changed invertebrate biomass Disturbance of sensitive species
	Predator control	Entrainment/entrapment
Land Use Change	Abstraction/discharge	Restriction to future developments
Visual Amenity	Cages, turbidity, eutrophication	Altered aesthetic value
Recreation-Related	Creation and operation of angling lakes and shop	Altered facilities Change in angling quality
	Fish escapes	Change in angling quality
	Fish cages	Alteration to access Disruption to users of water environment
Heritage & Archaeology	Fish cages/fish farm/angling lakes	Disturbance and damage of known/unknown features Change to historic landscape

## REFERENCES

### NRA Documents

Mainstone, C., Lambton, S., Gulson, J., and Seager, J. WRc Report to NRA PRS 2243 - M 1989 "The Environmental Impact of Fish Farming - a review". NRA, Bristol, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol.

### External Publications

J.F. de L.G. Solbe (1982) "Fish farm Effluents, a UK Survey", in Alabaster, J(ed). Report of the EIFAC Workshop on fish-farm effluents, Silkeborg, Denmark, 26-28 May 1981, FAO, Rome.

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House of Commons Agriculture Committee (1990) Fish Farming in the UK. Volume 1: Report and Proceedings of the Committee. HMSO, London.

Institute of Aquaculture (1990) Fish Farming and the Scottish Freshwater Environment. Nature Conservancy Council, Edinburgh.

### Other relevant scoping guidance

Generic Impacts of Construction  
Points of Large Abstraction  
Points of Large Discharge  
Off-Line Reservoirs and Ponds  
Deliberate Introduction of Species  
Ground Water Abstractions

**Development Type: Pipelines**

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further guidance notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Surface Water Hydrology/Hydraulics	Earthworks/trench/digging/ dewatering	Changed surface water runoff Changed flow velocities Changed magnitude of flooding Riparian drainage affected Changed frequency of flooding Changed duration of flooding
	Pipeline (crossing river bed)	Changed hydraulic roughness
Channel Morphology/	Earth Works/Trench digging/ runoff	Degradation/erosion of bed and/or banks Changed bed load Changed suspended sediment load
	Pipeline (crossing river bed)	Disturbance to bed forms (pools, riffles) Deposition/siltation Changed bed load
Groundwater Hydraulics	Earthworks/trench digging/ dewatering	Changed infiltration Change in water-table (level)
	Pipe leakage (Water main/ Sewer)	Rise in water-table
	Pipeline	Barrier to flow
	Pipeline drainage	Changed flow path of groundwater
Surface Water Quality	Earthworks/trench digging/dewatering	Organic pollution Increased turbidity Re-suspension of contaminated sediments
	Pipe leakage	Organic pollution Chemical pollution Microbial contamination Change in oxygen content Changed turbidity
	Pipe lining/rehabilitation	Chemical pollution Changed turbidity Rubbish/trash
Groundwater Quality	Earthworks/trench digging/ dewatering/ Pipe leakage/rehabilitation	Movement of contaminated water Chemical pollution Organic pollution Microbial contamination

Issues	Sources of impact	Potential Impacts
Aquatic Ecology	Earthworks/trench digging/ dewatering	Altered habitat Loss of rheophilic flora & fauna Changed invertebrate biomass Loss of sensitive species
	Pipe leakage	Altered habitat Changed fish biomass Changed invertebrate biomass Changed plant biomass Changed species diversity Fish kill Loss of sensitive species
Terrestrial Ecology	Earthworks/trench digging/ dewatering	Altered habitat Tree removal Wetland changes Disturbance of sensitive species
	Pipe leakage	Adverse odour Alterations to access Health risks Nuisances Changed water resource
Human-Related	Earthworks/trench digging/ dewatering	Change in noise levels Increased vibration Disrupted access
	Pipe leakage	Adverse odour Alterations to access Health risks Nuisances Changed water resource
Visual Amenity	Earthworks/trench digging/ dewatering	Altered aesthetic value Altered landscape
	Pipelines (above ground)	Altered landscape
Recreation-Related	Pipelines (over rivers)	Disruption to users of water environment
Heritage & Archaeology	Earthworks/trench digging/ dewatering	Disturbance and damage of known/unknown features
	Pipelines (above ground)	Change to historic landscape

## REFERENCES

### NRA Documents

NRA 1992: Policy and Practice for the Protection of Groundwater, NRA, Bristol, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol.

NRA 1994: Video: Pollution Prevention Pays, video offer, Freepost (B 54345). NRA, Bristol, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol.

### External Publications

Rees, C.P. (1980) "Environmental Impact Assessment of Pipelining", in Pipes and Pipelines International, pp 15-20.

Ryder, A.A. (1989) "Environmental Assessment & UK Cross-Country Pipelines", in Pipes & Pipelines International, 34, No. 6, pp 7-10.

DTi (1992) Guidelines for the Environmental Assessment of Cross-Country Pipelines, HMSO., London.

CIRIA (1994) (Construction Industry Research and Information Association) Environmental Assessment: a guide to the identification, evaluation and mitigation of environmental issues in construction schemes. 6 Storey's Gate, Westminster, London.

### Other relevant scoping guidance

Chemical Storage Units  
Petrol Stations  
Oil Refineries/Oil Exploration  
Generic Impacts of Construction

**Development Type: Sea Outfalls**

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further Guidance Notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Surface Water Hydrology/Hydraulics	Outfall structure	Change in local tidal currents
Estuary/Sea Bed Morphology/Sediments	Outfall structure and discharge	Change in sediment deposition/ resuspension characteristics
Surface Water Quality	Discharge	Microbial contamination Organic pollution Nutrient enrichment Sewage derived rubbish/trash on beach/shore Changed turbidity Chemical pollution Changed oxygen content Changed water quality (inshore)
Aquatic Ecology	Outfall structure	Altered habitat Change in invertebrate community Change in fish community Loss of sensitive species
	Discharge	Altered habitat Change in invertebrate community Changed invertebrate biomass Decrease in direct and secondary food supply inshore Increase in "food" supply offshore Change in trophic structure Change in bird abundance Change of bird diversity Change in fish community Effects on fish spawning Fish disease Loss of sensitive species Organic enrichment of sediments
Terrestrial Ecology	Headworks	Loss of wildlife habitats Changed species diversity
Human-Related	Outfall structure	Severance of beaches Hazard to commercial navigation and fisheries
	Discharge	Health risks Nuisances Adverse odour Contamination of shell fisheries

Issues	Sources of impact	Potential Impacts
	Headworks	Adverse odour Disrupted access
Land Use Change	Outfall structure	Restriction to future developments
	Discharge	Encouragement/restriction to future developments
Visual Amenity	Outfall structure	Altered aesthetic value
	Discharge	Altered aesthetic value
	Headworks	Altered aesthetic value
Recreation-Related	Outfall structure	Alteration to access Disruption to water users Disruption to users of water environment
	Discharge	Altered facilities
Heritage & Archaeology	Outfall structure	Change to historical landscape

## REFERENCES

### NRA Documents

NRA (1993 draft) Assessing Environmental Impact in the NRA: A Technical Guide to EA Function Applicability, pp 3/31 - 3/76, Coastal Schemes. NRA, Bristol, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol.

NRA SW (1994) Technical paper on guidelines for the development and assessment of impact of WS plc schemes for the collection, treatment and disposal of sewage to tidal waters. NRA SW Tidal Waters Quality Group. NRA, Manley House, Kestrel Way, Exeter.

### External Publications

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Flemons, K.J., and Taylor, A.G. (1985) "Planning, design and construction of the Great Grimsby Sewage Outfall", in Proceedings of Institution of Civil Engineers, (pt 1), 1985, 78, pp 1045-1064.

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Nixon S.C. (1990) Effects of sea outfalls on the environment - executive summary report. Foundation for Water Research. Report N° FR 0031

Ferrary, C. (1993) Linear Development, in Environmental Assessment: a guide to the identification, evaluation and mitigation of environmental issues in construction schemes. Pre-publication draft, Construction Industry Research and Information Association (CIRIA), 6 Storey's Gate, Westminster, London.

### Other relevant scoping guidance

Pipelines  
Points of Large Discharge  
General Construction Works

**Development Type: Points of Large Abstraction**

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further Guidance Notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Surface Water Hydrology/Hydraulics	Reduction in river flow	Changed flow regime Changed flow velocities Low flows Reduced tidal flow/flushing/mixing Riparian drainage affected
	Pumping Station	Changed surface water runoff Changed flow velocities Changed magnitude of flooding Changed frequency of flooding Changed duration of flooding Convergence/divergence of flow Changed hydraulic roughness Regulated flow Low flows Wave - generation Reduce tidal flow/flushing/mixing Riparian drainage affected Changed flow regime
Channel Morphology/ Sediments	Reduction in river flow	Deposition/siltation Changed channel size Disturbance to bed forms (pools, riffles) Changed bed load
	Pumping Station	Changed bank/bed stability Degradation/erosion of bed or banks Deposition/siltation Change of bed slope Change of planform/pattern Disturbance to bed forms (pools, riffles) Downstream erosion Changed channel size Changed turbidity Changed bed load
Groundwater Hydraulics	Reduction in river flow	Change in water-table (level)
	Pumping Station	Changed flow Changed infiltration Changed direction of flow Change in water-table (level) Barrier to flow Change in pressure potential Changed storage capacity

Issues	Sources of impact	Potential Impacts
Surface Water Quality	Reduction in river flow	Change in oxygen content Changed dilution capacity
	Pumping Station	Altered salinity Change in quality Chemical pollution Nutrient Enrichment Changed turbidity Microbial contamination Stratification Re-suspension of contaminated sediments Rubbish/trash Changed dilution capacity Organic pollution Change in residence/flushing time Change in oxygen content Change in electrical conductivity/pH/acidification Change in temperature
Aquatic Ecology	Reduction in river flow	Altered habitat Changed fish biomass Changed invertebrate biomass Changed species diversity Effect on fish behaviour Change in the fish community Effects on fish spawning Loss of sensitive species
	Pumping Station	Altered habitat Changed fish biomass Changed invertebrate biomass Changed plant biomass Changed species diversity Effect on fish behaviour Change in the fish community Fish kill Effects on fish spawning Disturbance of sensitive species Loss of rheophilic flora and fauna Barrier to mammals Loss of sensitive species
Terrestrial Ecology	Pumping	Changed habitat Disturbance of sensitive species
	Pumping Station	Altered habitat Tree removal Loss of wildlife habitat Wetland changes Change in plant biomass Change in animal biomass Changed riparian habitat Disturbance of sensitive species Changed species diversity

Issues	Sources of impact	Potential Impacts
	Reduction in river flow	Wetland changes Loss of wildlife habitat Changed species diversity
Human-Related	Reduction in river flow	Changed flood risk Changed water resource Disruption to water users Disruption to commercial navigation
	Pumping	Change in noise level Increased vibration
	Pumping station	Changed flood risk
Land Use Change	Reduction in river flow	Restriction to future developments
	Pumping station	Restriction to future developments Increased urban area
Visual Amenity	Reduction in river flow	Altered aesthetic value
	Pumping station	Altered aesthetic value
Recreation-Related	Reduction in river flow	Altered facilities Disruption to users of water environment Change in angling quality
	Pumping station	Alterations to access
Heritage & Archaeology	Reduction in river flow	Disturbance and damage of known/unknown features

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## REFERENCES

### NRA Documents

1994: Abstraction Licensing & Water Resources. A brief guide for potential abstractors. NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol.

1994: NRA Technical Guide: Assessing environmental impact in the NRA. NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol.

### External Publications

Drake, P.J., Sherriff, J.D.F. (1987) "A method for managing river abstractions and protecting the environment", in Journal of Water and Environmental Management, pp 27-38.

Wilkins, M. (1993) "Fishy goings on in Yorkshire", in Water Bulletin, No. 575, pp 10-11.

Construction Industry Research and Information Association (CIRIA), (1994) in Environmental Assessment: a guide to the identification and mitigation of environmental issues in construction schemes. CIRIA, 6 Storey's Gate, Westminster, London.

### Other relevant scoping guidance

Interbasin Transfer of flow  
Groundwater Abstraction  
Generic Impact of Construction

**Development Type: Points of Large Discharge**

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further guidance notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Surface Water Hydrology/Hydraulics	Discharge	Changed flow velocities Changed magnitude of flooding
	Pumping station	Changed surface water runoff Changed flow velocities Changed magnitude of flooding Changed frequency of flooding Changed duration of flooding Changed hydraulic roughness Regulated flow Wave - generation Riparian drainage affected Changed flow regime
Channel Morphology/ Sediments	Discharge	Degradation/erosion of bed and/or banks Changed channel size Deposition/siltation Changed turbidity Changed bed load Sediment contamination
	Pumping Station	Changed bank/bed stability Degradation/erosion of bed or banks Deposition/siltation Disturbance to bed forms (pools, riffles) Changed channel size Changed turbidity Changed bed load
Surface Water Quality	Discharge	Chemical pollution Organic pollution Altered salinity Change in quality Change in oxygen content Nutrient enrichment Changed turbidity Microbial contamination Re-suspension of contaminated sediments Rubbish/trash Change in temperature Change in electrical conductivity/pH/acidification

Issues	Sources of impact	Potential Impacts
	Pumping Station	<ul style="list-style-type: none"> <li>Altered salinity</li> <li>Change in quality</li> <li>Chemical pollution</li> <li>Nutrient Enrichment</li> <li>Changed turbidity</li> <li>Microbial contamination</li>   <li>Stratification</li> <li>Re-suspension of contaminated sediments</li> <li>Rubbish/trash</li> <li>Changed dilution capacity</li> <li>Organic pollution</li> <li>Change in residence/flushing time</li> <li>Change in oxygen content</li> <li>Change in electrical conductivity/pH/acidification</li> <li>Change in temperature</li> </ul>
Groundwater Quality	Discharge	Movement of contaminated water
Aquatic Ecology	Discharge	<ul style="list-style-type: none"> <li>Altered habitat</li> <li>Changed fish biomass</li> <li>Changed invertebrate biomass</li> <li>Changed plant biomass</li> <li>Loss of rheophilic flora &amp; fauna</li> <li>Changed species diversity</li> <li>Effect on fish behaviour</li> <li>Change in the fish community</li> <li>Fish kill</li> <li>Effects on fish spawning</li> <li>Disturbance of sensitive species</li> <li>Loss of sensitive species</li> </ul>
	Pumping Station	<ul style="list-style-type: none"> <li>Altered habitat</li> <li>Changed fish biomass</li> <li>Changed invertebrate biomass</li> <li>Changed plant biomass</li> <li>Changed species diversity</li> <li>Effect on fish behaviour</li> <li>Change in the fish community</li> <li>Effects on fish spawning</li> <li>Disturbance of sensitive species</li> <li>Loss of rheophilic flora and fauna</li> <li>Barrier to mammals</li> <li>Loss of sensitive species</li> </ul>
Terrestrial Ecology	Discharge	<ul style="list-style-type: none"> <li>Wetland changes</li> <li>Change in plant biomass</li> <li>Change in animal biomass</li> <li>Changed species diversity</li> </ul>

Issues	Sources of impact	Potential Impacts
	Pumping Station	Altered habitat Tree removal Loss of wildlife habitat Wetland changes Change in plant biomass Change in animal biomass Changed riparian habitat Disturbance of sensitive species Changed species diversity
Human-Related	Discharge	Adverse odour Health risks Nuisances Changed flood risk Changed water resource
	Pumping	Change in noise levels Increased vibration
	Pumping Station	Changed flood risk
Land Use Change	Discharge	Restriction to future developments
	Pumping Station	Restriction to future developments Increased urban area
Visual Amenity	Discharge	Altered aesthetic value
	Pumping station	Altered aesthetic value
Recreation-Related	Discharge	Altered facilities Disruption to users of water environment Change in angling quality Alterations to access
	Pumping Station	Alterations to access
Heritage & Archaeology	Discharge	Disturbance and damage of known/ unknown features

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## REFERENCES

### NRA Documents

1994: Discharge Consents & Compliance. The NRA's approach to control of discharges to water WQ.17.

1994: NRA Technical Guide: "Assessing Environmental Impact in the NRA". NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol.

### External Publications

International Atomic Energy Agency (1971) "Disposal of Radioactive Wastes into Rivers, Lakes and Estuaries", in Safety Series, No. 36, Vienna.

Fraser, J.C. (1972) "Regulated Discharge and the Stream Environment", in Oglesby, R.T., et al (eds) River Ecology and Man, pp 263-86, Academic Press, New York, USA.

Hawkes, F.B. (1974) "Heated Discharges from Thermal Power Stations", in Effluent Water Treatment Journal, 14, No. 10, pp 549-553 and 555-559.

Construction Industry Research and Information Association (CIRIA), (1994) in Environmental Assessment: a guide to the identification and mitigation of environmental issues in construction schemes. CIRIA, 6 Storey's Gate, Westminster, London.

### Other relevant scoping guidance

Pipelines

Interbasin Transfer of Flow

Generic Impacts of Construction

Large Industrial/Manufacturing Development

**Development Type: Sewage treatment works (extension and installation)**

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further Guidance Notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Surface Water Hydrology/Hydraulics	Buildings/tanks/car parks	<ul style="list-style-type: none"> <li>Changed surface water runoff</li> <li>Changed flow velocities</li> <li>Changed magnitude of flooding</li> <li>Changed frequency of flooding</li> <li>Changed duration of flooding</li> <li>Riparian drainage affected</li> <li>Changed hydraulic roughness</li> </ul>
	Discharge	<ul style="list-style-type: none"> <li>Changed flow velocity</li> </ul>
Channel Morphology/ Sediments	Discharge/storm overflow	<ul style="list-style-type: none"> <li>Degradation/erosion of bed and/or banks</li> <li>Deposition/siltation</li> <li>Changed channel size</li> <li>Changed suspended sediment load</li> <li>Changed bed load</li> </ul>
	Buildings/tanks/carparks	<ul style="list-style-type: none"> <li>Changed infiltration</li> <li>Changed direction of flow</li> <li>Change in water-table (level)</li> <li>Barrier to flow</li> </ul>
Groundwater Hydraulics	Sludge disposal/tertiary treatment in unlined ponds	<ul style="list-style-type: none"> <li>Change in water-table (level)</li> </ul>
	Construction	<ul style="list-style-type: none"> <li>Chemical pollution</li> <li>Re-suspension of contaminated sediments</li> <li>Organic pollution</li> </ul>
Surface Water Quality	Discharge	<ul style="list-style-type: none"> <li>Chemical pollution</li> <li>Change in oxygen content</li> <li>Eutrophication</li> <li>Changed turbidity</li> <li>Microbial contamination</li> <li>Stratification</li> <li>Rubbish/trash</li> <li>Organic pollution</li> </ul>
	Treatment upgraded	<ul style="list-style-type: none"> <li>Change in quality</li> <li>Changed dilution capacity</li> <li>Changed turbidity</li> </ul>
	Maintenance/spills	<ul style="list-style-type: none"> <li>Chemical pollution</li> <li>Organic pollution</li> </ul>

Issues	Sources of impact	Potential Impacts
	Sludge disposal to land (runoff)	Organic pollution Eutrophication Microbial contamination
	Sludge incineration	Change in pH (acidification)
	Sludge disposal to sea	Organic pollution Eutrophication Microbial contamination Chemical pollution
Groundwater Quality	Spills	Chemical pollution Organic pollution
	Sludge disposal to land	Chemical pollution Microbial contamination Organic pollution
Aquatic Ecology	Construction and discharge	Altered habitat Changed fish biomass Changed plant biomass Changed plant biomass Changed species diversity Change in the fish community Barrier to fish migration Fish kill Effects on fish spawning Loss of sensitive species Changed invertebrate biomass
	Upgrade to works/tertiary reed bed or pond treatment	Altered habitat Changed invertebrate biomass Loss of sensitive species
Terrestrial Ecology	Operations	Changed habitat Loss of wildlife habitat Disturbance of sensitive species
	Reed beds	Changed habitat Wetland changes Changed riparian habitat
	Percolating filters	Changed habitat
	Sludge to land	Changed habitat
Human-Related	Discharge	Changed water resource Adverse odour Nuisances Health risks

Issues	Sources of impact	Potential Impacts
	Pumping	Change in noise levels Increased vibration
	Operations	Adverse odour Disrupted access Improved safety Nuisances
	Sludge transport and disposal to land	Change in noise levels Increased vibration Nuisances Health risks
Land Use Change	Buildings and works	Increased urban area Loss of riparian land Restriction to future developments
	Sludge disposal to land	Restriction to future development
	Site	Increased urban area
Visual Amenity	Discharge	Altered aesthetic value
	Buildings and works	Altered aesthetic value
Recreation-Related	Buildings and works	Alteration to access Change in angling quality Disruption to water users
	Discharge	Altered facilities
Heritage & Archaeology	Buildings and works	Disturbance and damage of known/unknown features Change to historic landscape

## REFERENCES

### NRA Documents

1994: Discharge Consents and Compliance. The NRA's approach to control of discharges to water - WQ.17., NRA, Bristol, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 2UD.

Pollution Prevention Guidance 1. General Guide to the Prevention of Pollution of Controlled Waters, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol BS1 2UD.

### External Publications

Antonucci, D.C., and Schaumburg, F.D. (1975) "Environmental effects of advanced waste-water treatment at South Lake, Tahoe", in Journal of Water Pollution Control Federation, 47, No. 11. pp 2694-2701.

Powlesland, C., and Frost, R. (1990) A methodology for undertaking BPEO studies of sewage sludge treatment and disposal, WRc plc, Report No. PRD, 2305 - M/I.

Barron, J. (1993) Waste Management, in Environmental Assessment: a guide to the identification, evaluation and mitigation of environmental issues in construction schemes. Pre-publication draft, Construction Industry Research and Information Association (CIRIA), 6 Storey's Gate, Westminster, London.

### Other relevant scoping guidance

Pipelines  
Points of Large Discharge  
Septic Tanks/Cesspits etc  
Chemical Storage Units  
Generic Impacts of Construction  
Channel Works

**Development Type: Large Residential Developments**

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further Guidance Notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Surface Water Hydrology/Hydraulics	Buildings/car parks	Changed surface water runoff Changed flow velocity Changed frequency of flooding Changed magnitude of flooding Changed flow regime Riparian drainage affected
	Balancing/ornamental ponds	Riparian drainage affected Regulated/controlled flow
Channel Morphology/ Sediments	Buildings/car parks/ storm drains and overflows Landscaping	Deposition/siltation Degradation, erosion of bed and/or banks Changed bank/bed stability Changed channel size
Groundwater Hydraulics	Buildings/carparks	Changed infiltration Change in water-table (level) Barrier to flow Change in pressure potential
Surface Water Quality	Buildings/car parks/ Increased sewage discharges/storm overflows	Organic pollution Chemical pollution Change in oxygen content Nutrient enrichment Changed turbidity Microbial contamination Rubbish/trash Changed dilution capacity
	Balancing/ornamental ponds	Changed turbidity Changed dilution capacity Changed water quality
	Garden/vehicle maintenance	Chemical pollution Organic pollution
Groundwater Quality	Garden/vehicle maintenance (runoff)	Chemical pollution Organic pollution
	Increased sewage discharges/storm overflows	Organic pollution Chemical pollution

Issues	Sources of impact	Potential Impacts
Aquatic Ecology	Buildings/car parks (runoff)/ Increased sewage discharges/storm overflows/ Garden vehicle maintenance	Altered habitat Changed fish biomass Changed invertebrate biomass Changed plant biomass Changed species diversity Fish kill Change in the fish community Barrier to fish migration Effects on fish spawning Loss of sensitive species
	Balancing/ornamental ponds	Altered habitat Changed fish biomass Changed invertebrate biomass Changed plant biomass Change in the fish community Changed species diversity
	Culverts	Barrier to fish migration Barrier to mammals Loss of habitat Change in invertebrate biomass Loss of sensitive species
	Buildings/car parks	Loss of wildlife habitat Altered severance habitat
Terrestrial Ecology	Traffic	Disturbance of sensitive species
	Balancing/ornamental lakes/ Landscaping	Wetland changes Altered habitat Illegal species imported Altered habitat
Human-Related	Buildings/car parks (runoff)	Adverse odour Changed flood risk
	Balancing/ornamental lakes	Adverse odour Health risk Safety risk Nuisance Changed flood risk
	Traffic	Change in noise levels Disrupted access
Land Use Change	Development	Increased urban area Deforestation Loss of riparian land Development of floodplain
	Landscaping	Afforestation

Issues	Sources of impact	Potential Impacts
Visual Amenity	Runoff/culverts	Altered aesthetic value
	Buildings/car parks	Altered aesthetic value
	Balancing/ornamental lakes	Altered aesthetic value
	Buildings/car parks/ Balancing/ornamental lakes	Altered aesthetic value
	Buildings/car parks and associated development	Altered aesthetic value
Recreation-Related	Balancing/ornamental lakes	Altered facilities
	Heritage & Archaeology	Development

## REFERENCES

### NRA Documents

Pollution Prevention Guidance Notes 15 - Retail Premises, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 2UD.

Pollution Prevention Guidance Notes 16 - Schools and other Educational Establishments, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 2UD.

Pollution Prevention Guidance Notes 7 - Fuelling Stations, Construction and Operation, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 2UD.

Pollution Prevention Guidance Notes 2 - Garages, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 2UD.

### External Publications

Rack, C. (1989) "Decision criteria of drainage systems in built-up areas with special references to the protection of quality of natural waters and the use of alternative methods", in Technische Universität of Berlin, IWAWI, Report No. 114.

Renger, M. (1994) Built Development, in Environmental Assessment: a guide to the identification, and mitigation of environmental issues in construction schemes. Construction Industry Research and Information Association (CIRIA), 6 Storey's Gate, Westminster, London.

Mikkelsen, P.S. et al (1994) "Pollution from Urban Stormwater Infiltration", in Water Science & Technology, 29, No. 1/2, pp 293-302.

### Other essential scoping guidance

Roads and Road Widening  
Pipelines  
Generic Impact of Construction

### Other relevant scoping guidance

Redevelopment of Contaminated Land (if applicable)  
Flood Storage Areas  
Culverts and Tunnels  
Sewage Treatment Works  
Channel Works

**Development Type: Large industrial/manufacturing developments and operations**

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further guidance notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Surface Water Hydrology/Hydraulics	Buildings/car parks (runoff)	<ul style="list-style-type: none"> <li>Changed surface water runoff</li> <li>Changed flow velocities</li> <li>Changed magnitude of flooding</li> <li>Changed frequency of flooding</li> <li>Changed duration of flooding</li> <li>Riparian drainage affected</li> <li>Changed flow regime</li> </ul>
	Abstraction	<ul style="list-style-type: none"> <li>Changed flow velocity</li> <li>Low flows</li> <li>Reduced tidal flow/flushing/mixing</li> </ul>
Channel Morphology/ Sediments	Buildings/car parks (runoff)	<ul style="list-style-type: none"> <li>Changed bank/bed stability</li> <li>Degradation/erosion of bed and/or banks</li> <li>Deposition/siltation</li> </ul>
	Abstraction	<ul style="list-style-type: none"> <li>Changed channel size</li> <li>Changed turbidity</li> <li>Changed bed load</li> </ul>
Groundwater Hydraulics	Buildings/car parks	<ul style="list-style-type: none"> <li>Changed infiltration</li> <li>Change in water table (level)</li> <li>Barrier to flow</li> <li>Change in pressure potential</li> </ul>
	Abstraction	<ul style="list-style-type: none"> <li>Change in water-table (level)</li> </ul>
Surface Water Quality	Buildings/car parks/spills/ leaks/discharges/development of contaminated land	<ul style="list-style-type: none"> <li>Chemical pollution</li> <li>Altered salinity</li> <li>Change in oxygen content</li> <li>Nutrient enrichment</li> <li>Changed turbidity</li> <li>Stratification</li> <li>Microbial contamination</li> <li>Re-suspension of contaminated sediments</li> <li>Rubbish/trash</li> <li>Changed dilution capacity</li> <li>Organic pollution</li> </ul>
	Abstraction	<ul style="list-style-type: none"> <li>Changed dilution capacity</li> </ul>
Groundwater Quality	Spills/leaks/development of contaminated land	<ul style="list-style-type: none"> <li>Movement of contaminated water</li> <li>Chemical pollution</li> <li>Organic pollution</li> </ul>
	Abstraction	<ul style="list-style-type: none"> <li>Saline intrusion</li> </ul>

Issues	Sources of impact	Potential Impacts
Aquatic Ecology	Buildings/car parks/ spills/discharge	Altered habitat Changed fish biomass Changed invertebrate biomass Changed plant biomass Changed species diversity Change in the fish community Fish kill Effects on fish spawning Loss of sensitive species
	Emissions	Change in pH (acidification) Changed invertebrate biomass Loss of sensitive species
	Abstraction	Altered habitat Changed invertebrate biomass Loss of sensitive species
Terrestrial Ecology	Buildings/roads/ car parks and associated development	Loss of wildlife habitat Changed habitat Severance of habitat
	Operations	Altered habitat Loss of wildlife habitat Disturbance of sensitive species
	Emissions	Change in pH (acidification)
Human-Related	Buildings/roads/car parks	Changed flood risk Changed water resource
	Discharges	Adverse odour Health risks
	Abstraction/runoff/discharge	Changed water resource
	Operations/ transport	Change in noise levels Increased vibration Disrupted access Health risks Nuisances
Land Use Change	Buildings/roads/car parks and associated development	Increased urban area Loss of riparian land Development of floodplain
	Emissions	Restriction to future development Change in grade of agricultural land
Visual Amenity	Discharge	Altered aesthetic value
	Buildings	Altered aesthetic value Altered landscape

Issues	Sources of impact	Potential Impacts
Recreation-Related	Buildings	Alterations to access
	Discharges	Altered facilities Disruption to users of the water environment Change in angling quality
Heritage & Archaeology Development		Disturbance and damage of known/unknown features Change to historic landscape

## REFERENCES

### NRA Documents

Pollution Prevention Guidance 1, General Guide to the Prevention of Pollution of Controlled Waters, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 2UD

Pollution Prevention Guidance 21, Timber Treatment Plants, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 2UD

Pollution Prevention Guidance 11, Industrial Sites, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 2UD

Pollution Prevention Guidance 18, Spillage and Firefighting Runoff, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 2UD

Pollution Prevention guidance 13, Guidance Note on the Use of High Pressure Water and Steam Cleaners, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 2UD

1994: Discharge Consents and Compliance. The NRA's, Approach to Control of Discharges to Water, WQ.17, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol.

### External Publications

Sundaresan, B.B., and Raman, V. (1983) "Environmental impact analysis for siting of industries", in Indian Journal of Environmental Health, 25, No. 1, pp 1-14.

Owen, J.W. (1991) "The hazard assessment of pulp and paper effluents in the aquatic environment: a review", in Environmental Toxicology and Chemistry, 10, No. 12, pp 1511-1540.

Mason, D. (1994) "Easing the drain on water resources", in Surveyor, 1994, 181, No. 5286, pp 10-11.

Renger, M. (1994) Built Development in Environmental Assessment: a guide to the identification and mitigation of environmental issues in construction schemes. CIRIA, 6 Storey's Gate, Westminster, London.

### Other relevant scoping guidance

Generic Impacts of Construction Works

Roads and Road Widening

Points of Large Abstraction

Large Residential Developments

Pipelines

Re-development of Contaminated Land (where appropriate)

Chemical Storage Units

Culverts and Tunnels

Channel Works

Sewage Treatment Works

**Development Type: Golf Courses**

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further guidance notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Surface Water Hydrology/Hydraulics	Club house, car park, drainage & landscaping (including maintainance)	Changed surface water runoff Changed flow velocities Changed duration of flooding Changed frequency of flooding Changed magnitude of flooding Changed flow regime
	Off stream lakes	Changed surface water runoff Changed flow velocities Changed duration of flooding
	On-stream lakes	Excessive evaporation (low flows)
	Abstraction	Low flows
	Drainage/lakes	Riparian drainage affected
Channel Morphology/ Sediments	Club house, car park, drainage and landscaping	Changed bank/bed stability Degradation/erosion of bed and/or banks Deposition/siltation Change of bed slope Disturbance to bed forms (pools, riffles) Changed suspended sediment load Changed bed load
	In stream lakes	Changed channel size Changed suspended sediment load
Groundwater Hydraulics	Drainage/lakes	Changed infiltration Change in water-table (level)
Surface Water Quality	Club house, car parks, drainage and landscaping	Organic pollution Changed turbidity Chemical pollution
	Maintenance	Organic pollution Chemical pollution Nutrient enrichment
	In stream lakes	Nutrient enrichment Change in oxygen content
	Abstraction/offstream lakes	Changed dilution capacity

Issues	Sources of impact	Potential Impacts
Groundwater Quality	Club house, car park, drainage and landscaping (including maintenance)	Organic pollution Chemical pollution
Aquatic Ecology	Club house, car park, drainage and landscaping (including maintenance)	Altered habitat Tree removal Changed plant biomass Changed fish biomass Changed riparian habitat Changed invertebrate biomass Fish kill Disturbance/loss of sensitive species Changed species diversity
	Instream lakes/structures	Change in the fish community Barrier to fish migration Changed invertebrate biomass Loss of sensitive species
	Offstream lakes	Altered habitat Changed plant biomass Changed fish biomass Changed invertebrate biomass Changed species diversity
	Golf play	Altered habitat Disturbance of sensitive species Changed invertebrate biomass
	Drainage/lakes	Wetland changes Changed invertebrate biomass Loss of sensitive species
Human-Related	Drainage/lakes	Changed flood risk
	Abstraction	Changed water resource
Land Use Change	Club house, car park, drainage and landscaping	Disrupted access
	Club house, car park, drainage and landscaping	Increased urban area Development of floodplain Change in grade of agricultural land
Visual Amenity	Club house, car park, drainage and landscaping	Altered aesthetic value Altered landscape
Recreation-Related	Club house, car park, drainage and landscaping	Alterations to access Disruption to users of water environment Altered facilities
	Landscaping/lakes/drainage	Change in angling quality

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Issues	Sources of impact	Potential Impacts
Heritage & Archaeology	Club house, car park, drainage and landscaping	Change to historic landscape

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## REFERENCES

### NRA Documents

Pollution Prevention Guidance 1 - General Guide to the Prevention of Pollution of Controlled Waters, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 2UD

### External Publications

Stone, R. (1963) "Waste water reclaimed for golf course use", in Public Works, New York, 94, No. 3, pp 88-90.

Ministry of Agriculture, Fisheries and Food (1985) Guidelines for the use of herbicides on weeds in or near to watercourses and lakes. MAFF, London.

Arent, K.A. (1989) "The creation of a park", in Public Works, New York, 120, No. 6, pp 58-60.

Nature Conservancy Council (1990) On course conservation: Managing golf's natural heritage. English Nature, Peterborough.

Construction Industry Research and Information Association (CIRIA) (1994) Environmental Assessment: A Guide to the identification and mitigation of environmental issues in construction schemes. CIRIA, 6 Storey's Gate, Westminster, London

### Other relevant scoping guidance

Off-line Reservoirs and Ponds  
Points of Large Abstraction  
General Impacts of Construction Works  
Channel Works  
Vegetation Management

**Development Type: Power stations (excl. hydroelectric and wind generation)**

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further guidance notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Surface Water Hydrology/Hydraulics	Buildings/roads/railways/ fuel/waste storage/disposal areas	Changed surface water runoff Changed flow velocities Changed magnitude of flooding Changed duration of flooding Changed frequency of flooding
	Abstraction	Changed flow velocities Low flows Reduced tidal flow/flushing/mixing
	Discharge	Changed flow velocities
Channel Morphology/ Sediments	Buildings/roads/railways/ fuel/waste storage/disposal areas	Changed turbidity Deposition/siltation Changed bed load Degradation/erosion of bed and/or banks Changed bank/bed stability
Groundwater Hydraulics	Buildings/roads/railways/ fuel/waste storage/disposal areas	Changed infiltration Change in water-table (level) Barrier to flow Change in pressure potential
Surface Water Quality	Buildings/roads/railways/ fuel/waste storage/disposal areas	Organic pollution Altered salinity Chemical pollution Change in oxygen content Changed turbidity Microbial contamination Re-suspension of contaminated sediments Rubbish/trash
	Discharge	Organic pollution Altered salinity Chemical pollution Change in oxygen content Changed turbidity Microbial contamination Stratification Re-suspension of contaminated sediments Rubbish/trash Change in temperature

Issues	Sources of impact	Potential Impacts
	Fuel/waste transport	Organic pollution Chemical pollution
	Emissions to air	Change in pH (Acidification)
Groundwater Quality	Buildings/roads/railways/ fuel/waste storage//disposal areas	Organic pollution Chemical pollution
Aquatic Ecology	Fuel/Waste/transport	Organic pollution Chemical pollution
	Discharge	Altered habitat Changed invertebrate biomass Changed plant biomass Changed species diversity Effect on fish behaviour Change in the fish community Fish kill Effects on fish spawning Loss of sensitive species
	Abstraction	Fish kill Changed invertebrate biomass Loss of sensitive species
	Emissions to air	Change in pH (acidification) Loss of sensitive species Changed invertebrate biomass
	Buildings/roads/fuel/waste storage/disposal areas	Altered habitat Changed fish biomass Changed invertebrate biomass Changed plant biomass Changed species diversity Effect on fish behaviour Change in the fish community Fish kill Effects on fish spawning Disturbance of sensitive species Loss of rheophilic flora and fauna Barrier to mammals Loss of sensitive species
	Balancing/cooling lagoons	Altered habitat Changed invertebrate biomass Loss of sensitive species

Issues	Sources of impact	Potential Impacts
Terrestrial Ecology	Buildings/roads/fuel/waste storage/transport, pipelines, cables, lighting, operation	<ul style="list-style-type: none"> <li>Changed habitat</li> <li>Loss of wildlife habitat</li> <li>Disturbance of sensitive species</li> <li>Change in plant biomass</li> <li>Change in animal biomass</li> <li>Changed species diversity</li> </ul>
	Emissions	<ul style="list-style-type: none"> <li>Loss of sensitive species</li> <li>Tree removal</li> </ul>
	Balancing/cooling lagoons	<ul style="list-style-type: none"> <li>Wetland changes</li> </ul>
Human-Related	Abstraction	<ul style="list-style-type: none"> <li>Changed water resource</li> </ul>
	Balancing/cooling lagoons	<ul style="list-style-type: none"> <li>Nuisances</li> </ul>
	Discharge	<ul style="list-style-type: none"> <li>Changed flood risk</li> </ul>
	Emissions	<ul style="list-style-type: none"> <li>Nuisances</li> <li>Health risks</li> <li>Adverse odour</li> <li>Disrupted access</li> </ul>
	Operations/Fuel/waste transport	<ul style="list-style-type: none"> <li>Change in noise levels</li> <li>Increased vibration</li> <li>Adverse odour</li> <li>Disrupted access</li> <li>Health risks</li> </ul>
Land Use Change	Buildings/roads/railways/fuel/waste storage/disposal areas	<ul style="list-style-type: none"> <li>Development of floodplain</li> <li>Increased urban area</li> </ul>
Visual Amenity	Buildings/roads/railways/fuel/waste storage/disposal areas	<ul style="list-style-type: none"> <li>Altered aesthetic value</li> <li>Altered landscape</li> </ul>
Recreation-Related	Site and operations	<ul style="list-style-type: none"> <li>Alterations to access</li> </ul>
	Balancing/cooling lagoons	<ul style="list-style-type: none"> <li>Change in angling quality</li> </ul>
Heritage & Archaeology	Buildings/roads, Operations and Emissions	<ul style="list-style-type: none"> <li>Disturbance and damage of known/unknown features</li> <li>Change to historic landscape</li> </ul>

Notes:

Further impacts may occur in the decommission of power stations

## REFERENCES

### NRA Documents

March 1994: Discharge Consents & Compliance - WQ.17., NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol.

### External Publications

Markowski, S. (1959) "The cooling water of power stations: a new factor in the environment of marine and freshwater invertebrates", in Animal Ecology, 28, pp 243-258.

Langford, T.E. (1983) Electricity Generation and the Ecology of Natural Waters. Liverpool University Press.

Miller, D.S., and Brighthouse, B.A. (1984) "Thermal discharges: a guide to power and process plants cooling water discharges into rivers, lakes and seas", in British Hydromechanics Research Association.

Department of the Environment/Welsh Office (1991) Integrated Pollution Control: A practical guide. HMSO, London.

Ferrary, C. (1993) Linear Development, in Environmental Assessment: a guide to the identification, evaluation and mitigation of environmental issues in construction schemes. Pre-publication draft, Construction Industry Research and Information Association (CIRIA), 6 Storey's Gate, Westminster, London.

### Other relevant scoping guidance

Points of Large Discharge  
Points of Large Abstraction  
Waste Mangement  
Hydro Electric Power Schemes  
Generic Impacts of Construction  
Pipelines

**Development Type: Windfarms**

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further Guidance Notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Surface Water Hydrology/Hydraulics	Construction and use of haul and access roads	Changed surface water runoff Changed flow velocities Changed magnitude of flooding Changed frequency of flooding Changed duration of flooding Changed hydraulic roughness Riparian drainage affected Changed flow regime
	Construction and operation of substations and transformers	Changed surface water runoff Changed flow velocities Changed magnitude of flooding Changed frequency of flooding Changed duration of flooding Changed hydraulic roughness Riparian drainage affected Changed flow regime
	Cable laying	Changed surface water runoff Changed flow velocities Changed magnitude of flooding Changed frequency of flooding Changed duration of flooding Changed hydraulic roughness Riparian drainage affected Changed flow regime
Channel Morphology/ Sediments	Construction and use of haul and access roads	Deposition/siltation Changed turbidity Changed bed load
	Cable laying	Deposition/siltation Changed turbidity Changed bed load
Ground Water Hydraulics	Haul and access roads, cable laying	Changed flow Changed infiltration Changed direction of flow Change in water-table (level) Barrier to flow Change in pressure potential Changed storage capacity

Issues	Sources of impact	Potential Impacts
Surface Water Quality	Cable laying and road use	Organic pollution Change in quality Chemical pollution Changed turbidity Re-suspension of contaminated sediments Rubbish/trash Changed dilution capacity
	Operations and site maintenance	Organic pollution Chemical pollution
Ground Water Quality	Operations and site maintenance	Organic pollution Chemical pollution
Aquatic Ecology	Cable laying and road use	Altered habitat Changed fish biomass Changed invertebrate biomass Changed plant biomass Changed species diversity Effect on fish behaviour Change in the fish community Fish kill Effects on fish spawning Disturbance of sensitive species Loss of rheophilic flora and fauna Barrier to mammals Loss of sensitive species
Terrestrial Ecology	Cable laying and road use	Altered habitat Tree removal Loss of wildlife habitat Wetland changes Change in plant biomass Change in animal biomass Changed riparian habitat Disturbance of sensitive species Changed species diversity
Human-Related	Operations	Change in noise levels Increased vibration
Visual Amenity	Operations	Altered aesthetic value Altered landscape
Heritage & Archaeology	Structure/operations	Change to historical landscape

## REFERENCES

### NRA Documents

### External Publications

Countryside Commission (1991) "Wind Energy Development and the Landscape", Technical Report.

Taylor, D.A., and Rand, M. (1991) "How to plan the nuisance out of wind energy", in Town and Country Planning, May, 152.

Department of the Environment/Welsh Office (1993) Planning Policy Guidance Note: Renewable Energy. HMSO, London.

English Nature (1994) Nature Conservation Guidelines for Renewable Energy Projects. English Nature, Peterborough.

Department of Trade & Industry (1992) Planning Policy Guidance Note: Cross County Pipelines, HMSO, London.

Hinson, P(1994) Environmental Assessment for Windfarms in 5th Annual Conference on Advances in Environmental Impact Assessment Documentation 24/25 November 1994, organised by IBC Technical Services Ltd, Gilmoora House, 5761 Mortimer St London WIN 8JX.

Robson A. (1994) Electricity Generation in Environmental Assessment: A guide to the identification and mitigation of environmental issues in construction schemes. Construction Industry Research and Information Association (CIRIA) CIRIA, 6 Storey's Gate, Westminster, London.

### Other relevant scoping guidance

Generic Impacts of Construction  
Hydro Electric Power Schemes  
Power Stations  
Roads and Road Widening  
Pipelines

## Development Type: Hydroelectric Power

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further guidance notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Surface Water Hydrology/Hydraulics	Impoundment	<ul style="list-style-type: none"> <li>Changed surface water runoff</li> <li>Changed flow velocities</li> <li>Changed magnitude of flooding</li> <li>Changed frequency of flooding</li> <li>Changed duration of flooding</li> <li>Riparian drainage affected</li> </ul>
	Impounding structure	<ul style="list-style-type: none"> <li>Changed surface water runoff</li> <li>Changed hydraulic roughness</li> <li>Riparian drainage affected</li> </ul>
	Release regime	<ul style="list-style-type: none"> <li>Changed flow regimes</li> <li>Changed flow velocities</li> <li>Changed magnitude of flooding</li> <li>Changed frequency of flooding</li> <li>Changed duration of flooding</li> <li>Regulated flow</li> <li>Low flows</li> <li>Wave/generation</li> </ul>
Channel Morphology/ Sediments	Impoundment	<ul style="list-style-type: none"> <li>Changed bank/bed stability</li> <li>Degradation/erosion of bed or banks</li> <li>Deposition/siltation</li> <li>Change of bed slope</li> <li>Disturbance to bed forms (pools, riffles)</li> <li>Changed turbidity</li> <li>Changed bed load</li> </ul>
Groundwater Hydraulics	Impoundment	<ul style="list-style-type: none"> <li>Changed flow</li> <li>Change in water-table (level)</li> <li>Change in pressure potential</li> </ul>
	Impounding structure	<ul style="list-style-type: none"> <li>Changed infiltration</li> <li>Barrier to flow</li> <li>Change in pressure potential</li> <li>Changed storage capacity</li> </ul>
	Release regime	<ul style="list-style-type: none"> <li>Changed bank/bed stability</li> <li>Degradation/erosion of bed and/or bank</li> <li>Deposition/siltation</li> <li>Changed channel size</li> <li>Changed turbidity</li> <li>Changed bed load</li> <li>Downstream erosion</li> </ul>

Issues	Sources of impact	Potential Impacts
Surface Water Quality	Impoundment	Change in quality Chemical pollution Stratification Rubbish/trash Changed dilution capacity Change in residence/flushing time Change in oxygen content Change in electrical conductivity/pH/acidification
	Release regime	Change in oxygen content Changed turbidity Changed dilution capacity
Aquatic Ecology	Impoundment	Altered habitat Effect on fish behaviour Barrier to fish migration Effects on fish spawning Disturbance of sensitive species Barrier to mammals Loss of sensitive species
	Impounding structure	Altered habitat Changed plant biomass Barrier to fish migration Disturbance of sensitive species Barrier to mammals Loss of sensitive species
	Release regime	Altered habitat Changed fish biomass Changed invertebrate biomass Changed plant biomass Effect on fish behaviour Change in the fish community Barrier to fish migration Effects on fish spawning Disturbance of sensitive species Changed species diversity
Terrestrial Ecology	Maintenance and operational activity/ turbines/pumps	Altered habitat Disturbance of sensitive species
	Impoundment	Changed surface water runoff Changed flow velocities Changed magnitude of flooding Changed frequency of flooding Changed duration of flooding Riparian drainage affected
	Impounding structure	Changed surface water runoff Changed hydraulic roughness Riparian drainage affected

Issues	Sources of impact	Potential Impacts
	Release regime	Wetland changes Disturbance of sensitive species
	Pipelines/cables	Loss of wildlife habitat
Human-Related	Maintenance and operational activity/ turbines/pumps	Change in noise levels Increased vibration
Human-Related	Impoundment	Adverse odour Disrupted access Health risks Changed flood risk Flooding
	Impounding structure	Disrupted access Changed flood risk
	Release regime	Disrupted access Health and safety risks Changed water resource Disruption to commercial navigation
Land Use Change	Impoundment	Loss of riparian land Change in grade of agricultural land Restriction to future developments Development of floodplain
	Impounding structure	Loss of riparian land Restriction to future developments Development of floodplain
Visual Amenity	Impoundment	Altered aesthetic value Altered landscape
	Impounding structure	Altered aesthetic value Altered landscape
Recreation-Related	Impoundment	Alterations to access Change in angling quality Disruption to users of water environment Changed boat use
	Impounding structure	Alterations to access Altered facilities Disruption to users of water environment
	Release regime	Disrupted access Altered facilities Disruption to users of water environment Change in angling quality Alterations to access

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Issues	Sources of impact	Potential Impacts
Heritage & Archaeology	Impoundment	Disturbance and damage of known/unknown features Change to historic landscape
	Impounding structure	Disturbance and damage of known/unknown features Change to historic landscape
	Release regime	Disturbance and damage of known/unknown features

## REFERENCES

### NRA Documents

Hydropower - a handbook for NRA staff. NRA (Severn Trent), Sapphire East, 550 Streetsbrook Road, Solihull, West Midlands.

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### External Publications

Hydropower Development. Series of volumes published by Norwegian Institute of Technology, Division of Hydraulic Engineering, NRA, Box 173 Kjelsas 0411, Oslo, Norway.

Grover, B., Primus, C. (1981) "Investigating whether a large hydro development can be environmentally compatible: The slave river hydro feasibility study", in Canadian Water Resources Journal, 6, No. 3, pp 47-62.

Department of the Environment/Welsh Office Planning Policy Guidance Note on Renewable Energy. PPG 22. HMSO.

Robson, A. (1994), in Environmental Assessment: A guide to the identification and mitigation of environmental issues in construction schemes. Construction Industry Research and Information Association (CIRIA)CIRIA, 6 Storey's Gate, Westminster, London.

### Other relevant scoping guidance

Barriers/Bridges/Weirs

Pipelines

Channel Works

Generic Impacts of Construction

Points of Large Abstraction

**Development Type: Oil Refineries/Oil Exploration**

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further Guidance Notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Surface Water Hydrology/Hydraulics	Buildings, roads, storage tanks	Changed surface water runoff Changed flow velocities Changed magnitude of flooding Changed frequency of flooding Changed duration of flooding Convergence/divergence of flow Changed hydraulic roughness Regulated flow Low flows Wave - generation Reduce tidal flow/flushing/mixing Riparian drainage affected Changed flow regime
	Shipping, drilling	Changed turbidity Changed bed load Changed bed/bank stability
Channel Morphology/ Sediments	Buildings, roads, storage tanks	Changed turbidity Deposition/siltation Changed bed load
	Shipping, drilling	Changed turbidity Changed bed load Changed bed/bank stability
Groundwater Hydraulics	Buildings, roads, storage tanks	Changed infiltration Change in water-table (level) Barrier to flow Changed pressure potential
Surface Water Quality	Buildings, roads, storage tanks	Organic pollution Altered salinity Chemical pollution Change in oxygen content Changed turbidity Change in quality Chemical pollution Re-suspension of contaminated sediments Changed dilution capacity Rubbish/trash
	Shipping/drilling	Chemical pollution Changed turbidity Rubbish/trash Organic pollution
	Spillage	Organic pollution Chemical pollution

Issues	Sources of impact	Potential Impacts
	Discharge	Organic pollution Altered salinity Chemical pollution Change in oxygen content Changed turbidity Change in quality Chemical pollution Re-suspension of contaminated sediments Changed dilution capacity Rubbish/trash
Groundwater Quality	Spillage	Organic pollution Chemical pollution
Aquatic Ecology	Buildings, roads, storage tanks, spillage, discharge	Altered habitat Changed fish biomass Changed invetebate biomass Changed plant biomass Changed species diversity Effect on fish behaviour Fish kill Loss of sensitive species Change in fish community Effects on fish spawning
Terrestrial Ecology	Refinery/drilling operations	Altered habitat Disturbance of sensitive species Changed riparian habitat
	Buildings, roads, storage tanks, dock facilities	Loss of wildlife habitat Changed riparian habitat Disturbance of sensitive species Changed species diversity
Human-Related	Refinery/drilling operations	Disruption to users of water environment Change in noise levels Increased vibration Disrupted access Health risks
	Buildings, roads, storage tanks, spillage	Changed water resource Disrupted access Changed flood risks
Land Use Change	Buildings, roads, storage tanks	Increased urban area
Visual Amenity	Buildings, roads, storage tanks, spillage	Altered aesthetic value Altered landscape
	Refinery, drilling rigs	Altered aesthetic value Altered landscape
Recreation-Related	Refinery	Alterations to access
	Oil rigs	Change in angling quality Disruption to users of water environment

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Issues	Sources of impact	Potential Impacts
Heritage & Archaeology	Refinery, drilling rigs	Disturbance and damage of known/unknown features Change to historical landscape

## REFERENCES

### NRA Documents

NRA Video: Pollution Prevention Pays, video offer, Freepost (BS4345). NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol.

Pollution Prevention Guidance 2, Above Ground Oil Storage Tanks, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 2UD.

Pollution Prevention Guidance 8, Safe Storage and Disposal of Used Oils, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 2UD.

NRA 1991 Policy & Practice for the Protection of Groundwater, ISBN 1873160372, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 2UD.

### External Publications

Davis, W.P. et al (1980) "Methodology for environmental assessment of oil and hazardous substance spills", in Helgolander Meeresuntersuchungen, 33, pp 246-256.

Menzie, C.A. (1982) "The environmental implications of offshore oil and gas activities", in Environmental Science & Technology, 16, No. 8, 454a-472a.

Renger, M. (1994) Built Development, Environmental Assessment: a guide to the identification and mitigation of environmental issues in construction schemes. Construction Industry Research and Information Association (CIRIA), 6 Storey's Gate, Westminster, London

### Other relevant scoping guidance

Generic Impacts of Construction  
Chemical Storage Units  
Tipping/Dumping  
Culverts and Tunnels  
Pipelines  
Points of Large Discharge

## Development Type: Afforestation

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further Guidance Notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Surface Water Hydrology/Hydraulics	Site preparation and ploughing	<ul style="list-style-type: none"> <li>Changed surface water runoff</li> <li>Changed magnitude of flooding</li> <li>Changed flow velocities</li> <li>Changed frequency of flooding</li> <li>Changed duration of flooding</li> <li>Changed flow regime</li> <li>Riparian drainage affected</li> </ul>
	Tree maturation	<ul style="list-style-type: none"> <li>Changed surface water runoff</li> <li>Changed magnitude of flooding</li> <li>Changed flow velocities</li> <li>Changed frequency of flooding</li> <li>Changed duration of flooding</li> <li>Changed flow regime</li> <li>Riparian drainage affected</li> </ul>
	Felling	<ul style="list-style-type: none"> <li>Changed surface water runoff</li> <li>Changed magnitude of flooding</li> <li>Changed flow velocities</li> <li>Changed frequency of flooding</li> <li>Changed duration of flooding</li> <li>Changed flow regime</li> <li>Riparian drainage affected</li> </ul>
Channel Morphology/ Sediments	<ul style="list-style-type: none"> <li>Site preparation/ploughing</li> <li>Tree maturation</li> <li>Felling</li> </ul>	<ul style="list-style-type: none"> <li>Changed bank/bed stability</li> <li>Degradation/erosion of bed or banks</li> <li>Deposition/siltation</li> <li>Changed turbidity</li> <li>Changed bed load</li> </ul>
Groundwater Hydraulics	<ul style="list-style-type: none"> <li>Site preparation/ploughing</li> <li>Tree maturation</li> </ul>	<ul style="list-style-type: none"> <li>Changed infiltration</li> <li>Changed in water-table (level)</li> </ul>
Surface Water Quality	Site preparation/ploughing	<ul style="list-style-type: none"> <li>Organic pollution</li> <li>Changed turbidity</li> <li>Rubbish/trash</li> </ul>
	Tree maturation	<ul style="list-style-type: none"> <li>Change in pH (acidification)</li> <li>Changed dilution capacity</li> <li>Changed temperature</li> </ul>
	Felling	<ul style="list-style-type: none"> <li>Change in pH (acidification)</li> <li>Nutrient enrichment</li> <li>Organic pollution</li> <li>Chemical pollution</li> <li>Changed turbidity</li> <li>Rubbish/trash</li> </ul>

Issues	Sources of impact	Potential Impacts
	Application of fertilisers/ pesticides	Chemical pollution Nutrient pollution Rubbish/trash
Groundwater Quality	Application of fertilisers/ pesticides	Chemical pollution
Aquatic Ecology	Site preparation/ploughing Tree maturation Application of pesticides Felling	Altered habitat Changed fish biomass Changed invertebrate biomass Changed plant biomass Changed species diversity Fish kill Effects on fish spawning Disturbance of sensitive species Barrier to mammals Changed species diversity
Terrestrial Ecology	Site preparation/ploughing Tree maturation	Wetland changes Changed riparian habitat Changed species diversity Disturbance of sensitive species Change in plant biomass Change in animal biomass
	Felling	Tree removal Changed habitat
	Application fertilisers/ pesticides	Disturbance of sensitive species Change in plant biomass Change in animal biomass
Human-Related	Site preparation/ploughing/ felling	Changed flood risk
	Tree maturation	Changed flood risk Changed water resource Disrupted access
Land Use Change	Site preparation/ploughing Tree maturation Felling	Altered aesthetic value Altered landscape
Visual Amenity	Site preparation Tree maturation Felling	Altered aesthetic value Altered landscape
Recreation-Related	Site preparation/ploughing Felling	Alterations to access
	Forest	Change in angling quality Altered facilities Disruption to users of water environment

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Issues	Sources of impact	Potential Impacts
Heritage & Archaeology	Afforestation	Disturbance and damage of known/unknown features Change to historic landscape

**Notes:**

Site preparation includes road construction

Ploughing includes other forms of ground preparation and drainage

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## REFERENCES

### NRA Documents

1994: Forestry Strategy, Draft Report, NRA Welsh Region, Rivers House, St Mellons Business Park, St Mellons, Cardiff.

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Forestry Commission (1993a) Consultation for Grant and Felling Applications, Forestry Commission, Edinburgh.

Forestry Commission (1993c) Environmental Assessment of New Woodlands, Forestry Commission, Edinburgh.

Construction Industry Research and Information Association (CIRIA) (1994), in Environmental Assessment: A guide to the identification and mitigation of environmental issues in construction schemes, CIRIA, 6 Storey's Gate, Westminster, London.

### Other relevant scoping guidance

**Deliberate Introduction of Species**

**Development Type: Redevelopment of Contaminated Land**

<b>Issues</b>	<b>Sources of impact</b>	<b>Potential Impacts</b>
Surface Water Hydrology/Hydraulics	Boreholes, earthworks, piling, site demolition	Changed surface water runoff Changed flow velocities Changed magnitude of flooding Changed frequency of flooding Changed duration of flooding Convergence/divergence of flow Changed hydraulic roughness Regulated flow Low flows Wave - generation Reduce tidal flow/flushing/mixing Riparian drainage affected Changed flow regime
Channel Morphology/	Earthworks	Contaminated sediment
Groundwater Hydraulics	Boreholes, earthworks, piling, site demolition	Changed infiltration Change in water-table (level) Changed flow
Surface Water Quality	Boreholes, earthworks, piling sit demolition, disposal of contaminated soil (Runoff, leachate)	Chemical pollution Organic pollution Change in oxygen content Changed turbidity Microbial contamination Re-suspension of contaminated sediments Rubbish/trash
Groundwater Quality	Boreholes, earthworks, piling, site demolition, disposal of contaminated soil (Runoff, leachate)	Movement of contaminated water Chemical pollution Organic pollution
Aquatic Ecology	Boreholes, earthworks, piling, site demolition, disposal of contaminated soil (Runoff, leachate)	Altered habitat Changed fish biomass Changed invertebrate biomass Changed plant biomass Changed species diversity Effect on fish behaviour Change in the fish community Fish kill Effects on fish spawning Disturbance of sensitive species Loss of rheophilic flora and fauna Barrier to mammals Loss of sensitive species

Issues	Sources of impact	Potential Impacts
Terrestrial Ecology	Boreholes, earthworks, piling, site demolition, disposal of contaminated soil (Runoff, leachate)	Changed habitat Loss of wildlife habitat Disturbance of sensitive species Westland changes Changed species diversity
Human-Related	Contaminants	Health risks  Nuisances Changed water resource
Land Use Change	Development	Increased urban area
Visual Amenity	Runoff, leachate	Altered aesthetic value
Recreation-Related	Earthworks, contaminants  Removal/capping of contamination	Alterations to access  Alterations to access
Heritage & Archaeology	Development	Change to historic landscape

## REFERENCES

### NRA Documents

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1994 : Abandoned mines and the Water Environment - WQ.14. NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol.

1994 : Contaminated Land and the Water Environment - WQ.15. NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol.

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Bardsley, P.J. (1994) Redevelopment of contaminated land - a view from the NRA. In Proceedings of conference The Legal, Technical and Practical Issues of Building on Contaminated Land, London.

### Other relevant scoping guidance

Generic Impacts of Construction  
Waste Management  
Restoration of Mineral Extraction Sites - Landfill

**Development Type: Waste Management (incinerators, digesters, composting plants, treatment works, disposal to sacrificial land, waste separation/transfer stations, scrap yards)**

Issues	Sources of impact	Potential Impacts
Surface Water Hydrology/Hydraulics	Buildings, site, roads	<ul style="list-style-type: none"> <li>Changed surface water runoff</li> <li>Changed magnitude of flooding</li> <li>Changed frequency of flooding</li> <li>Changed duration of flooding</li> <li>Changed hydraulic roughness</li> <li>Riparian drainage affected</li> <li>Changed flow regime</li> </ul>
Channel Morphology/ Sediments	Building, site, roads (Runoff/spills)	<ul style="list-style-type: none"> <li>Changed bank/bed stability</li> <li>Degradation/erosion of bed or banks</li> <li>Deposition/siltation</li> <li>Change of bed slope</li> <li>Change of planform/pattern</li> <li>Disturbance to bed forms (pools, riffles)</li> <li>Domino effect</li> <li>Changed channel size</li> <li>Changed turbidity</li> <li>Changed bed load</li> </ul>
Groundwater Hydraulics	Buildings, site, roads	<ul style="list-style-type: none"> <li>Change of infiltration</li> <li>Change in water-table (level)</li> </ul>
	Disposal of liquid waste to land	<ul style="list-style-type: none"> <li>Change in water-table (level)</li> </ul>
Surface Water Quality	Buildings, site, roads (runoff/spills)	<ul style="list-style-type: none"> <li>Altered salinity</li> <li>Change in quality</li> <li>Chemical pollution</li> <li>Nutrient Enrichment</li> <li>Changed turbidity</li> <li>Microbial contamination</li> <li>Stratification</li> <li>Re-suspension of contaminated sediments</li> <li>Rubbish/trash</li> <li>Changed dilution capacity</li> <li>Organic pollution</li> <li>Change in residence/flushing time</li> <li>Change in oxygen content</li> <li>Change in electrical conductivity/pH/acidification</li> <li>Change in temperature</li> </ul>
	Emissions (incinerators)	<ul style="list-style-type: none"> <li>Change in electrical conductivity/pH/acidification</li> </ul>
Groundwater Quality	Buildings, site, roads	<ul style="list-style-type: none"> <li>Chemical pollution</li> <li>Organic pollution</li> </ul>
	Disposal to land	<ul style="list-style-type: none"> <li>Chemical pollution</li> <li>Organic pollution</li> <li>Microbial contamination</li> </ul>

Issues	Sources of impact	Potential Impacts
Aquatic Ecology	Buildings, site, roads Emissions/discharges/leachate/ (Runoff/spills)	Altered habitat Changed fish biomass Changed invertebrate biomass Changed plant biomass Changed species diversity Effect on fish behaviour Change in the fish community Fish kill Effects on fish spawning Disturbance of sensitive species Loss of rheophilic flora and fauna Barrier to mammals Loss of sensitive species
Terrestrial Ecology	Buildings, site, roads,	Altered habitat Tree removal Loss of wildlife habitat Wetland changes Change in plant biomass Change in animal biomass Changed riparian habitat Disturbance of sensitive species Changed species diversity
	Disposal to land	Changed habitat Disturbance of sensitive species Loss of wildlife habitat
	Emissions	Disturbance of sensitive species Change in plant biomass
Human-Related	Buildings, site, roads	Change in noise levels Increased vibration Adverse odour Disrupted access Improved safety Health risks Nuisances Changed flood risk Changed water resource Disruption to commercial navigation Flooding
	Emissions	Health risks
	Waste transport, storage and treatment	Adverse odour Health risks Nuisances

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Issues	Sources of impact	Potential Impacts
Land Use Change	Building, site, roads	Increased urban area
	Disposal to land	Restriction to future developments Change in grade of agricultural land
Visual Amenity	Leachate/runoff	Altered aesthetic value
Recreation-Related	Site and operations	Alterations to access
Heritage & Archaeology	Site and operations	Disturbance and damage of known/unknown features Change to historic landscape

Notes:

For disposal of incinerator residues, e.g. flyash, and landfill see relevant (restoration of mineral extraction sites) guidance notes.

## REFERENCES

### NRA Documents

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Pollution Prevention Guidance 1, General Guide to the Prevention of Pollution of Controlled Waters, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol.

Pollution Prevention Guidance 17, Scrap Yards, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol.

### External Publications

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Ministry of Agriculture, Fisheries and Food (1991) A Code of Good Agricultural Practice for the Protection of Water, MAFF, London.

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Petts, J., and Eduljee, G. (1994) Environmental Impact Assessment for Waste Treatment and Disposal Facilities, John Wiley & Sons Ltd., Chichester.

### Other relevant scoping guidance

Generic Impacts of Construction  
Restoration of Mineral Extraction Sites - Landfill  
Mineral Extraction - Mining and Quarrying  
Redevelopment of Contaminated Land  
Tipping/Dumping  
Points of Large Discharge

## Development Type: Mineral Extraction/Quarrying

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further Guidance Notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Surface Water Hydrology/Hydraulics	Buildings, plant, roads	<ul style="list-style-type: none"> <li>Changed surface water runoff</li> <li>Changed flow velocities</li> <li>Changed magnitude of flooding</li> <li>Changed frequency of flooding</li> <li>Changed duration of flooding</li> <li>Changed hydraulic roughness</li> <li>Riparian drainage affected</li> <li>Changed flow regime</li> </ul>
	Dewatering	<ul style="list-style-type: none"> <li>Changed flow velocities</li> <li>Riparian drainage affected</li> </ul>
Channel Morphology/ Sediments	Buildings, plant, roads (runoff)	<ul style="list-style-type: none"> <li>Changed bank/bed stability</li> <li>Degradation/erosion of bed or banks</li> <li>Deposition/siltation</li> <li>Disturbance to bed forms (pools, riffles)</li> <li>Changed channel size</li> <li>Changed turbidity</li> </ul>
	Groundwater Hydraulics	<ul style="list-style-type: none"> <li>Buildings, plant, roads</li> <li>Removal of aquifer material/ dewatering</li> </ul>
Surface Water Quality	Buildings, plant, roads (runoff)	<ul style="list-style-type: none"> <li>Organic pollution</li> <li>Chemical pollution</li> <li>Changed turbidity</li> <li>Rubbish/trash</li> </ul>
	Removal of aquifer material/ dewatering	<ul style="list-style-type: none"> <li>Changed dilution capacity</li> </ul>
Groundwater Quality	Buildings, plant, roads (runoff)	<ul style="list-style-type: none"> <li>Chemical pollution</li> <li>Organic pollution</li> </ul>
	Dewatering	<ul style="list-style-type: none"> <li>Chemical pollution</li> <li>Organic pollution</li> </ul>

Issues	Sources of impact	Potential Impacts
Aquatic Ecology	Building, plant, roads, removal of aquifer material, dewatering	Altered habitat Changed fish biomass Changed invertebrate biomass Changed plant biomass Changed species diversity Effect on fish behaviour Change in the fish community Fish kill Effects on fish spawning Disturbance of sensitive species Loss of rheopilic flora and fauna Barrier to mammals Loss of sensitive species
	Catchment lagoons	Altered habitat Changed invertebrate biomass Loss of sensitive species
Terrestrial Ecology	Site investigating/prospecting	Disturbance of sensitive species
	Buildings, plant, roads Blasting, overburden disposal	Altered habitat Tree removal Loss of wildlife habitat Wetland changes Change in plant biomass Change in animal biomass Changed riparian habitat Disturbance of sensitive species Changed species diversity
	Removal of aquifer material, dewatering	Altered habitat Wetland changes
	Catchment lagoons	Wetland changes Changed habitat
Human-Related	Removal of aquifer material/ dewatering	Changed water resource
	Site investigating/prospecting	Change in noise levels Increased vibration
	Operation	Change in noise levels Increased vibration Disrupted access Nuisances Health risks
Land Use Change	Site	Loss of riparian land Restriction to future development
Visual Amenity	Buildings, plant and excavations	Altered aesthetic value Altered landscape
Recreation-Related	Buildings, plant and excavations	Alterations to access

**Issues**

**Sources of impact**

**Potential Impacts**

Heritage & Archaeology

Buildings, plant and  
excavations

Disturbance and damage of known/unknown features  
Change to historic landscape

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Hester, R.E., and Harrison, R.M.Y. (1994) Mining and its environmental impact, Issues in Environmental Science & Technology, Vol. 1, Royal Society of Chemistry.

### Other relevant scoping guidance

Generic Impacts of Construction  
Tipping/Dumping  
Waste Management  
Peat Extraction  
Restoration of Mineral Extraction/Quarrying  
Roads and Road Widening

**Development Type: Restoration of mineral extraction sites (landfill, recreation)**

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further Guidance Notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Surface Water Hydrology/Hydraulics	Landfill capping	<ul style="list-style-type: none"> <li>Changed surface water runoff</li> <li>Changed magnitude of flooding</li> <li>Changed frequency of flooding</li> <li>Changed duration of flooding</li> </ul>
	Flooded pit	<ul style="list-style-type: none"> <li>Convergence/divergence of flow</li> <li>Riparian drainage affected</li> </ul>
Channel Morphology/ Sediments		<ul style="list-style-type: none"> <li>Changed deposition/siltation</li> <li>Changed suspended sediment load</li> <li>Changed bed load</li> </ul>
Groundwater Hydraulics	Landfill lining	<ul style="list-style-type: none"> <li>Changed infiltration</li> <li>Change in water-table (level)</li> <li>Barrier to flow</li> </ul>
Surface Water Quality	Landfill leachate	<ul style="list-style-type: none"> <li>Chemical pollution</li> <li>Change in oxygen content</li> <li>Changed turbidity</li> <li>Microbial contamination</li> <li>Organic pollution</li> <li>Rubbish/trash</li> <li>Change in electrical conductivity/pH/acidification</li> </ul>
	Leachate treatment (e.g. reed beds, ponds)	<ul style="list-style-type: none"> <li>Change in water quality</li> </ul>
	Flooded pit - recreation	<ul style="list-style-type: none"> <li>Organic pollution</li> <li>Rubbish/trash</li> </ul>
	Flooded pit - birds	<ul style="list-style-type: none"> <li>Microbial contamination</li> <li>Eutrophication</li> </ul>
Groundwater Quality	Leachate	<ul style="list-style-type: none"> <li>Chemical pollution</li> <li>Change in oxygen content</li> <li>Changed turbidity</li> <li>Microbial contamination</li> <li>Organic pollution</li> </ul>

Issues	Sources of impact	Potential Impacts
Aquatic Ecology	Landfill/recreational activity	Altered habitat Disturbance of sensitive species
	Leachate	Altered habitat Changed invertebrates biomass Changed plant biomass Changed species diversity Fish kill (& loss of other aquatic life) Effects on fish spawning Loss of sensitive species
	Leachate treatment (ponds, reed beds)	Altered habitat
	Flooded pit	Altered habitat
Terrestrial Ecology	Landfill/water fill	Changed habitat Loss of sensitive species
	Landfill/recreational activity	Changed habitat Disturbance of sensitive species
	Leachate treatment (reedbeds, ponds)	Wetland changes Changed riparian habitat
	Site restoration (soil importation/sowing/planting)	Changed species diversity
	Conservation management	Changed habitat
	Flooded pit	Wetland changes Changed riparian habitat
Human-Related	Water body	Changed water resource
	Water recreation	Change in noise levels
	Creation of nature reserve/public area	Disrupted access
	Landfill operation	Change in noise levels Increased vibration Adverse odour Disrupted access Health risks Nuisances Changed water resource
Land Use Change	Restoration of landfill	Arable intensification Change in grade of agricultural land Restriction to future developments

Issues	Sources of impact	Potential Impacts
Visual Amenity	Flooded pit	Altered landscape
	Landfill gas/flare	Altered aesthetic value Altered landscape
	Nature reserve/water body/ restoration of landfill	Altered aesthetic value
	Creation of water body/ restoration of landfill	Altered landscape
Recreation-Related	Landfill	Alterations to access
	Creation of nature reserve	Alterations to access Altered facilities
	Flooded pit	Altered facilities
Heritage & Archaeology	Landfill/creation of water body	Disturbance and damage of known/unknown features
	Restoration of landfill	Change of historic landscape

Notes: "Landraise" is taken to be synonymous with "landfill"

## REFERENCES

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1994: Abandoned Mines and the Water Environment - Water Quality Series No. 15, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol.

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Department of the Environment/Welsh Office (1989) Minerals Planning Guidance 12: Treatment of Disused Mine Opening and Availability of Information on Mined Ground, HMSO, London.

Department of the Environment (1992) Amenity Reclamation of Mineral Workings, HMSO, London.

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Department of the Environment (1993) Waste Management Paper No. 26A - Landfill Completion.

Petts, J., and Edujee, G. (1994) Environmental Impact Assessment for Waste Treatment and Disposal Facilities, John Wiley & Sons, Chichester.

Department of the Environment (1994) Waste Management Paper No. 4 - Licensing of Waste Management Facilities.

### Other relevant scoping guidance

Conservation Enhancement  
Tipping/Dumping  
Mineral Extraction  
Redevelopment of contaminated land  
Off-Road Recreation Activities  
Water Based Recreation  
Groundwater Abstraction

### Development Type: Roads and Road Widening

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further Guidance Notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Surface Water Hydrology/Hydraulics	Drainage/runoff	<ul style="list-style-type: none"> <li>Changed surface water runoff</li> <li>Changed flow velocities</li> <li>Changed magnitude of flooding</li> <li>Changed frequency of flooding</li> <li>Changed duration of flooding</li> <li>Changed hydraulic roughness</li> <li>Riparian drainage affected</li> <li>Changed flow regime</li> </ul>
	Bridges/culverts	<ul style="list-style-type: none"> <li>Changed flow velocities</li> <li>Changed magnitude of flooding</li> </ul>
	Reed beds	<ul style="list-style-type: none"> <li>Changed hydraulic roughness</li> </ul>
Channel Morphology/ Sediments	Drainage/runoff	<ul style="list-style-type: none"> <li>Changed bank/bed stability</li> <li>Degradation/erosion of bed or banks</li> <li>Deposition/siltation</li> <li>Disturbance to bed forms (pools, riffles)</li> <li>Changed channel size</li> <li>Changed turbidity</li> </ul>
	Bridges/culverts	<ul style="list-style-type: none"> <li>Changed channel size</li> </ul>
	Road routing	<ul style="list-style-type: none"> <li>River diversion</li> <li>Changed bank/bed stability</li> </ul>
Groundwater Hydraulics	Soakaways	<ul style="list-style-type: none"> <li>Change in water-table (levels)</li> <li>Changed flow patterns</li> <li>Infiltration/groundwater recharge reduction</li> </ul>
Surface Water Quality	Drainage/runoff/spillage	<ul style="list-style-type: none"> <li>Altered salinity</li> <li>Change in quality</li> <li>Chemical pollution</li> <li>Changed turbidity</li> <li>Re-suspension of contaminated sediments</li> <li>Rubbish/trash</li> <li>Changed dilution capacity</li> <li>Organic pollution</li> </ul>
	Verge maintenance	<ul style="list-style-type: none"> <li>Chemical pollution</li> </ul>
	Traffic	<ul style="list-style-type: none"> <li>Change in pH (acidification)</li> <li>Chemical pollution</li> </ul>

Issues	Sources of impact	Potential Impacts
Groundwater Quality	Runoff/soakaways	Chemical pollution Organic pollution
Aquatic Ecology	Hard surface (runoff/ spillage) Verge maintenance	Altered habitat Changed fish biomass Changed invertebrate biomass Changed plant biomass Changed species diversity Effect on fish behaviour Change in the fish community Fish kill Effects on fish spawning Loss of rheophilic flora and fauna Barrier to mammals Loss of sensitive species
	Culverts	Barrier to fish migration Barrier to mammals Loss of habitat Change in invertebrate biomass Loss of sensitive species
	Balancing ponds/reed beds	Altered habitat
Terrestrial Ecology	Road/traffic	Altered habitat Tree removal Loss of wildlife Wetland changes Change in plant biomass Change in animal biomass Changed riparian habitat Disturbance of sensitive species Changed species diversity
	Surface water spray/rubbish/ trash	Altered habitats
	Runoff/soakaways/balancing ponds	Wetland change
Human-Related	Runoff	Changed flood risk Changed water resource
	Bridges/culverts	Changed flood risk
	Traffic	Change in noise levels Increased vibration Adverse odour Disrupted access Health risks Nuisances

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<b>Issues</b>	<b>Sources of impact</b>	<b>Potential Impacts</b>
Land Use Change	Associated development	Increased urban area Development of floodplain
Visual Amenity	Road/traffic	Altered aesthetic value Altered landscape
Recreation-Related	Bridges/culverts	Disruption to water users
	Road	Alterations to access
Heritage & Archaeology	Road/traffic	Disturbance and damage of known/unknown features Change of historic landscape

**Notes:**

Associated developments, e.g motorway surface areas, can magnify the local impact of a road. Similarly, link roads and extensions can have further impacts.

## REFERENCES

### NRA Documents

Brookes, A., and Hills, K. (1993) The Impact of Road Developments on River Corridors: Lessons Learnt from South-Central England.

Pollution Revention Guidance 10, Highways Report, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 2UD.

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Department of Transport (1992) Design Manual for Roads and Bridges. Volume 10 Environmental Assessment. London: HMSO.

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IEA (1993) Guidelines for the Environmental Assessment of Road Traffic. Guidance Notes N°1. Institute of Environmental Assessment.

English Nature (1994) Roads and Nature Conservation. English Nature, Peterborough.

Highways Agency (1994) MCD special requirements for the National Rivers Authority and revised MCD Clause 29. Guidance Note 27.

### Other relevant scoping guidance

Barrier/Bridges/Weirs  
Culverts/Tunnels  
Generic Construction Impacts  
Conservation Enhancement  
Channels Works  
Embankments

**Development Type: Railways**

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further Guidance Notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Surface Water Hydrology/Hydraulics	Track drainage/runoff/ spillage	Changed surface water runoff Changed flow velocities Changed magnitude of flooding Changed frequency of flooding Changed duration of flooding Changed hydraulic roughness Riparian drainage affected Changed flow regime
	Bridges/culverts	Changed flow velocities Changed magnitude of flooding Changed duration of flooding Changed frequency of flooding
Channel Morphology/ Sediments	Track drainage/runoff spillage	Changed bank/bed stability Degradation/erosion of bed or banks Deposition/siltation Disturbance to bed forms (pools, riffles) Changed channel size Changed turbidity
	Bridges/culverts	Changed channel size
	Rail routing - river diversion	Changed bank/bed stability Degradation/erosion of bed and/or banks Change of bed slope
Groundwater Hydraulics	Track drainage	Changed infiltration Change in water-table (level) Changed flow
	Tunnelling	Changed flow Change in pressure potential Changed storage capacity
Surface Water Quality	Track drainage/runoff spillage	Organic pollution Change in quality Chemical pollution Changed turbidity Re-suspension of contaminated sediments Rubbish/trash Changed dilution capacity
	Vegetation management	Chemical pollution
	Emissions	Change in pH (acidification)

Issues	Sources of impact	Potential Impacts
Groundwater Quality	Track drainage/spillage	Chemical pollution Organic pollution
	Vegetation management	Chemical pollution
Aquatic Ecology	Track drainage/runoff/ spillage	Altered habitat Changed fish biomass
	Vegetation management	Changed invertebrate biomass Changed plant biomass Changed species diversity Effect on fish behaviour Change in the fish community Fish kill Effects on fish spawning Disturbance of sensitive species Loss of rheophilic flora and fauna Barrier to mammals Loss of sensitive species
	Culverts	Barrier to fish migration Barrier to mammals Loss of habitat Change in invertebrate biomass Loss of sensitive species
	Track	Barrier to mammals Changed riparian habitat
Terrestrial Ecology	Rail traffic	Altered habitat Loss of wildlife habitat Change in animal biomass Disturbance of sensitive species Rubbish/trash Change in plant biomass
	Vegetation management	Change in plant biomass Tree removal Loss of wildlife habitat
	Tunnelling	Altered habitat
	Drainage	Changed flood risk Changed water resource
Human-Related	Bridges/culverts	Changed flood risk
	Rail traffic	Change in noise levels Increased vibration Disrupted access Health risks
	Tunnelling	Change in noise levels Increased vibration
	Track/tunnelling	Increased urban area Development of floodplain

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<b>Issues</b>	<b>Sources of impact</b>	<b>Potential Impacts</b>
Visual Amenity	Track/traffic	Altered aesthetic value Altered landscape
Recreation-Related	Track	Alterations to access Altered facilities Disruption to users of water environment
	Bridges/culverts	Disruption to users of water environment
Heritage & Archaeology	Track/traffic	Disturbance and damage of known/unknown features Change to historic landscape

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### NRA Documents

### External Publications

Nelson, P. (1992) "EA of a Rail Link Terminal and Associated Development" (Article), in Advance in Environmental Assessment Documentation 29-30 October 1992 organized by IBC Technical Services Ltd, Gilmoora House, 5761 Mortimer St London WIN 8JX.

Ferrary, C. (1994) Linear Development, in Environmental Assessment: a guide to the identification, evaluation and mitigation of environmental issues in construction schemes. Pre-publication draft, Construction Industry Research and Information Association (CIRIA), 6 Storey's Gate, Westminster, London.

Carpenter, T.G. (1994) The Environmental Impact of Railways, John Wiley & Sons Ltd, Chichester.

### Other relevant scoping guidance

Embankments  
Channel Works  
Barriers/Bridges/Weirs  
Culverts/Tunnels  
General Construction Impacts

**Development Type: Airports**

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further guidance notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Surface Water Hydrology/Hydraulics	Runways/terminals/car parks/ underground stores	Changed surface water runoff Changed flow velocities
	Drainage network	Changed frequency of flooding Changed duration of flooding Riparian drainage affected
Channel Morphology/ Sediments	Runways/terminals/car parks/ underground stores	Changed bank/bed stability Degradation/erosion of bed and/or banks Deposition/siltation Changed turbidity Changed bed load
	Drainage network	Downstream erosion
Groundwater Hydraulics	Runways/terminals/car parks/ underground stores	Changed infiltration Barrier to flow Change in pressure potential Change in water table
Surface Water Quality	Runways/terminals/car parks/ underground stores	Altered salinity Change in quality Chemical pollution Nutrient enrichment Changed turbidity Microbial contamination Stratification Re-suspension of contaminated sediments Rubbish/trash Changed dilution capacity Organic pollution Change in residence/flushing time Change in oxygen content Change in electrical conductivity/pH/acidification Change in temperature
	Above and below ground chemical/fuel and oil stores/ high pressure fuel pipes	Chemical pollution
	Runway maintenance(spillages/ de-icing/fire fighting/ aircraft & vehicle washing)	Chemical pollution Organic pollution Altered salinity Changed turbidity Changed dilution capacity
	Emissions	Change in pH (acidification)

Issues	Sources of impact	Potential Impacts
Groundwater Quality	Runways/terminals/car parks underground stores	Chemical pollution Organic pollution
	Runway maintenance (spillages/ de-icing/fire fighting/ aircraft & vehicle washing)	Chemical pollution Organic pollution Altered salinity Changed turbidity Changed dilution capacity
	Above and below ground chemical/fuel and oil stores/ high pressure fuel pipes	Chemical pollution
Aquatic Ecology	Runways/terminals/car parks underground stores/ Drainage network	Altered habitat Changed species diversity Effect on fish behaviour Fish kill Effects on fish spawning Loss of sensitive species Changed invertebrate biomass Changed plant biomass Changed fish biomass Change in the fish community
	Runway maintenance (spillages/ de-icing/fire fighting/ aircraft & vehicle washing)	Altered habitat Changed species diversity Effect on fish behaviour Fish kill Effects on fish spawning Loss of sensitive species Changed invertebrate biomass Changed plant biomass Changed fish biomass Change in the fish community
Terrestrial Ecology	Runways/terminals/car parks underground stores	Loss of wildlife habitat Altered habitat Change in plant biomass Tree removal Change in animal biomass Barrier to flora and fauna
	Runway maintenance (spillages/ de-icing/fire fighting/ aircraft & vehicle washing)	Change in plant biomass Change in animal biomass
	Emissions	Altered habitat Change in plant biomass Disturbance of sensitive species
	Airplane movements & operations	Altered habitat Disturbance of sensitive species
	Drainage network	Wetland changes

Issues	Sources of impact	Potential Impacts
Human-Related	Runways/terminals/car parks underground stores	Changed flood risk Changed water resource Disrupted access
	Airplane movements	Change in noise levels Increased vibration
	Emissions	Health risks Nuisances
Land Use Change	Runways/terminals/car parks underground stores	Increased urban area Restriction to future developments Change in grade of agricultural land
Recreation-Related	Runways/terminals/car parks underground stores	Alterations to access Disruption to uses of water environment
	Runway maintenance (spillages/ de-icing/fire fighting/ aircraft & vehicle washing)	Altered facilities Alterations to access Disruption to uses of water environment
Heritage & Archaeology	Runways/terminals/car parks	Disturbance and damage of known/unknown features Change to historic landscape

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## REFERENCES

### NRA Documents

NRA 1992: Policy and Practice for the Protection of Groundwater. ISBN 1873160372, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol.

Pollution Prevention Guidance 20 - Airfields, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol.

1994: Discharge Consents and Compliance, The NRA's approach to Control of Discharges to Water, WQ.17, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol.

### External Publications

Ministry of Agriculture, Fisheries and Food (1985) Guidelines for the Use of Herbicides on Weeds in or near watercourses and Lakes. MAFF London

Maeda, M. (1991) "The Kansai International Airport Project and Environmental Impact Assessment", in Marine Pollution Bulletin, 23, pp 349-353.

Renger, M. (1994), in Environmental Assessment: A guide to the identification and mitigation of environmental issues in construction schemes. Construction Industry Research and Information Association (CIRIA), 6 Storey's Gate, Westminster, London.

### Other relevant scoping guidance

Roads and Road Widening  
Flood Storage Areas  
Chemical Storage Units  
Vehicle Parks/Plant Hire  
Generic Impacts of Construction  
Channel Works  
Pipelines  
Culverts and Tunnels

**Development Type: Cemeteries**

Issues	Sources of impact	Potential Impacts
Surface Water Hydrology/Hydraulics	Buildings, roads, impermeable surfaces	Changed surface water runoff Changed flow velocities Changed magnitude of flooding Changed frequency of flooding Changed duration of flooding Convergence/divergence of flow Changed hydraulic roughness Regulated flow Low flows Wave - generation Reduce tidal flow/flushing/mixing Riparian drainage affected Changed flow regime
	Use of trimmers, mowers	Changed hydraulic roughness
Channel Morphology/ Sediments	Excavation/soil disturbance	Deposition/siltation Changed turbidity Changed bed load
	Buildings, roads, impermeable surfaces (runoff)	Changed bank/bed stability Degradation/erosion of bed or banks Deposition/siltation Change of bed slope Change of planform/pattern Disturbance to bed forms (pools, riffles) Downstream erosion Changed channel size Changed turbidity Changed bed load
Groundwater Hydraulics	Excavation/soil disturbance	Changed storage capacity
	Buildings, roads, impermeable surfaces	Changed infiltration
Surface Water Quality	Leachate	Chemical pollution Microbial contamination Organic pollution
	Excavation/soil disturbance	Changed turbidity
	Herbicide application	Change in quality Chemical pollution Organic pollution
	Use of trimmers, mowers	Change in quality Organic pollution

Issues	Sources of impact	Potential Impacts
	Building, roads, impermeable surfaces	Altered salinity Change in quality Chemical pollution Nutrient enrichment Changed turbidity Microbial contamination Stratification Re-suspension of contaminated sediments Rubbish/trash Changed dilution capacity Organic pollution Change in residence/flushing time Change in oxygen content Change in electrical conductivity/pH/acidification Change in temperature
Groundwater Quality	Leachate	Change in quality Organic pollution Microbial contamination
	Herbicide application	Change in quality Chemical pollution Organic pollution
	Use of strimmers, mowers	Organic pollution
Aquatic Ecology	Buildings, roads, impermeable surfaces (runoff)	Altered habitat Changed fish biomass Changed invertebrate biomass Changed plant biomass Changed species diversity Effect on fish behaviour Change in the fish community Fish kill Effects on fish spawning Disturbance of sensitive species Loss of rheophilic flora and fauna Barrier to mammals Loss of sensitive species
Terrestrial Ecology	Excavation/soil disturbance	Altered habitat Tree removal Disturbance of sensitive species Changed species diversity Changed riparian habitat
	Use of strimmers, mowers	Changed habitat Change in plant biomass  Disturbance of sensitive species

Issues	Sources of impact	Potential Impacts
	Herbicide application	Changed habitat Disturbance of sensitive species
Human-Related	Excavation/soil disturbance	Change in noise levels Increased vibration Disrupted access
	Herbicide application	Health risks
	Use of strimmers, mowers	Change in noise levels
Land Use Change	Buildings, roads, impermeable surfaces	Restriction to future developments
Visual Amenity	Buildings, roads, impermeable surfaces Excavation/soil disturbance Use of strimmers, movers	Altered aesthetic value
Recreation-Related	Excavation/soil disturbance	Change in angling quality Disruption to users of water environment
	Buildings, roads, impermeable surfaces (runoff)	Alterations to access Change in angling quality
Heritage & Archaeology	Excavation/soil disturbance	Disturbance and damage of known/unknown features

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## REFERENCES

### NRA Documents

1992: Policy & Practice for the Protection of Groundwater, ISBN 1873160372. NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol.

### External Publications

Van der Horing, H. et al (1988) "The quality of surface water, drainage water and groundwater in the neighbourhood of cemeteries", in H2O, 1988, 21 No. 12, pp 327-331 (in Dutch, English summary pp 319).

Pacheco, A. et al (1991) "Cemeteries - a potential risk to groundwater", in Water Science & Technology, 24, No. 11, pp 97-104.

Construction Industry Research and Information Association (CIRIA) (1994), in Environmental Assessment: A guide to the identification and mitigation of environmental issues in construction schemes. CIRIA, 6 Storey's Gate, Westminster, London.

### Other relevant scoping guidance

Generic Impacts of Construction  
Vegetation Management  
Roads and Road Widening

**Development Type: Navigation issues**

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further Guidance Notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Surface Water Hydrology/Hydraulics	Boat wash (speed limit)	Changed flow velocities Wave generation
	Lockage	Changed flow velocities Regulated flow Low flows Reduced tidal flow/flushing/mixing
	Canoeing (artificial freshets)	Regulated flow Changed flow velocities Low flows
Channel Morphology/ Sediments	Piling	Changed bed/bank stability
	Boat wash	Changed bed/bank stability Degradation/erosion of bed and/or banks Deposition/siltation Changed channel size Changed suspended sediment load
	Installation of locks	Change of bed slope Disturbance of bed forms (pools, riffles) Degradation/erosion of bed and/or banks Changed channel size Deposition/siltation Changed suspended sediment load Changed bed load
	Canoeing (artificial freshets)	Degradation/erosion of bed and/or banks
Groundwater Hydraulics	Installation of lockage	Change in water-table (level)
	Canoeing/rafting	Change in water-table (level)
Surface Water Quality	Boats	Organic pollution Chemical pollution Changed turbidity Rubbish/trash Re-suspension of contaminated sediments
	Lockage/canoeing (freshets)	Changed dilution capacity
Groundwater Quality	Boats	Chemical pollution Organic pollution

Issues	Sources of impact	Potential Impacts
Aquatic Ecology	Boats/boat wash	Altered habitat Changed plant biomass Disturbance of sensitive species
	Lockage/canoeing (freshets)	Effect on fish behaviour Barrier to fish migration Effects on fish spawning Disturbance of sensitive species
Terrestrial Ecology	Boat use	Changed habitat Disturbance of sensitive species
Human-Related	Boat use	Change in noise levels Increased vibration Health risks
	Lockage	Health risks Changed flood risk Changed water resource
	Canoeing (freshets)	Health risks Changed water resource Disrupted access Change in noise levels
Land Use Change	Marinas/land based facilities	Loss of riparian land
Visual Amenity	Boat use/freshets/lock installation	Altered aesthetic value Altered landscape
Recreation-Related	Canoeing	Disruption to users of water environment Altered facilities
	Freshets	Disruption to water users Disruption to users of water environment
	Boating	Disruption to users of water environment
	Lock construction/widening	Alterations to access Altered facilities (boats) Disruption to water users Disruption to users of water environment Change in angling quality
	Lock operation	Alterations to access (boats) Disruption to users of water environment

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Issues	Sources of impact	Potential Impacts
Heritage & Archaeology	Lock installation	Destruction and damage of known/unknown features Change to historic landscape
	Freshets/canoeing	Destruction and damage of known/unknown features

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## REFERENCES

### NRA Documents

1994: River Thames Recreation Strategy, draft report. NRA, Thames Region, Kings Meadow House, Reading.

### External Publications

#### Other relevant scoping guidance

Generic Impacts of Construction  
Navigation Works  
Channel Works  
Water Based Recreation  
Marinas

**Development Type: Navigation Works**

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further Guidance Notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Surface Water hydrology/hydraulics	Bankside mooring facilities	Changed flow velocities Changed hydraulic roughness Riparian drainage affected
	Dredging	Changed flow velocities Changed hydraulic roughness Riparian drainage affected
	Vegetation maintenance (obstruction removal)	Changed flow velocities Changed hydraulic roughness Changed magnitude of flooding Riparian drainage affected
Channel morphology/ sediments	Bankside mooring facilities	Changed bank stability Degradation/erosion of bed and/or banks Domino effect
	Dredging	Changed bank/bed stability Degradation/erosion of bed and/or banks Deposition/siltation Change of bed slope Disturbance to bed forms (pools, riffles) Changed channel size Changed suspended sediment load Changed bed load
	Pest species	Changed bank/bed stability
	Vegetation maintenance (obstruction removal)	Changed bank/bed stability Degradation/erosion of bed and/or banks Deposition/siltation Disturbance to bed forms (pools, riffles) Changed channel size Changed suspended sediment load
Groundwater Hydraulics	Bankside mooring facilities	Barrier to flow Changed flow
	Dredging	Change in water table (level) Changed flow
	Vegetation maintenance (obstruction removal)	Changed infiltration Change in water table (level) Changed flow

Issues	Sources of impact	Potential impacts
Surface Water Quality	Bankside mooring facilities	Chemical pollution Changed turbidity Rubbish/trash
	Dredging	Changed turbidity Re-suspension of contaminated sediments
	Vegetation maintenance (obstruction removal)	Change in quality Eutrophication Changed turbidity Re-suspension of contaminated sediments
Groundwater Quality	Dredging	Movement of contaminated water
Aquatic Ecology	Bankside mooring facility	Altered habitat Habitat removal Changed invertebrate biomass Changed plant biomass Disturbance of sensitive species Barrier to mammals
	Dredging	Altered habitat Habitat removal Changed fish biomass Changed invertebrate biomass Changed plant biomass Effect on fish behaviour Fish kill Effects on fish spawning Disturbance of sensitive species Loss of rheophilic fauna
	Pest species	Changed fish biomass Changed plant biomass
	Vegetation maintenance (obstruction removal)	Altered habitat Habitat removal Changed invertebrate biomass Changed plant biomass Changed species diversity Effect on fish behaviour Change in the fish community Effects on fish spawning Disturbance of sensitive species Loss of rheophilic fauna Loss of sensitive species

Issues	Sources of impact	Potential impacts
Terrestrial Ecology	Bankside mooring facilities	<ul style="list-style-type: none"> <li>Changed habitat</li> <li>Loss of wildlife habitat</li> <li>Disturbance of sensitive species</li> <li>Barrier to mammals</li> </ul>
	Dredging	<ul style="list-style-type: none"> <li>Wetland changes</li> <li>Disturbance of sensitive species</li> </ul>
Terrestrial Ecology	Vegetation maintenance (obstruction removal)	<ul style="list-style-type: none"> <li>Changed habitat</li> <li>Loss of wildlife habitat</li> <li>Tree removal</li> <li>Change in animal biomass</li> <li>Wetland changes</li> <li>Changed riparian habitat</li> <li>Disturbance of sensitive species</li> <li>Changed species diversity</li> </ul>
	Pest species	<ul style="list-style-type: none"> <li>Disturbance of sensitive species</li> <li>Changed habitat</li> </ul>
Human-Related	Bankside mooring facilities	<ul style="list-style-type: none"> <li>Disrupted access</li> <li>Improved safety</li> </ul>
	Dredging	<ul style="list-style-type: none"> <li>Improved safety</li> <li>Changed flood risk</li> </ul>
	Vegetation maintenance (obstruction removal)	<ul style="list-style-type: none"> <li>Improved safety</li> <li>Changed flood risk</li> </ul>
Land Use Change	Bankside mooring facilities	Loss of riparian land
Visual amenity	Bankside mooring facilities	Altered aesthetic value
	Vegetation maintenance (obstruction removal)	<ul style="list-style-type: none"> <li>Allocated aesthetic value</li> <li>Altered landscape</li> </ul>
Recreation-Related	Bankside mooring facilities	<ul style="list-style-type: none"> <li>Alterations to access</li> <li>Altered facilities</li> <li>Disruption to users of water environment</li> </ul>
	Dredging	<ul style="list-style-type: none"> <li>Altered facilities</li> <li>Change in angling quality</li> </ul>
	Vegetation maintenance (obstruction removal)	<ul style="list-style-type: none"> <li>Alterations to access</li> <li>Change in angling quality</li> </ul>

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<b>Issues</b>	<b>Sources of impact</b>	<b>Potential impacts</b>
<b>Heritage &amp; Archaeology</b>	<b>Bankside mooring facilities</b>	<b>Change in historic landscape Destruction &amp; damage of known/ unknown features</b>
	<b>Dredging</b>	<b>Destruction &amp; damage of known/ unknown features</b>
	<b>Vegetation maintenance (obstruction removal)</b>	<b>Change in historic landscape Destruction &amp; damage of known/ unknown features</b>

## REFERENCES

### NRA Documents

### External Publications

Bellessort, B. (1984) "Ecological problems related to the Loire Estuary development", in Water Science and Technology, 16, No. 3/4, pp 653-658.

Sexton, J.R. (1988) "Regulation of the River Thames - a case study on the Teddington Flow proposal", in Regulated Rivers: Research and Management, 2, No. 3, pp 323-333.

### Other relevant scoping guidance

Navigation Issues  
Channel Works  
Vermin Control  
Bank Protection  
Vegetation Management  
Dredging

### Development Type: Channel Works

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further guidance notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Surface Water Hydrology/Hydraulics	Widening and/or deepening of natural channel	<ul style="list-style-type: none"> <li>Changed flow velocities</li> <li>Low flows</li> <li>Changed magnitude of flooding</li> <li>Changed frequency of flooding</li> <li>Changed duration of flooding</li> </ul>
	Channel realignment	<ul style="list-style-type: none"> <li>Changed flow velocities</li> </ul>
	Multi-stage channels	<ul style="list-style-type: none"> <li>Changed flow velocities</li> <li>Changed magnitude of flooding</li> <li>Changed frequency of flooding</li> <li>Changed duration of flooding</li> </ul>
Channel Morphology	Widening and/or deepening of natural channel	<ul style="list-style-type: none"> <li>Changed bed/bank stability</li> <li>Deposition/siltation</li> <li>Changed channel size</li> <li>Disturbance to bed forms (pools, riffles)</li> <li>Degradation/erosion of bed and/or banks</li> <li>Altered cross-sectional shape</li> </ul>
	Channel realignment	<ul style="list-style-type: none"> <li>Change of gradient</li> <li>Changed bed/bank stability</li> <li>Degradation/erosion of bed and/or banks</li> <li>Changed bed load</li> <li>Disturbance to bed forms (pools, riffles)</li> <li>Change of planform pattern</li> </ul>
	Multi-stage channels	<ul style="list-style-type: none"> <li>Changed bed/bank stability</li> <li>Deposition/siltation</li> <li>Changed channel size</li> <li>Altered cross-sectional shape</li> </ul>
Groundwater Hydraulics	Channel realignment	<ul style="list-style-type: none"> <li>Changed infiltration</li> </ul>
Surface Water Quality	Widening and/or deepening of natural channel	<ul style="list-style-type: none"> <li>Change in oxygen content</li> <li>Nutrient enrichment</li> <li>Rubbish/trash</li> <li>Resuspension of contaminated sediment</li> </ul>
	Channel realignment	<ul style="list-style-type: none"> <li>Changed turbidity</li> </ul>
	Multi-stage channels	<ul style="list-style-type: none"> <li>Rubbish/trash</li> </ul>

Issues	Sources of impact	Potential Impacts
Aquatic Ecology	Widening and/or deepening of natural channel	Altered habitat Changed fish biomass Changed invertebrate biomass Changed plant biomass Changed species diversity/composition Disturbance of sensitive species Effects on fish spawning
	Channel realignment	Altered habitat Changed fish biomass Changed invertebrate biomass Changed plant biomass Changed species diversity Barrier to fish migration Effects on fish spawning Loss of sensitive species
	Multi-stage channels	Altered habitat Changed invertebrate biomass Loss of sensitive species
Terrestrial Ecology	Widening and/or deepening of natural channel	Tree removal Loss of wildlife habitat Change in animal biomass Wetland changes Disturbance of sensitive species
	Channel realignment	Tree removal Wetland changes Changed habitat
	Multi-stage channels	Changed habitat Tree loss Wetland changes
Human-Related	Widening and/or deepening of natural channel	Disrupted access Disruption to commercial navigation Changed flood risk
	Channel realignment	Changed flood risk
	Multi-stage channels	Improved safety Changed flood risk
Land Use Change	Widening and/or deepening of natural channel	Change in grade of agricultural land Development of floodplain

Issues	Sources of impact	Potential Impacts
	Channel realignment	Change in grade of agricultural land
	Multi-stage channels	Development of floodplain
Visual Amenity	Widening and/or deepening of natural channel	Altered aesthetic value
	Channel realignment	Altered aesthetic value
	Multi-stage channels	Altered aesthetic value
Recreation-Related	Widening and/or deepening of natural channel	Altered facilities Disruption to users of water environment Alteration in access Change in angling quality
	Channel realignment	Altered facilities Disruption to users of water environment Alteration in access Change in angling quality
	Multi-stage channels	Change in angling quality Alteration to access
Heritage & Archaeology	Widening and/or deepening of natural channel	Disturbance and damage of known/unknown features
	Channel realignment	Change to historic landscape Disturbance and damage of known/unknown features
	Multi-stage channels	Change to historical landscape

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## REFERENCES

### NRA Documents

### External Publications

Brookes, A. (1988) Channelized Rivers: Perspectives for Environmental Management, John Wiley & Sons Ltd.

Brookes, A. (1990) "Restoration and Enhancement of Engineered River Channels: some European experiences", in Regulated Rivers: Research and Management, 1990, 5, No. 1, pp 45-6.

Knighton, D. (1984) Fluvial Forms & Processes. Edward Arnold, London.

RSPB, NRA & RSNC (1994) The New Rivers & Wildlife Handbook. RSPB/RSCN, The Lodge, Sandy, Bedfordshire

### Other relevant scoping guidance

Generic Impacts of Construction  
Reservoirs  
Restoration & Enhancement of River Channels  
Flood Diversion Channels  
Flood Storage Areas  
Bank Protection  
Dredging  
Barriers/Bridges/Weirs  
Culverts and Tunnels

## Development Type: Flood Diversion Channels

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further Guidance Notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Surface Water Hydrology/Hydraulics	Diversion of flow from donor water body	Changed flow velocities Changed magnitude of flooding Low flows
	Diversion of flow into recipient water body	Changed flow velocities Changed magnitude of flooding
	Diversion channel	Changed flow velocities
Channel Morphology/ Sediments	Diversion of flow from donor water body	Changed bed/bank stability Deposition/siltation Disturbance to bed forms (pools, riffles) Changed channel size
	Diversion of flow into recipient water body	Degradation/erosion of bed and/or banks Changed channel size
	Diversion channel	Degradation/erosion of bed and/or banks Deposition/siltation
Groundwater Hydraulics	Diversion of flow from donor water body	Changed flow Change in water-table (level)
	Diversion channel	Changed direction Changed in water-table (level)
Surface Water Quality	Diversion of flow from donor water body	Change in oxygen content Eutrophication
	Diversion of flow into recipient water body	Chemical pollution Changed turbidity Microbial contamination Rubbish/trash
	Diversion channel	Chemical pollution Eutrophication Microbial contamination Rubbish/trash
Groundwater Quality	Diversion channel	Change in quality

Issues	Sources of impact	Potential Impacts
Aquatic Ecology	Diversion of flow from donor water body	Altered habitat Changed fish biomass Changed species diversity Effect on fish behaviour Change in the fish community Disturbance of sensitive species Changed invertebrate biomass
	Diversion of flow into recipient water body	Altered habitat Effect on fish behaviour Effects on fish spawning Disturbance of sensitive species Changed invertebrate biomass
	Diversion channel	Altered habitat Changed fish biomass Changed invertebrate biomass Changed plant biomass Effect on fish behaviour Change in the fish community Barrier to fish migration Disturbance of sensitive species
Terrestrial Ecology	Diversion of flow from donor water body	Wetland changes Disturbance of sensitive species
	Diversion of flow into recipient water body	Wetland changes
	Diversion channel	Changed habitat Tree removal Loss of wildlife habitat Wetland changes
Human-Related	Diversion of flow from donor water body	Adverse odour Changed flood risk Changed water resource Disruption to Commercial Navigation
	Diversion of flow into recipient water body	Changed flood risk Changed water resource
	Diversion channel	Changed water resource
Land Use Change	Diversion channel	Restriction to future developments
Visual Amenity	Diversion of flow from donor water body	Altered aesthetic value
	Diversion channel	Altered aesthetic value

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<b>Issues</b>	<b>Sources of impact</b>	<b>Potential Impacts</b>
<b>Recreation-Related</b>	<b>Diversion of flow from donor water body</b>	<b>Altered facilities Change in angling quality</b>
	<b>Diversion of flow into recipient water body</b>	<b>Altered facilities Change in angling quality</b>
	<b>Diversion channel</b>	<b>Change in angling quality Disruption to users of water environment</b>
<b>Heritage &amp; Archaeology</b>	<b>Diversion channel</b>	<b>Destruction and damage of known/ unknown features Change in historical landscape</b>

## REFERENCES

### NRA Documents

Flood Defence Guidance for Conservation in Water Course Maintenance Works (1994), NRA, Thames, Kings Meadow House, Kings Meadow Road, Reading.

Asset Management: Planning for Flood Defences, 2 Vols, NRA/R&D Note 199.

### External Publications

Brookes, A. (1988) Channelized Rivers: Perspectives for Environmental Management, John Wiley & Sons Ltd.

Brooke, J. (1990) The Role of EA in Design and Construction for Flood Defence, IWEM Conference, 1990.

Brooke, J. (1994), River and Coastal Engineering in Environmental Assessment: a guide to the identification and mitigation of environmental issues in construction schemes. Construction Industry Research and Information Association (CIRIA), 6 Storey's Gate, Westminster, London.

MAFF/English Nature/NRA (1992) Environmental Procedures for Inland Flood Defence Works: A guide for managers and decisions makers in the NRA, IDBs and local authorities. MAFF Publications, PB 1152, London.

### Other relevant scoping guidance

Flood Storage Areas  
Bank Protection  
Channel Works

## Development Type: Fluvial Dredging

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further Guidance Notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Surface Water hydrology/hydraulics	Increased channel capacity	Changed flow velocities Changed frequency of flooding Changed hydraulic roughness Low flows Riparian drainage affected
	Removal of obstacles/ vegetation/gravels	Changed flow velocities Changed hydraulic roughness Riparian drainage affected
Channel Morphology/ Sediments	Removal of bed material	Disturbance to bed forms (pools/riffles) Changed suspended sediment load Change of bed slope Changed channel size Changed bedload
	Change in sediment budget	Deposition/siltation Degradation/erosion of bed and banks
Surface Water Quality	Altered flow velocities	Changed turbidity Change in quality Change in flushing time Change in oxygen content
Aquatic Ecology	Altered sediment budget	Altered habitat Effects on fish behaviour Changed species diversity Changed invertebrate biomass Changed plant biomass Changed animal biomass Disturbance/loss of sensitive species Effects on fish spawning
	Removal of vegetation	Changed plant biomass Altered habitat Changed invertebrate biomass Changed animal biomass Disturbance/loss of sensitive species
	Removal of gravels	Effects on fish spawning Changed invertebrate biomass Altered habitat Loss of sensitive species

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<b>Issues</b>	<b>Sources of impact</b>	<b>Potential Impacts</b>
<b>Human-Related</b>	<b>Change in water levels</b>	<b>Changed flood risk</b>
<b>Visual Amenity</b>	<b>Change in channel's appearance</b>	<b>Altered aesthetic value Altered landscape</b>
<b>Recreation Related</b>	<b>Altered in-channel habitat appearance</b>	<b>Change in angling quality</b>
<b>Heritage &amp; Archaeology</b>	<b>Excavation of the river bed</b>	<b>Disturbance and damage of known/unknown features</b>

## REFERENCES

### NRA Documents

Flood Defence Guidance for Conservation in Watercourse maintenance works (1994),  
NRA, Thames.

Asset Management: Planning for Flood Defences, 2 Vols, NRA/R&D Note. 199.

Management of Dredging Operations (1994). RP492 NRA, CIRIA, 6 Storey's Gate,  
Westminster, London SW1P 3AU

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Institution of Civil Engineers (1993) Land Drainage and Flood Defence Responsibilities,  
Thomas Telford, London.

An Introduction to River Management, Booklet 2, Institution of Water and Environmental  
Management, 15 John Street, London WC1N 2EB.

### Other relevant scoping guidance

Channel Works  
Restoration and Enhancement of River Channels  
Suction Dredging  
Vegetation Management

**Development Type: Bank Protection**

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further Guidance Notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Surface Water/ Hydrology/Hydraulics	Hard permeable revetments	Changed velocities Changed hydraulic roughness Riparian drainage affected
	Hard impermeable revetment	Changed velocities Changed hydraulic roughness Riparian drainage affected
	Groynes	Changed flow velocities Convergence/divergence of flow Changed hydraulic roughness
	Non-biodegradable geotextiles	Changed hydraulic roughness Riparian drainage affected
	Biodegradable geotextiles	Changed flow velocities Changed hydraulic roughness Riparian drainage affected
	Natural (cut) vegetation eg: spiling/faggots/hurdles/ straw/coir etc	Changed hydraulic roughness Riparian drainage affected
	Vegetation planting (grass, reeds etc)	Changed hydraulic roughness
Channel Morphology/ Sediments	Hard permeable revetments	Changed bank/bed stability Changed channel size
	Hard impermeable revetment	Changed bank/bed stability Changed channel size
	Groynes	Changed bank/bed stability Degradation/erosion of bed and/or banks Deposition/siltation Disturbance to bed forms (pools riffles) Changed channel size
	Non-biodegradable geotextiles	Changed bank/bed stability Changed channel size
	Biodegradable geotextiles	Changed bank/bed stability Changed channel size

Issues	Sources of impact	Potential Impacts
	Natural (cut) vegetation eg: spiling/faggots/hurdles/ straw/coir etc	Changed bank/bed stability Deposition/siltation Changed channel size
	Vegetation planting (grass, reeds etc)	Changed bank/bed stability Deposition/siltation Changed channel size
Groundwater Hydraulics	Hard permeable revetments	Changed infiltration
	Hard impermeable revetment (vertical/sloping)	Changed infiltration Change in water-table (level)
	Vegetation planting (grass, reeds etc)	Change in water-table (level)
Surface Water Quality	Hard permeable revetments	Changed in quality
	Groynes	Change in oxygen content Re-suspension of contaminated sediments
	Biodegradable geotextiles	Chemical pollution Change in oxygen content
	Natural (cut) vegetation eg: spiling/faggots/hurdles/ straw/coir etc	Change in quality Change in oxygen content
	Vegetation planting (grass, reeds etc)	Change in quality
Groundwater Quality	Vegetation planting (grass, reeds etc)	Change in quality
Aquatic Ecology	Hard permeable revetments	Altered habitat Changed invertebrate biomass Effects on fish spawning Disturbance of sensitive species
	Hard impermeable revetments	Habitat removal Change in plant biomass Disturbance of sensitive species Changed invertebrate biomass
	Groynes	Altered habitat Effect on fish behaviour Change in the fish community Effects on fish spawning Changed invertebrate biomass Disturbance of sensitive species
	Non-biodegradable geotextiles	Altered habitat Disturbance of sensitive species Changed invertebrate biomass

Issues	Sources of impact	Potential Impacts
	Biodegradable geotextiles	Altered habitat Disturbance of sensitive species Changed invertebrate biomass
	Natural (cut) vegetation eg: spiling/faggots/hurdles/ straw/coir etc	Altered habitat Disturbance of sensitive species Changed invertebrate biomass
	Vegetation planting (grass, reeds etc)	Altered habitat Changed plant biomass Disturbance of sensitive species Changed invertebrate biomass
Terrestrial Ecology	Hard permeable revetments	Changed habitat Changed riparian habitat
	Hard impermeable revetments	Changed habitat Changed riparian habitat Loss of wildlife habitat Change in animal biomass
	Groynes	Disturbance of sensitive species
	Non-biodegradable geotextiles	Changed habitat Changed riparian habitat
	Biodegradable geotextiles	Changed habitat Changed riparian habitat
	Natural (cut) vegetation eg: spiling/faggots/hurdles/ straw/coir etc	Changed habitat Changed riparian habitat
	Vegetation planting (grass, reeds etc)	Changed habitat Changed riparian habitat
Human-Related	Hard permeable revetments	Improved safety Changed flood risk
	Hard impermeable revetments	Improved safety Changed flood risk
	Groynes	Disruption to water users
	Non-biodegradable geotextiles	Disrupted access
	Biodegradable geotextiles	Disrupted access
	Natural (cut) vegetation eg: spiling/faggots/hurdles/ straw/coir etc	Disrupted access
	Vegetation planting (grass, reeds etc)	Disrupted access Changed flood risk

Issues	Sources of impact	Potential Impacts
Land Use Change	Hard permeable revetments	Loss of riparian land
	Hard impermeable revetments	Loss of riparian land
Visual Amenity	Hard permeable revetments	Altered aesthetic value
	Hard impermeable revetments	Altered aesthetic value
	Groynes	Altered aesthetic value
	Non-biodegradable geotextiles	Altered aesthetic value
	Biodegradable geotextiles	Altered aesthetic value
	Natural (cut) vegetation eg: spiling/faggots/hurdles/ straw/coir etc	Altered aesthetic value
	Vegetation planting (grass, reeds etc)	Altered aesthetic value
Recreation-Related	Hard permeable revetments	Alterations to access Change in angling quality
	Hard impermeable revetments	Alterations to access Altered facilities Disruption to users of water environment
	Groynes	Alterations to access Altered facilities Disruption to water users
	Non-biodegradable geotextiles	Alterations to access
	Biodegradable geotextiles	Alterations to access
	Natural (cut) vegetation eg: spiling/faggots/hurdles/ straw/coir etc	Alterations to access Altered facilities
	Vegetation planting (grass, reeds etc)	Alterations to access Disruption to water users Disruption to users of water environment
Heritage & Archaeology	Hard permeable revetments	Destruction and damage of known/unknown features Change in historic landscape
	Hard impermeable revetments	Destruction and damage of known/unknown features Change in historic landscape
	Non-biodegradable geotextiles	Destruction and damage of known/unknown features
	Biodegradable geotextiles	Destruction and damage of known/unknown features

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Issues	Sources of impact	Potential Impacts
	Natural (cut) vegetation eg: spiling/faggots/hurdles/ straw/coir etc	Destruction and damage of known/unknown features
	Vegetation planting (grass, reeds etc)	Destruction and damage of known/unknown features

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## REFERENCES

### NRA Documents

### External Publications

The Institution of Civil Engineers, (1984) Flexible Armoured Revetments, Incorporating Geotextiles. Proceedings of the International Conferences organised by the Institute of Civil Engineering, March 1984.

Coppin, N.J., and Richards, I.G. (eds) (1990) Use of Vegetation in Civil Engineering, in Environmental Assessment: a guide to the identification, evaluation and mitigation of environmental issues in construction schemes. Pre-publication draft, Construction Industry Research and Information Association (CIRIA), 6 Storey's Gate, Westminster, London.

### Other relevant scoping guidance

Generic Impacts of Construction  
Coastal Protection  
Restoration & Enhancement of River Channels  
Channel Works  
Embankments  
Vegetation Management

## Development Type: Flood Storage Area

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further Guidance Notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Surface Water Hydrology/Hydraulics	Impoundment	<ul style="list-style-type: none"> <li>Changed surface water runoff</li> <li>Changed flow velocities</li> <li>Changed magnitude of flooding</li> <li>Changed frequency of flooding</li> <li>Changed duration of flooding</li> <li>Riparian drainage affected</li> </ul>
	Discharge from impounding structure	<ul style="list-style-type: none"> <li>Changed flow velocities</li> <li>Regulated flow</li> </ul>
	Impounding structure	<ul style="list-style-type: none"> <li>Changed surface water runoff</li> <li>Changed hydraulic roughness</li> <li>Riparian drainage affected</li> </ul>
Channel Morphology/ Sediments	Impoundment	<ul style="list-style-type: none"> <li>Changed bank/bed stability</li> <li>Degradation/erosion of bed or banks</li> <li>Deposition/siltation</li> <li>Change of bed slope</li> <li>Disturbance to bed forms (pools, riffles)</li> <li>Changed suspended sediment load</li> <li>Changed bed load</li> </ul>
	Discharge from impounding structure	<ul style="list-style-type: none"> <li>Changed bank/bed stability</li> <li>Degradation/erosion of bed or banks</li> <li>Deposition/siltation</li> <li>Disturbance to bed forms (pools, riffles)</li> <li>Domino effect</li> <li>Changed channel size</li> <li>Changed suspended sediment load</li> </ul>
Groundwater Hydraulics	Impoundment	<ul style="list-style-type: none"> <li>Changed flow</li> <li>Change in water-table (level)</li> <li>Change in pressure potential</li> </ul>
	Impounding structure	<ul style="list-style-type: none"> <li>Changed infiltration</li> <li>Barrier to flow</li> <li>Change in pressure potential</li> <li>Changed storage capacity</li> </ul>

Issues	Sources of impact	Potential Impacts
Surface Water Quality	Impoundment	Change in quality Chemical pollution Stratification Rubbish/trash Changed dilution capacity Change in residence/flushing time Change in oxygen content
Aquatic Ecology	Impoundment	Altered habitat Effect on fish behaviour Barrier to fish migration Effects on fish spawning Disturbance/loss of sensitive species Barrier to mammals Changed invertebrate biomass
	Discharge from impounding structure	Altered habitat Effect on fish behaviour Barrier to fish migration Effects on fish spawning Disturbance/loss of sensitive species Loss of rheophilic flora and fauna Barrier to mammals Changed invertebrate biomass
	Impounding structure	Altered habitat Changed plan biomass Barrier to fish migration Disturbance/loss of sensitive species Barrier to mammals Changed invertebrate biomass
Terrestrial Ecology	Impoundment	Changed habitat Wetland changes Changed riparian habitat Disturbance of sensitive species
	Discharge from impounding structure	Changed habitat Effect on fish behaviour Barrier to fish migration Effects on fish spawning Disturbance of sensitive species Loss of rheophilic flora and fauna Barrier to mammals Loss of sensitive species
	Impounding structure	Changed habitat Changed riparian habitat Disturbance of sensitive species

Issues	Sources of impact	Potential Impacts
Human-Related	Impoundment	Adverse Odour Disrupted access Health and safety risks Changed flood risk Flooding
	Discharge from impounding structure	Change in noise levels Changed flood risk
	Impounding structure	Disrupted access Changed flood risk Health and safety risks
Land Use Change	Impoundment	Loss of riparian land Change in grade of agricultural land Restriction to future developments Development of floodplain
	Discharge from impounding structure	Development of floodplain  Development of floodplain
	Impounding structure	Loss of riparian land Restriction to future developments Development of floodplain
Visual Amenity	Impoundment	Altered aesthetic value Altered landscape
	Discharge from impounding structure	Altered aesthetic value
	Impounding structure	Altered aesthetic value Altered landscape
Recreation-Related	Impoundment	Alterations to access Change in angling quality Disruption to users of water environment Changed boat use
	Discharge from impounding structure	Altered facilities Change in angling quality Disruption to users of water environment Changed boat use
	Impounding structure	Alterations to access Altered facilities Disruption to users of water environment

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Issues	Sources of impact	Potential Impacts
Heritage & Archaeology	Impoundment	Disturbance and damage of known/unknown features Change to historic landscape
	Impounding structure	Disturbance and damage of known/unknown features Change to historic landscape

## REFERENCES

### NRA Documents

### External Publications

Brooke, J. (1990) The Role of EA in Design and Construction for Flood Defence, IWEM Conference, 1990.

MAFF/English Nature/NRA (1992) Environmental Procedures for Inland Flood Defence Works: A guide for managers and decision makers in the NRA, IDBs and local authorities. MAFF Publications, PB 1152, London.

### Other relevant scoping guidance

Flood Diversion Channels  
Bank Protection  
Channel Works  
Reservoirs

**Development Type: Flood Embankment**

Issues	Sources of impact	Potential Impacts
Surface Water Hydrology/Hydraulics	Impermeable embankment	Changed surface water runoff Changed flow velocities Changed magnitude of flooding Changed frequency of flooding Changed duration of flooding Convergence/divergence of flow Changed hydraulic roughness Regulated flow Low flows Wave - generation Reduce tidal flow/flushing/mixing Riparian drainage affected Changed flow regime
	Borrow pit	Changed surface water runoff
Channel Morphology/ Sediments	Impermeable embankment	Changed bank/bed stability Degradation/erosion of bed or banks Deposition/situation Change of bed slope Change of planform/pattern Disturbance to bed forms (pools, riffles) Downstream erosion Changed channel size Changed turbidity Changed bed load
Groundwater Hydraulics	Impermeable embankment	Changed flow Changed infiltration Changed direction of flow Change in water-table (level) Barrier to flow Change in pressure potential Changed storage capacity
	Borrow pit	Changed flow Changed infiltration Changed direction of flow Change in water-table (level) Change in pressure potential Changed storage capacity
Surface Water Quality	Impermeable embankment	Change in quality Change in residence/flushing time
Groundwater Quality	Borrow pit	Saline intrusion

Issues	Sources of impact	Potential Impacts
Aquatic Ecology	Impermeable embankment	<ul style="list-style-type: none"> <li>Altered habitat</li> <li>Changed fish biomass</li> <li>Changed invertebrate biomass</li> <li>Changed plant biomass</li> <li>Changed species diversity</li> <li>Effect on fish behaviour</li> <li>Change in the fish community</li> <li>Fish kill</li> <li>Effects on fish spawning</li> <li>Disturbance of sensitive species</li> <li>Loss of rheophilic flora and fauna</li> <li>Barrier to mammals</li> <li>Loss of sensitive species</li> </ul>
	Terrestrial Ecology	<ul style="list-style-type: none"> <li>Impermeable embankment</li> <li>Borrow pit</li> </ul>
Human-Related	Impermeable embankment	<ul style="list-style-type: none"> <li>Disrupted access</li> <li>Changed flood risk</li> <li>Flooding</li> </ul>
	Borrow pit	<ul style="list-style-type: none"> <li>Disrupted access</li> <li>Improved safety</li> <li>Health risks</li> <li>Changed flood risk</li> <li>Flooding</li> </ul>
Land Use Change	Impermeable embankment	<ul style="list-style-type: none"> <li>Loss of riparian land</li> </ul>
	Borrow pit	<ul style="list-style-type: none"> <li>Loss of riparian land</li> </ul>
Visual Amenity	Impermeable embankment	<ul style="list-style-type: none"> <li>Altered aesthetic value</li> <li>Altered landscape</li> </ul>
	Borrow pit	<ul style="list-style-type: none"> <li>Altered aesthetic value</li> <li>Altered landscape</li> </ul>

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Issues	Sources of impact	Potential Impacts
Recreation-Related	Impermeable embankment	Alterations to access Change in angling quality Disruption to users of water environment
	Borrow pit	Alterations to access Altered facilities Change in angling quality Disruption to users of water environment
Heritage & Archaeology	Impermeable embankment	Disturbance and damage to known/unknown features
	Borrow pit	Change to historic landscape

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## REFERENCES

### NRA Documents

### External Publications

Gardiner, J.L. et al (1987) "The appraisal of environmentally sensitive options for flood alleviation using mathematical modelling", in Journal of Institution of Water and Environmental Management, 1987, 1, No. 2, pp 171-184.

Brookes, A. (1988) Channelized Rivers: Perspectives for Environmental Management, John Wiley & Sons Ltd.

### Other relevant scoping guidance

Generic Impacts of Construction  
Flood Diversion Channels  
Flood Storage Areas  
Channel Works

## Development Type: Culverts and Tunnels

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further guidance notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Surface Water Hydrology/Hydraulics	Steel/concrete cover (top/lid/arch)	<ul style="list-style-type: none"> <li>Changed surface water runoff</li> <li>Changed flow velocities</li> <li>Changed hydraulic roughness</li> <li>Riparian drainage affected</li> </ul>
	Steel/concrete lining (sides and bed)	<ul style="list-style-type: none"> <li>Changed hydraulic roughness</li> <li>Riparian drainage affected</li> </ul>
	Flow constriction	<ul style="list-style-type: none"> <li>Changed surface water runoff</li> <li>Changed flow velocities</li> <li>Changed magnitude of flooding</li> <li>Changed frequency of flooding</li> <li>Changed duration of flooding</li> <li>Convergence/divergency of flow</li> <li>Changed hydraulic roughness</li> <li>Regulated flow</li> <li>Reduce tidal flow/flushing/mixing</li> <li>Changed depth of flow</li> </ul>
	Trash screen	<ul style="list-style-type: none"> <li>Changed hydraulic roughness</li> <li>Changed flow velocities</li> </ul>
Channel Morphology/ Sediments	Steel/concrete cover (top/lid/arch)	<ul style="list-style-type: none"> <li>Changed channel size</li> </ul>
	Steel/concrete lining (sides and bed)	<ul style="list-style-type: none"> <li>Changed bank/bed stability</li> <li>Degradation/erosion of bed or banks</li> <li>Deposition/siltation</li> <li>Change of bed slope</li> <li>Change of planform/pattern</li> <li>Disturbance to bed forms (pools, riffles)</li> <li>Downstream erosion</li> <li>Changed channel size</li> <li>Changed turbidity</li> <li>Changed bed load</li> </ul>
	Flow constriction	<ul style="list-style-type: none"> <li>Degradation/erosion of bed or banks</li> <li>Deposition/siltation</li> <li>Change of bed slope</li> <li>Change of planform/pattern</li> <li>Disturbance to bed forms (pools, riffles)</li> <li>Downstream erosion</li> <li>Changed channel size</li> <li>Changed turbidity</li> <li>Changed bed load</li> <li>Changed invertebrate biomass</li> </ul>

Issues	Sources of impact	Potential Impacts
Groundwater Hydraulics	Steel/concrete cover (top/lid/arch)	Changed infiltration
	Steel/concrete lining (sides and bed)	Changed flow Changed infiltration Changed direction of flow Change in water-table (level) Barrier to flow Change in pressure potential Changed storage capacity
Surface Water Quality	Steel/concrete cover (top/lid/arch)	Change in quality Change in oxygen content Change in temperature Difficulty in tracing pollution source
	Steel/concrete lining (sides and bed)	Change in quality Chemical pollution Changed turbidity Rubbish/trash Changed dilution capacity Change in residence/flushing time Change in electrical conductivity/pH/acidification
	Flow constriction	Change in quality Changed turbidity Changed dilution capacity Change in residence/flushing time Change in oxygen content
	Trash/screen	Rubbish/trash
Groundwater Quality	Steel/concrete lining (sides and bed)	Chemical pollution
Aquatic Ecology	Steel/concrete cover (top/lid/arch)	Altered habitat Changed fish biomass Changed invertebrate biomass Changed plant biomass Changed species diversity Effect on fish behaviour Change in the fish community Effects on fish spawning Disturbance of sensitive species Loss of rheophilic flora and fauna Barrier to mammals Loss of sensitive species

Issues	Sources of impact	Potential Impacts
	Steel/concrete lining (sides and bed)	Altered habitat Changed fish biomass Changed invertebrate biomass Changed plant biomass Changed species diversity Effect on fish behaviour Change in the fish community Effects on fish spawning Disturbance of sensitive species Loss of rheophilic flora and fauna Barrier to mammals Loss of sensitive species
	Flow constriction	Altered habitat Effect on fish behaviour Change in the fish community Effects on fish spawning Disturbance of sensitive species Loss of sensitive species Changed invertebrate biomass Changed plant biomass
	Trash screen	Effect on fish behaviour Disturbance of sensitive species Barrier to mammals
Terrestrial Ecology	Steel/concrete cover (top/lid/arch)	Changed habitat Loss of wildlife habitat Changed riparian habitat Disturbance of sensitive species
	Steel/concrete lining (sides and bed)	Changed habitat Loss of wildlife habitat Change in plant biomass Change in animal biomass Changed riparian habitat Disturbance of sensitive species
	Trash screen	Changed habitat Disturbance of sensitive species
Human-Related	Steel/concrete cover (top/lid/arch)	Disrupted access Improved safety/safety hazard Health risks Adverse odour Disruption to commercial navigation
	Steel/concrete lining (sides and bed)	Disrupted access Health risks Disruption to commercial navigation
	Flow constriction	Change in noise levels Changed flood risk

Issues	Sources of impact	Potential Impacts
	Trash screen	Disrupted access Improved safety Health risks Disruption to commercial navigation
Land Use Change	Steel/concrete lining (sides and bed)	Loss of riparian land
Visual Amenity	Steel/concrete cover (top/lid/arch)	Altered aesthetic value Altered landscape
	Steel/concrete lining (sides and bed)	Altered aesthetic value
	Trash screen	Altered aesthetic value
Recreation-Related	Steel/concrete cover (top/lid/arch)	Alterations to access Altered facilities Change in angling quality Disruption to users of water environment Changed boat use
	Steel/concrete lining (sides and bed)	Change in angling quality Disruption to users of water environment Changed boat use
	Flow constriction	Altered facilities Change in angling quality Disruption to users of water environment
	Trash screen	Alterations to access Disruption to users of water environment
Heritage & Archaeology	Steel/concrete cover (top/lid/arch)	Change to historic landscape
	Steel/concrete lining (sides and bed)	Disturbance and damage of known/unknown features Change to historic landscape
	Flow constriction	Disturbance and damage of known/unknown features

## REFERENCES

### NRA Documents

### External Publications

Brookes, A. (1988) Channelized Rivers: Perspectives for Environmental Management, John Wiley & Sons Ltd.

Brooke, J. (1994), River and Coastal Engineering in Environmental Assessment: A guide to the identification and mitigation of environmental issues in construction schemes, Construction Industry Research and Information Association (CIRIA), 6 Storey's Gate, Westminster, London.

### Other relevant scoping guidance

Generic Impacts of Construction  
Channel Works  
Bank Protection  
Barriers/Bridges/Weirs

**Development Type: Barriers/Bridges/Weirs**

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further Guidance Notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Surface Water Hydrology/Hydraulics	Barrier to flow (flow impedance)	<ul style="list-style-type: none"> <li>Changed surface water runoff</li> <li>Changed flow velocities</li> <li>Changed magnitude of flooding</li> <li>Changed frequency of flooding</li> <li>Changed duration of flooding</li> <li>Convergence/divergence of flow</li> <li>Regulated flow</li> <li>Low flows</li> <li>Reduce tidal flow/flushing/mixing</li> <li>Riparian drainage affected</li> </ul>
	Bridge structure	<ul style="list-style-type: none"> <li>Changed flow velocities</li> <li>Changed magnitude of flooding</li> <li>Changed frequency of flooding</li> <li>Changed duration of flooding</li> <li>Convergence/divergence of flow</li> <li>Changed hydraulic roughness</li> </ul>
	Weir structure	<ul style="list-style-type: none"> <li>Changed flow velocities</li> <li>Changed magnitude of flooding</li> <li>Changed frequency of flooding</li> <li>Changed duration of flooding</li> <li>Convergence/divergence of flow</li> <li>Changed hydraulic roughness</li> <li>Regulated flow</li> <li>Low flows</li> <li>Riparian drainage affected</li> </ul>
	Impoundment behind weir	<ul style="list-style-type: none"> <li>Changed flow velocities</li> <li>Changed magnitude of flooding</li> <li>Changed frequency of flooding</li> <li>Changed duration of flooding</li> <li>Reduce tidal flow/flushing/mixing</li> <li>Riparian drainage affected</li> </ul>
	Flow constriction through bridge	<ul style="list-style-type: none"> <li>Changed flow velocities</li> <li>Changed magnitude of flooding</li> <li>Changed frequency of flooding</li> <li>Changed duration of flooding</li> <li>Convergence/divergence of flow</li> <li>Changed hydraulic roughness</li> <li>Regulated flow</li> </ul>

Issues	Sources of impact	Potential Impacts
Channel Morphology/ Sediments	Barrier to flow (flow impedance)	<ul style="list-style-type: none"> <li>Changed bank/bed stability</li> <li>Degradation/erosion of bed or banks</li> <li>Deposition/siltation</li> <li>Change of bed slope</li> <li>Disturbance to bed forms (pools, riffles)</li> <li>Downstream erosion</li> <li>Changed turbidity</li> </ul>
	Bridge structure	<ul style="list-style-type: none"> <li>Changed bank/bed stability</li> <li>Degradation/erosion of bed or banks</li> <li>Deposition/siltation</li> <li>Change of bed slope</li> <li>Disturbance to bed forms (pools, riffles)</li> <li>Downstream erosion</li> <li>Changed channel size</li> </ul>
	Weir structure	<ul style="list-style-type: none"> <li>Changed bank/bed stability</li> <li>Degradation/erosion of bed or banks</li> <li>Deposition/siltation</li> <li>Change of bed slope</li> <li>Disturbance to bed forms (pools, riffles)</li> <li>Downstream erosion</li> <li>Changed turbidity</li> <li>Changed bed load</li> </ul>
	Impoundment behind weir	<ul style="list-style-type: none"> <li>Changed bank/bed stability</li> <li>Degradation/erosion of bed or banks</li> <li>Deposition/siltation</li> <li>Change of planform/pattern</li> <li>Disturbance to bed forms (pools, riffles)</li> <li>Changed turbidity</li> <li>Changed bed load</li> </ul>
	Flow constriction through bridge	<ul style="list-style-type: none"> <li>Changed bank/bed stability</li> <li>Degradation/erosion of bed or banks</li> <li>Deposition/siltation</li> <li>Change of bed slope</li> <li>Disturbance to bed forms (pools, riffles)</li> <li>Changed channel size</li> <li>Changed turbidity</li> <li>Changed bed load</li> </ul>
Groundwater Hydraulics	Barrier to flow (flow impedance)	<ul style="list-style-type: none"> <li>Changed flow</li> <li>Changed infiltration</li> <li>Change in water-table (level)</li> <li>Barrier to flow</li> <li>Change in pressure potential</li> <li>Changed storage capacity</li> </ul>
	Weir structure	<ul style="list-style-type: none"> <li>Change in water-table (level)</li> <li>Change in pressure potential</li> </ul>

Issues	Sources of impact	Potential Impacts
Surface Water Quality	Impoundment behind weir	Changed flow Changed direction of flow Change in water-table (level) Change in pressure potential
	Barrier to flow (flow impedance)	Change in quality Changed turbidity Stratification Changed dilution capacity
	Bridge structure	Changed turbidity Change in residence/flushing time
	Weir structure	Change in quality Changed dilution capacity Change in oxygen content
	Impoundment behind weir	Change in quality Changed turbidity Stratification Rubbish/trash Change in residence/flushing time Change in oxygen content
Aquatic Ecology	Flow constriction through bridge	Change in residence/flushing time
	Barrier to flow (flow impedance)	Altered habitat Effect on fish behaviour Effects on fish spawning Disturbance/loss of sensitive species Barrier to mammals Changed invertebrate biomass
	Bridge structure	Altered habitat Changed invertebrate biomass Loss of sensitive species
	Weir structure	Altered habitat Changed species diversity Effect on fish behaviour Changed invertebrate biomass Loss of sensitive species
Aquatic Ecology	Impoundment behind weir	Altered habitat Effect on fish behaviour Effects on fish spawning Disturbance/loss of sensitive species Changed invertebrate biomass

Issues	Sources of impact	Potential Impacts
	Flow constriction through bridge	Altered habitat Effect on fish behaviour Disturbance/loss of sensitive species Changed invertebrate biomass
Terrestrial Ecology	Barrier to flow (flow impedance)	Wetland changes Changed riparian habitat Disturbance of sensitive species Changed species diversity
	Bridge structure	Changed habitat
	Weir structure	Wetland changes Changed riparian habitat Disturbance of sensitive species
	Impoundment behind weir	Changed habitat Wetland changes Changed riparian habitat Disturbance of sensitive species
	Flow constriction through bridge	Disturbance of sensitive species
Human-Related	Barrier to flow (flow impedance)	Disrupted access Changed flood risk Disruption to Commercial Navigation Flooding
	Bridge structure	Changed flood risk Disruption to Commercial Navigation Flooding
	Weir structure	Change in noise levels Adverse odour Changed flood risk Changed water resource Disruption to Commercial Navigation Flooding
	Impoundment behind weir	Adverse odour Disrupted access Changed flood risk Disruption to Commercial Navigation Flooding
Land Use Change	Bridge structure	Loss of riparian land
	Impoundment behind weir	Loss of riparian land Restriction to future developments

Issues	Sources of impact	Potential Impacts
Visual Amenity	Barrier to flow (flow impedance)	Aesthetic value Altered landscape
	Bridge structure	Aesthetic value Altered landscape
	Weir structure	Aesthetic value Altered landscape
	Impoundment behind weir	Altered aesthetic value Altered landscape
Recreation	Barrier to flow (flow impedance)	Alterations to access Disruption to users of water environment Change in angling quality
	Bridge structure	Alterations to access Disruption to users of water environment
	Weir structure	Change in angling quality Disruption to users of water environment
	Impoundment behind weir	Alterations to access Altered facilities Disruption to water users Change in angling quality Changed boat use
	Flow constriction through bridge	Change in angling quality Disruption to users of water environment
Heritage & Archaeology	Barrier to flow (flow impedance)	Change to historic landscape
	Bridge structure	Change to historic landscape
	Weir structure	Change to historic landscape
	Impoundment behind weir	Disturbance and damage of known/unknown features Change to historic landscape
	Flow constriction through bridge	Disturbance and damage of known/unknown features

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## REFERENCES

### NRA Documents

### External Publications

Albrecht, D. (1968) "The aeration of Ruhr Water at the Spillenburg Weir", in Wasserwirtschaft, Stuttgart, 58, pp 317-321.

Brookes, A. (1988) Channelized Rivers: Perspectives for Environmental Management, John Wiley & Sons Ltd.

Brooke, J. (1994), River and Coastal Engineering in Environmental Assessment: A guide to the identification and mitigation of environmental issues in construction schemes. Construction Industry Research and Information Association (CIRIA), 6 Storey's Gate, Westminster, London.

### Other relevant scoping guidance

Generic Impacts of Construction  
Culverts and Tunnels  
Construction Impacts  
Barrages

## Development Type: Off Line Ponds and Reservoirs

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further Guidance Notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Surface Water Hydrology/Hydraulics	Abstraction of water	Changed flow velocities Changed frequency/magnitude of flooding Low flows
	Discharge of Water	Changed flow velocities Changed frequency/magnitude of flooding
Channel Morphology/ Sediments	Abstraction from river	Changed bed/bank stability Changed suspended sediment load
	Discharge to river	Changed bed/bank stability Changed suspended sediment load Degradation/erosion of bed/banks
Groundwater Hydraulics	Abstraction from Groundwater	Changed flow
Surface Water Quality	Standing water in pond	Change in quality Eutrophication Organic pollution Chemical pollution Change in oxygen content Change in temperature
Aquatic Ecology	Pond creation	Altered habitat Changed fish biomass Fish kill Changed plant biomass Changed invertebrate biomass Loss of sensitive species
Terrestrial Ecology	Pond creation	Changed riparian habitat Wetland changes
Human-Related	Pond creation	Changed flood risk Maintenance requirement Changed water resource
Land Use Change	Pond creation	Loss of riparian land
Visual Amenity	Pond creation	Altered aesthetic value Altered landscape
Recreation-Related	Pond creation corridor	Altered facilities Change in angling quality

**Issues**

**Sources of impact**

**Potential Impacts**

Heritage and  
Archaeology

Excavation within the river  
corridor

Disturbance and damage of  
known/unknown features

## REFERENCES

### NRA Documents

### External Publications

Brooke, J. (1994), River and Coastal Engineering in Environmental Assessment: a guide to the identification and mitigation of environmental issues in construction schemes. Construction Industry Research and Information Association (CIRIA), 6 Storey's Gate, Westminster, London.

### Other relevant scoping guidance

Generic Impacts of Construction  
Groundwater Abstraction  
Flood Storage Areas  
Reservoirs  
Vegetation Management  
Conservation Enhancements

## Development Type: Coastal Protection

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further Guidance Notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Coastal hydrology/hydraulics	Hard impermeable revetment	Changed hydraulic roughness Changed flow velocities Wave generation
	Hard permeable revetment	Changed hydraulic roughness Changed flow velocities Wave generation
	Groynes	Changed hydraulic roughness Changed flow velocities
	Beach recharge	Changed hydraulic roughness Changed flow velocities
	Sediment extraction from donor beach	Changed hydraulic roughness Changed flow velocities
Coastal Morphology/ Sediments	Hard impermeable revetment	Changed stability of coastline Downstream erosion Beach erosion/deposition
	Hard permeable revetment	Changed stability of coastline Downstream erosion
	Groynes	Changed stability of Coastline Downstream erosion
	Sediment extraction from donor beach	Changed stability of donor coastline
	Beach recharge	Changed stability of recipient coastline
Groundwater Hydraulics	Hard impermeable revetment	Barrier to flow Changed flow
Coastal Water Quality	Groynes	Changed turbidity Re-suspension of contaminated sediments Change in oxygen content

Issues	Sources of impact	Potential Impacts
	Beach recharge	Changed turbidity Re-suspension of contaminated sediments Organic pollution Chemical pollution
	Sediment extraction from donor beach	Changed turbidity Resuspension of contaminated sediments
Groundwater Quality	Beach recharge	Movement of contaminated water Saline intrusion at donor beach
Aquatic Ecology	Hard impermeable revetment	Altered habitat Habitat removal Changed invertebrate biomass Changed plant biomass Changed species diversity Disturbance of sensitive species Barrier to mammals
	Hard permeable revetment	Altered habitat Habitat removal Changed invertebrate biomass Changed plant biomass Changed species diversity Disturbance of sensitive species Barrier to mammals
	Groynes	Altered habitat Effects on fish behaviour Effects on fish spawning Disturbance of sensitive species Changed invertebrate biomass
	Beach recharge	Altered habitat Effects on fish behaviour Effects on fish spawning Disturbance of sensitive species Changed invertebrate biomass
	Sediment extraction from donor beach	Altered habitat Effects on fish behaviour Effects on fish spawning Disturbance of sensitive species Changed invertebrate biomass
Terrestrial Ecology	Hard impermeable revetment	Changed habitat Change in plant biomass Wetland changes Disturbance of sensitive species Loss of wildlife habitat loss

Issues	Sources of impact	Potential Impacts
	Hard permeable revetment	Changed habitat Change in plant biomass Wetland changes Disturbance of sensitive species Loss of wildlife habitat
	Groynes	Changed habitat Disturbance of sensitive species
	Beach recharge	Changed habitat Disturbance of sensitive species
	Sediment extraction from donor beach	Changed habitat Disturbance of sensitive species
Human-Related	Hard impermeable revetment	Disrupted access Improved safety
Visual Amenity	Hard impermeable revetment	Altered aesthetic value Altered landscape
	Hard permeable revetment	Altered aesthetic value Altered landscape
	Groynes	Altered aesthetic value Altered landscape
	Beach recharge	Altered aesthetic value Altered landscape
Recreation-Related	Hard impermeable revetment	Alterations to access
	Groynes	Alterations to access Disruption to users of water environment Change in angling quality
	Beach recharge	Change in angling quality
	Sediment extraction from donor beach	Change in angling quality
Heritage & Archaeology	Hard impermeable revetment	Change in historic landscape Construction impact Prevention of cliff erosion (loss of fossils)
	Hard permeable revetment	Change in historic landscape Prevention of cliff erosion (loss of fossils)
	Groynes	Change in historic landscape Prevention of cliff erosion (loss of fossils)

## REFERENCES

### NRA Documents

### External Publications

Construction Industry Research and Information Association : Report 119 : Guide on the uses of groynes in coastal engineering. CIRIA, 6 Storey's Gate Westminster, London.

Construction Industry Research and Information Association : Technical Note 135 : Groynes in coastal engineering : data on performance of existing groyne systems. CIRIA, 6 Storey's Gate Westminster, London.

Haderme, E.C. (1971) "Ecological implications of breakwater construction in Monterey Harbour", in Mar. Pollution Bulletin, 2, pp 90-92.

Ministry of Agriculture Fisheries and Food : Performance of submerged offshore breakwaters. MAFF, London.

Ministry of Agriculture Fisheries and Food : Soft Cliffs : Prediction of recession rates & erosion control techniques. MAFF, London.

Murphy, K.O. (1989) "A knowledge-based consultation system for coastal zone management and development of planning", in South African Journal of Science, 85, April, pp 224-228.

MAFF (1993a) Coastal Defense and the Environment: A Strategic Guide, London, MAFF.

MAFF (1993b) Coastal Defense and the Environment: A Guide to Good Practice, London, MAFF.

Brooke, J. (1994), River and Coastal Engineering in Environmental Assessment: A guide to the identification and mitigation of environmental issues in construction schemes. Construction Industry Research and Information Association (CIRIA), 6 Storey's Gate, Westminster, London.

### Other relevant scoping guidance

Sea Outfalls  
Beach Nourishment  
Bank Protection  
Generic Impacts of Construction

## Development Type: Beach Nourishment

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further guidance notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Coastal Water hydrology/hydraulics	Altered offshore sediment budget	Changed tidal flow Changed hydraulic roughness Changed wave generation
	Altered onshore sediment budget	Changed hydraulic roughness Changed wave pattern
Coastal Morphology/ Sediments	Altered beach morphology	Changed coastline/beach stability Deposition/siltation of sediment Erosion of beach sediment
	Altered sea bed morphology	Changed turbidity Deposition/siltation Erosion of sea bed
	Altered grain size	Erosion of beach sediments deposition/siltation
Coastal Water Quality	Movement of sediment	Changed turbidity Change in quality Resuspension of contaminated sediments Organic pollution Chemical pollution Microbial contamination Sewage in water pumping Sand on shore
Aquatic Ecology	Altered sediment budget	Altered habitat Effects on fish behaviour Changed species diversity Changed invertebrate biomass Changed plant biomass Changed animal biomass Disturbance/loss of sensitive species
Terrestrial Ecology	Altered beach habitat	Disturbance to sensitive species Changed species diversity Changed habitat Change in plant biomass Change in animal biomass

Issues	Sources of impact	Potential Impacts
Human-Related	Change in water levels	Changed flood risk
	Sewage in water pumping/ Sand on shore	Health risks
	Operations: off shore	Disturbance of commercial fishing and navigation
	On shore	Change in noise levels Disrupted access Safety risks
	Higher drying beaches cause sand blow	Nuisance
Visual Amenity	Change in beach morphology/ appearance	Altered aesthetic value Altered landscape
Recreation-Related	Public exclusion during works	Alteration to access
	Change in beach morphology/ appearance	Altered facilities Disruptions to users of water environment

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## REFERENCES

### NRA Documents

Brooke, J. River and Coastal Engineering in Environmental Assessment . a Guide to the Identification, Evaluation and Mitigation of Environmental Issues in Construction Schemes. Construction Industry Research and Information Association (CIRIA), 6 Storey's Gate, Westminster, London

### External Publications

Beach Management Manual, see scheme options, Beach Replenishment Maintenance Work; Periodic Renourishment, Appendix 1 Beach Nourishment Resources, Construction Industry Research and Information Association (CIRIA), 6 Storey's Gate, Westminster, London

### Other relevant scoping guidance

Coastal Protection  
Sea Outfalls  
Suction Dredging

**Development Type: Suction Dredging**

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further Guidance Notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Coastal Water hydrology/hydraulics	Excavation of sea bed (Altered Bed topography)	Changed hydraulic roughness Changed tidal mixing Altered tidal flows Altered wave patterns
Coastal Morphology/ Sediments	Excavation of sea bed (Altered sediment budget)	Changed stability of sea bed Degradation/erosion of beach/coast Deposition/siltation of beach/coast Changed suspended sediment load Change of sea bed morphology
	Sediment disposal (lagoons/spray/bung/fill)	Changed stability of sea bed Degradation/erosion of beach/coast Deposition/siltation of beach/coast Changed suspended sediment load Change of sea bed morphology
Channel Morphology/ Sediments	Removal of bed material	Disturbance to bed forms (pools/riffles) Changed suspended sediment load Change of bed slope Changed channel size Changed bed load
	Sediment disposal (lagoons/spray/bung/fill)	Disturbance to bed forms (pools/riffles) Changed suspended sediment load Change of bed slope Changed channel size Changed bed load
Coastal Surface Water Quality	Altered flow patterns	Changed turbidity Change in quality Re-suspension of contaminated sediments Organic pollution Chemical pollution
	Excavation of sea bed	Release of radioactive material

Issues	Sources of impact	Potential Impacts
Aquatic Ecology	Excavation of sea bed/ removal of bed material (altered bed topography and sediment budget)	Altered habitat Effects on fish behaviour/biomass Changed species diversity Changed invertebrate biomass Changed plant biomass Disturbance/loss of sensitive species Effects on fish spawning Effects on bird feeding
Heritage & Archaeology	Excavation of the river bed	Disturbance and damage of known/unknown features
Military	Operations	Disturbance of exercise areas
Human-Related	Operations	Disruption to commercial fishing and navigation
Surface Water Quality	Sediment disposal	Changed turbidity Change in quality Organic pollution Chemical pollution
Groundwater Hydraulics	Sediment disposal (lagoons/spray/bung/fill)	Changed water table
Groundwater Quality	Sediment disposal (lagoons/spray/bung/fill)	Change in quality
Aquatic Ecology	Sediment disposal (lagoons/spray/bung/fill)	Altered habitat Changed fish biomass Changed invertebrate biomass Changed plant biomass Changed species diversity Effect on fish behaviour Change in the fish community Barrier to fish migration Fish kill Effects on fish spawning Disturbance of sensitive species Loss of rheophilic flora and fauna Barrier to mammals Loss of sensitive species
Terrestrial Ecology	Sediment disposal (lagoons/spray/bung/fill)	Altered habitat Loss of wildlife habitat Wetland changes Disturbance of sensitive species Changed species diversity
Human-Related	Sediment disposal (lagoons/spray/bung/fill)	Adverse odour

**Issues**

**Sources of impact**

**Potential Impacts**

Visual Amenity

Sediment disposal  
(lagoons/spray/bung/fill)

Altered aesthetic value

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## REFERENCES

### NRA Documents

Flood Defence Guidance for Conservation in Watercourse Maintenance Works (1994, NRA, Thames, Kings Meadow House, Kings Meadow Road, Reading.

Asset Management: Planning for Flood Defences, 2 Vols NRA/R & D, Note 199.

Management of Dredging Operations (1994/5) RP492, NRA, CIRIA, 6 Storey's Gate, Westminster, London.

### External Publications

Brooke, J. River and Coastal Engineering in Environmental Assessment, a Guide to the Identification, Evaluation and Mitigation Issues in Construction Schemes. Pre-publication draft, Construction Industry Research and Information Association (CIRIA), 6 Storey's Gate, Westminster, London.

RSPB, NRA, RSNC (1994), The New Rivers and Wildlife Handbook, RSPB, Sandy, Beds.

An Introduction to River Management, Booklet 2, Institution of Water and Environmental Management, 15 John Street, London WC1N 2EB.

Institution of Civil Engineers (1993) Land Drainage and Flood Defence Responsibilities, Thomas Telford, London.

MAFF/English Nature/NRA (1992) Environmental Procedures for Inland Flood Defence Works: A guide for managers and decisions makers in the NRA, IDBs and local authorities. MAFF Publications, PB 1152, London

### Other relevant scoping guidance

Beach Recharge  
Fluvial Dredging  
Coastal Protection  
Sea Outfalls

## Development Type: Restoration and Enhancement of River Channels

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further Guidance Notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Surface Water Hydrology/Hydraulics	Bank reprofiling	Changed flow velocities
	Instream habitat devices	Changed hydraulic roughness Convergence/divergence of flow Changed frequency of flooding Changed magnitude of flooding Changed duration of flooding
	Pool and riffle reconstruction	Changed hydraulic roughness Convergence/divergence of flows Changed frequency of flooding Changed magnitude of flooding Changed duration of flooding
	Substrate reinstatement	Changed hydraulic roughness Changed flow velocities Changed frequency of flooding Changed magnitude of flooding Changed duration of flooding
	Remeandering	Changed hydraulic roughness Changed flow velocities Changed frequency of flooding
Channel Morphology	Bank reprofiling	Changed bank/bed stability Deposition/siltation
	Instream habitat devices	Disturbance/erosion of bed and/or banks Deposition/siltation Changed bed load
	Pool and riffle reconstruction	Change of bed slope Deposition/siltation Changed channel size
	Substrate reinstatement	Changed channel size Change of bed slope Deposition/siltation Changed bed load

Issues	Sources of impact	Potential Impacts
	Remeandering	Changed channel size Changed bank/bed stability Disturbance/erosion of bed and/or banks Change of bed slope Change of planform/pattern Changed bed load
Groundwater Hydraulics	Substrate reinstatement	Change in water-table (level) Changed infiltration
	Remeandering	Change in water-table (level)
Surface Water Quality	Instream habitat devices	Change in quality Change in oxygen content Changed turbidity
	Pool and riffle reconstruction	Change in oxygen content
	Substrate reinstatement	Change in oxygen content
	Remeandering	Eutrophication Change in oxygen content
Aquatic Ecology	Bank reprofiling	Altered habitat Changed species diversity Changed invertebrate biomass Loss of sensitive species
	Instream habitat devices	Altered habitat Changed fish biomass Changed species diversity Changed invertebrate biomass Effects on fish spawning Loss of sensitive species
	Pool and riffle reconstruction	Altered habitat Effects on fish spawning Changed species diversity Changed invertebrate biomass Loss of sensitive species
	Substrate reinstatement	Altered habitat Effects on fish spawning Changed fish biomass Changed invertebrate biomass Loss of sensitive species

Issues	Sources of impact	Potential Impacts
	Remeandering	Altered habitat Changed fish biomass Changed invertebrate biomass Changed plant biomass Changed species diversity Effects on fish spawning Loss of sensitive species
Terrestrial Ecology	Substrate reinstatement	Wetland changes
	Remeandering	Wetland changes Changed riparian habitat
Human-Related	Substrate reinstatement	Changed flood risk Disruption to water users
	Remeandering	Changed flood risk Disruption to water users
Land Use Change	Bank reprofiling	Loss of riparian land
	Substrate reinstatement	Change in grade of agricultural land
	Remeandering	Change in grade of agricultural land Restriction to future developments Loss of riparian land
Visual Amenity	Bank reprofiling	Altered aesthetic value
	Instream habitat devices	Altered aesthetic value
	Pool and riffle reconstruction	Altered aesthetic value
	Substrate reinstatement	Altered aesthetic value
	Remeandering	Altered aesthetic value
Recreation-Related	Bank reprofiling	Alterations to access
	Instream habitat devices	Altered facilities Disruption to water users Change in angling quality
	Pool and riffle reconstruction	Altered facilities Disruption to water users Change in angling quality
	Substrate reinstatement	Disruption to water users Change in angling quality

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Issues	Sources of impact	Potential Impacts
	Remeandering	Altered facilities Disruption to water users Change in angling quality Alterations to access
Heritage & Archaeology	Remeandering	Change to historic landscape

## REFERENCES

### NRA Documents

### External Publications

Brookes, A. (1988) Channelized Rivers: Perspectives for Environmental Management, John Wiley & Sons Ltd.

Larsen, P. (1994) "Restoration of River Corridors: German Experiences", in The Rivers Handbook, Vol 2. (1994), Blackwell.

Brooke, J. (1994), River and Coastal Engineering in Environmental Assessment: a guide to the identification and mitigation of environmental issues in construction schemes. Construction Industry Research and Information Association (CIRIA), 6 Storey's Gate, Westminster, London.

RSPB, NRA & RSNC (1994), The New Rivers and Wildlife Handbook, RSPB, The Lodge, Sandy, Bedfordshire.

### Other relevant scoping guidance

Generic Impacts of Construction  
Bank Protection  
Channel Works  
Vegetation Management  
Conservation Enhancements

**Development Type: Conservation Enhancements (excluding in-channel works)**

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further guidance notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Surface Water Hydrology/Hydraulics	Pond creation	Low flows
Surface Water Quality	Pond creation	Change in water quality
Aquatic Ecology	Planting of <u>marginal</u> vegetation	Altered habitat Changed plant biomass Changed invertebrate biomass Changed species diversity
	Pond creation	Altered habitat Changed plant biomass Changed invertebrate Changed fish biomass Fish kill
Terrestrial Ecology	Bird/bat boxes corridor	Altered habitat Change in animal biomass Changed species diversity
	Otter holts	Altered habitat Change in animal biomass Changed species diversity
	Tree/shrub planting	Altered habitat Change in plant biomass Change in animal biomass Changed species diversity
	Willow pollarding	Altered habitat Change in plant biomass
	Wetland creation	Altered habitat Wetland changes Changed riparian habitat Changed species diversity
	Ponds	Altered habitat Wetland changes Changed riparian habitat Changed species diversity
Human-Related	Tree planting	Changed flood risk
	Wetland creation	Changed flood risk
	Pond creation	Maintenance requirement

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<b>Issues</b>	<b>Sources of impact</b>	<b>Potential Impacts</b>
<b>Visual Amenity</b>	<b>Enhancements within the river corridor</b>	<b>Altered aesthetic value Altered landscape</b>
<b>Recreation-Related</b>	<b>Enhancements within the river corridor</b>	<b>Altered facilities (eg Access)</b>
<b>Heritage and Archaeology</b>	<b>Excavation within the river corridor</b>	<b>Disturbance and damage of known/unknown features</b>

## REFERENCES

### NRA Documents

NRA (1993) Otters and River Habitat Management, Conservation Technical Handbook 3. NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol.

NRA Ponds & Conservation, A Rough Guide to Pond Restoration, Creation and Management. NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 2UD

### External Publications

RSPB, NRA, RSNC (1994) The New Rivers and Wildlife Handbook, RSPB, Beds

### Other relevant scoping guidance

Generic Impacts of Construction  
Restoration and Enhancement of River Channels  
Bank Protection  
Off Line Reservoirs and Ponds  
Channel Works

**Development Type: Water-based Recreation**

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further guidance notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Surface Water Hydrology/Hydraulics	Rowing, windsurfing etc	Wave generation
	Whitewater canoeing/rafting	Regulated flow
	Power assisted boats	Changed flow velocities Wave generation
Channel Morphology	Cyclists/walkers	Degradation/erosion of bed and/or banks
	Angling, bathing etc	Degradation/erosion of bed and/or banks
	Rowing, windsurfing etc	Changed turbidity Degradation/erosion of bed and/or banks
	Whitewater canoeing/rafting	Degradation/erosion of bed and/or banks Changed bank/bed stability
	Power assisted boats	Changed bank/bed stability Changed turbidity Degradation/erosion of bed and/or banks Contaminated sediment
Groundwater Hydraulics	Whitewater canoeing/rafting	Change in water-table (level)
Surface Water Quality	Cyclists/walkers	Rubbish/trash
	Angling, bathing etc	Microbial contamination Changed turbidity Rubbish/trash
	Rowing, windsurfing etc	Changed turbidity
	Whitewater canoeing/rafting	Changed turbidity
	Power assisted boats	Chemical pollution Re-suspension of contaminated sediments Rubbish/trash

Issues	Sources of impact	Potential Impacts
Aquatic Ecology	Angling, bathing etc	Altered habitat Changed plant biomass Disturbance of sensitive species Effect on fish behaviour
	Rowing, windsurfing etc	Effect on fish behaviour Effects on fish spawning
	Whitewater canoeing/rafting	Effect on fish behaviour Effects on fish spawning
	Power assisted boats	Effect on fish behaviour Altered habitat Changed fish biomass Changed plant biomass Disturbance of sensitive species
Terrestrial Ecology	Cyclists/walkers	Changed habitat Change in plant biomass Disturbance of sensitive species Loss of wildlife habitat
	Angling, bathing etc	Change in plant biomass Tree removal Changed habitat
Human-Related	Cyclists/walkers	Change in noise levels Nuisances
	Angling, bathing etc	Change in noise levels Nuisances Health risks
	Rowing, windsurfing etc	Change in noise levels Nuisances Health risks
	Whitewater canoeing/rafting	Change in noise levels Disrupted access
	Power assisted boats	Change in noise levels Disrupted access Health risks Nuisances Adverse odour
Visual Amenity	Cyclists/walkers	Altered aesthetic value
	Angling, bathing etc	Altered aesthetic value
	Rowing, windsurfing etc	Altered aesthetic value
	Whitewater canoeing/rafting	Altered aesthetic value
	Power assisted boats	Altered aesthetic value

Issues	Sources of impact	Potential Impacts
Recreation-Related	Angling, bathing etc	Disruption to users of the water environment
	Rowing, windsurfing etc	Disruption to users of the water environment
	Whitewater canoeing/rafting	Change in angling quality Disruption to users of the water environment Altered facilities
	Power assisted boats	Change in angling quality Disruption to users of the water environment Altered facilities
Heritage & Archaeology	Cyclists/walkers	Disturbance and damage of known/ unknown features
	Power assisted boats	Disturbance and damage of known/ unknown features

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## REFERENCES

### NRA Documents

River Thames Recreation Strategy, (1995) Consultation Report, NRA, Kings Meadow House, Kings Meadow Road, Reading.

NRA: National Recreation Strategy, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 2UD.

NRA: Impact of Recreation on Wildlife, R & D Study No. 498, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 2UD.

Pollution Prevention Guidance 14, Boats and Marinas, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 2UD.

### External Publications

### Other relevant scoping guidance

Navigation Issues, Speed Limits, Canoeing  
Swimming Pools  
Navigation Works  
Bank Protection  
Channel Works  
Vegetation Management

**Development Type: Off Road Recreation Activities (4x drive vehicles, mountain biking etc)**

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further guidance notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Channel Morphology/ Sediments	Activity in/across river channel	Changed bank/bed stability Degradation/erosion bed/banks Disturbance of bed forms
Surface Water Quality	Activity in/across river channel	Changed turbidity Change in quality Organic pollution Chemical pollution
Aquatic Ecology	Activity in/across river channel	Altered habitat Changed plant biomass Changed invertebrate biomass Disturbance/loss of sensitive species Changed species diversity Effect on fish spawning
Terrestrial Ecology	Activity within the river corridor	Altered habitat Loss of wildlife habitat Changed plant biomass Changed riparian habitat Disturbance of sensitive species
Human-Related	Activity within the river corridor	Change in noise levels Nuisance Increased vibration
Visual Amenity	Activity within the river corridor	Altered aesthetic value
Recreation-Related	Activity within the river corridor	Disruption to users of the water environment

## REFERENCES

### NRA Documents

NRA: River Thames Recreation Strategy (1995) NRA, Kings Meadow House, Kings Meadow Road, Reading.

### External Publications

### Other relevant scoping guidance

Water Based Recreation  
Restoration and Enhancement of River Channels  
Bank Protection

## Development Type: Vegetation Management

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further guidance notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Surface Water Hydrology/Hydraulics	Tree planting	<ul style="list-style-type: none"> <li>Changed surface water runoff</li> <li>Changed magnitude of flooding</li> <li>Changed duration of flooding</li> <li>Changed hydraulic roughness</li> <li>Riparian drainage affected</li> </ul>
	Reduction/removal of weeds	<ul style="list-style-type: none"> <li>Changed flow velocities</li> <li>Changed magnitude of flooding</li> <li>Changed frequency of flooding</li> <li>Changed duration of flooding</li> <li>Changed hydraulic roughness</li> <li>Riparian drainage affected</li> </ul>
	Pollarding/coppicing	<ul style="list-style-type: none"> <li>Changed surface water runoff</li> <li>Changed magnitude of flooding</li> <li>Changed duration of flooding</li> <li>Changed hydraulic roughness</li> <li>Riparian drainage affected</li> </ul>
	Tree removal	<ul style="list-style-type: none"> <li>Changed surface water runoff</li> <li>Changed magnitude of flooding</li> <li>Changed duration of flooding</li> <li>Changed hydraulic roughness</li> <li>Riparian drainage affected</li> </ul>
	Shrub/grass removal, cutting	<ul style="list-style-type: none"> <li>Changed surface water runoff</li> <li>Changed magnitude of flooding</li> <li>Changed duration of flooding</li> <li>Changed hydraulic roughness</li> <li>Riparian drainage affected</li> </ul>
	Decomposition of organic matter/residues	<ul style="list-style-type: none"> <li>Changed surface water runoff</li> <li>Changed hydraulic roughness</li> <li>Riparian drainage affected</li> </ul>
	Booms	<ul style="list-style-type: none"> <li>Changed flow velocities</li> <li>Changed magnitude of flooding</li> <li>Changed duration of flooding</li> <li>Changed hydraulic roughness</li> </ul>
	Straw bales (algae control)	<ul style="list-style-type: none"> <li>Changed surface water runoff</li> <li>Changed magnitude of flooding</li> <li>Changed duration of flooding</li> <li>Changed hydraulic roughness</li> <li>Riparian drainage affected</li> </ul>

Issues	Sources of impact	Potential Impacts
	Irrigation	Changed surface water runoff Changed magnitude of flooding Changed duration of flooding
	Hedge removal	Changed surface water runoff Changed magnitude of flooding Changed duration of flooding Changed hydraulic roughness
	Mulching	Changed surface water runoff Changed hydraulic roughness
	Dominance of a particular species	Changed surface water runoff Changed flow velocities
Channel Morphology/ Sediments	Tree planting	Changed bank/bed stability
	Tree removal	Changed bank/bed stability Degradation/erosion of bed or banks Deposition/siltation Change of planform/pattern Disturbance to bed forms (pools, riffles) Changed turbidity
	Shrub/grass removal, cutting	Changed bank/bed stability Changed turbidity
	Decomposition of organic matter/residues	Changed turbidity
	Hand cutting, hoeing, raking	Changed turbidity
	Mechanical weed cutting boats	Changed bank/bed stability Disturbance to bed forms (pools, riffles) Changed turbidity Changed bed load
	Tractor mounted cutters/ buckets	Changed bank/bed stability Degradation/erosion of bed or banks Changed turbidity
	Straw bales (algae control)	Changed bank/bed stability
	Irrigation	Changed turbidity
	Hedge removal	Disturbance to bed forms (pools, riffles)
Groundwater Hydraulics	Tree planting	Changed infiltration Change in pressure potential Change in water-table (level)
	Reduction/removal of weeds	Change in water-table (level) Change in pressure potential

Issues	Sources of impact	Potential Impacts
	Pollarding/coppicing	Changed infiltration Change in pressure potential
	Tree removal	Changed infiltration Change in water-table (level) Change in pressure potential
	Shrub/grass removal, cutting	Changed infiltration
	Decomposition of organic matter/residues	Changed infiltration Changed storage capacity
	Irrigation	Changed flow Changed infiltration Change in water-table (level) Change in pressure potential
	Hedge removal	Changed infiltration Change in pressure potential
	Mulching	Changed infiltration Changed storage capacity
Surface Water Quality	Tree planting	Organic pollution Change in temperature
	Reduction/removal of weeds	Change in residence/flushing time
	Pollarding/coppicing	Change in temperature
	Tree removal	Change in quality Changed turbidity Change in temperature
	Mechanical mowing	Organic pollution
	Decomposition of organic matter/residues	Change in quality Nutrient enrichment Changed turbidity Microbial contamination Changed dilution capacity Organic pollution Change in residence/flushing time Change in oxygen content Change in electrical conductivity/pH/acidification Change in temperature
	Booms	Change in quality Change in temperature
	Mechanical weed cutting boats	Changed turbidity Organic pollution
	Tractor mounted cutters/ buckets	Changed turbidity Organic pollution

Issues	Sources of impact	Potential Impacts
	Straw bales (algae control)	Change in quality Organic pollution
	Biological weed control	Change in quality Nutrient enrichment
	Chemical weed control	Change in quality Chemical pollution Changed turbidity Changed dilution capacity Organic pollution Change in residence/flushing time Change in oxygen content
	Irrigation	Change in quality Nutrient enrichment
	Hedge removal	Change in quality
Groundwater Quality	Tractor mounted cutters/ buckets	Organic pollution
	Irrigation	Change in quality
Aquatic Ecology	Tree planting	Altered habitat Changed invertebrate biomass Loss of sensitive species
	Reduction/removal of weeds	Altered habitat Changed plant biomass Changed species diversity Effect on fish behaviour Fish kill Disturbance/loss of sensitive species Changed invertebrate biomass
	Pollarding/coppicing	Altered habitat Changed plant biomass Disturbance of sensitive species Changed invertebrate biomass
	Tree removal	Altered habitat Changed plant biomass Changed species diversity Effect on fish behaviour Disturbance/loss of sensitive species Changed invertebrate biomass
	Mechanical mowing	Disturbance of sensitive species Changed invertebrate biomass
	Decomposition of organic matter/residues	Altered habitat Changed plant biomass Disturbance of sensitive species Changed invertebrate biomass

Issues	Sources of impact	Potential Impacts
	Hand cutting, hoeing, raking	Disturbance of sensitive species Changed invertebrate biomass
	Booms	Altered habitat Effect on fish behaviour Disturbance of sensitive species Changed invertebrate biomass
	Mechanical weed cutting boats	Effect on fish behaviour Disturbance of sensitive species Changed invertebrate biomass
	Tractor mounted cutters/ buckets	Effect on fish behaviour Disturbance of sensitive species Changed invertebrate biomass
	Straw bales (algae control)	Altered habitat Changed species diversity Disturbance of sensitive species Changed invertebrate biomass
	Biological weed control	Altered habitat Changed fish biomass Changed invertebrate biomass Changed plant biomass Changed species diversity Change in the fish community Disturbance/loss of sensitive species
	Irrigation	Altered habitat Disturbance of sensitive species Changed invertebrate biomass
	Hedge removal	Altered habitat Disturbance of sensitive species Changed invertebrate biomass
Terrestrial Ecology	Tree planting	Changed habitat Wetland changes Change in plant biomass Changed riparian habitat Changed species diversity
	Reduction/removal of weeds	Wetland changes Changed riparian habitat Disturbance of sensitive species
	Pollarding/coppicing	Altered habitat Loss of wildlife habitat Change in plant biomass Disturbance of sensitive species

Issues	Sources of impact	Potential Impacts
	Tree removal	Altered habitat Tree removal Loss of wildlife habitat Change in plant biomass Disturbance of sensitive species Changed species diversity
	Mechanical mowing	Altered habitat Disturbance of sensitive species
	Decomposition of organic matter/residues	Altered habitat Disturbance of sensitive species
	Hand cutting, hoeing, raking	Disturbance of sensitive species
	Mechanical weed cutting boats	Disturbance of sensitive species
	Tractor mounted cutters/ buckets	Altered habitat Disturbance of sensitive species
	Straw bales (algae control)	Altered riparian habitat Disturbance of sensitive species
	Irrigation	Altered habitat Wetland changes Disturbance of sensitive species
	Hedge removal	Altered habitat Loss of wildlife habitat Change in plant biomass Disturbance of sensitive species
	Mulching	Altered habitat
	Dominance of a particular species	Altered habitat Loss of wildlife habitat Change in plant biomass Change in animal biomass Disturbance of sensitive species Change in species diversity
Human-Related	Tree planting	Disrupted access
	Reduction/removal of weeds	Improved safety
	Tree removal	Changed flood risk
	Mechanical mowing	Change in noise levels Increased vibration Disrupted access
	Decomposition of organic matter/residues	Adverse odour Health risks
	Booms	Disruption to commercial navigation

Issues	Sources of impact	Potential Impacts
	Mechanical weed cutting boats	Change in noise levels Nuisances Disruption to commercial navigation
	Tractor mounted cutters/ buckets	Change in noise levels Increased vibration Disrupted access Nuisances Disruption to commercial navigation
	Straw bales (algae control)	Disruption to commercial navigation
	Biological weed control	Adverse odour Health risks
Land Use Change	Tree planting	Afforestation
	Tree removal	Deforestation
	Decomposition of organic matter/residues	Change in grade of agricultural land Restriction to future development
	Irrigation	Arable intensification
	Hedge removal	Arable intensification
	Mulching	Arable intensification
Visual Amenity	Tree planting	Altered aesthetic value Altered landscape
	Reduction/removal of weeds	Altered aesthetic value
	Pollarding/coppicing	Altered aesthetic value
	Tree removal	Altered aesthetic value Altered landscape
	Mechanical Mowing	Altered aesthetic value Altered landscape
	Decomposition of organic matter/residues	Altered aesthetic value
	Booms	Altered aesthetic value
	Straw bales (algae control)	Altered aesthetic value
	Biological weed control	Altered aesthetic value
	Hedge removal	Altered aesthetic value Altered landscape
	Dominance of a particular species	Altered aesthetic value Altered landscape

Issues	Sources of impact	Potential Impacts
Recreation-Related	Tree planting	Alterations to access Change in angling quality
	Reduction/removal of weeds	Alterations to access Change in angling quality
	Pollarding/coppicing	Change in angling quality
	Tree removal	Alterations to access Change in angling quality Changed boat use
	Mechanical mowing	Alterations to access Disruption to users of water environment Change in angling quality
	Decomposition of organic matter/residues	Change in angling quality Disruption to users of water environment Alterations to access
	Hand cutting, hoeing, raking	Alterations to access Change in angling quality
	Booms	Alterations to access Altered facilities Disruption to users of water environment Change in angling quality Changed boat use
	Mechanical weed cutting boats	Alterations to access Disruption to users of water environment Change in angling quality Changed boat use
	Tractor mounted cutters/ buckets	Alterations to access Disruption to users of water environment Change in angling quality Changed boat use
	Straw bales (algae control)	Alterations to access Disruption to users of water environment Change in angling quality Changed boat use
	Biological weed control	Altered facilities Disruption to users of water environment Change in angling quality
	Irrigation	Change in angling quality
Hedge removal	Alterations to access	

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Issues	Sources of impact	Potential Impacts
Heritage & Archaeology	Tree planting	Disturbance and damage of known/unknown features
	Tree removal	Change to historic landscape
	Mechanical weed cutting boats	Disturbance and damage of known/unknown features
	Tractor mounted cutters/ buckets	Disturbance and damage of known/unknown features
	Hedge removal	Change to historic landscape

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## REFERENCES

### NRA Documents

Forestry Business Plan, (1995) NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 2UD

### External Publications

MAFF : Experimental investigation of hydraulic affects of vegetation management - FD 0108 (HR & Aqu, Weeds Res. Unit).

MAFF : Guidelines for the use of herbicide on weeds in or near watercourses and lakes. Booklet B2078. Revised 1985.

Seagrove C. (1988) Aquatic Weed Control, Fishing News Books Ltd, Surrey.

Forestry Commission (1989) Provisional Code of Practice for the Use of Pesticides in Forestry. Occasional Paper 21. Forestry Commission, Edinburgh.

Forestry Commission (1990) Forest Nature Conservation Guidelines. Forestry Commission. Edinburgh.

### Other relevant scoping guidance

Deliberate Introduction of Species

Agriculture

Afforestation

Restoration and Enhancements of River Channels

Points of Large Abstraction

Conservation Enhancement

**Development Type: Deliberate Introduction of Species**

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further guidance notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Surface water hydrology/hydraulics	Vegetation	<ul style="list-style-type: none"> <li>Changed surface water runoff</li> <li>Changed flow velocities</li> <li>Changed magnitude of flooding</li> <li>Convergence/divergence of flow</li> <li>Changed hydraulic roughness</li> </ul>
	Channel morphology/sediments	<ul style="list-style-type: none"> <li>Changed bank/bed stability</li> <li>Deposition/siltation</li> <li>Changed channel size</li> </ul>
Surface Water Quality	Fish	<ul style="list-style-type: none"> <li>Change in quality</li> <li>Changed turbidity</li> <li>Microbial contamination</li> <li>Organic pollution</li> </ul>
	Alien eggs, larvae	<ul style="list-style-type: none"> <li>Change in quality</li> <li>Microbial contamination</li> </ul>
	Vegetation	<ul style="list-style-type: none"> <li>Change in quality</li> <li>Change in oxygen content</li> <li>Change in organic pollution</li> </ul>
Aquatic Ecology	Fish	<ul style="list-style-type: none"> <li>Disease/parasite infection</li> <li>Changed fish biomass</li> <li>Changed plant biomass</li> <li>Changed invertebrate biomass</li> <li>Changed species diversity</li> <li>Change in the fish community</li> <li>Disturbance/loss of sensitive species</li> </ul>
	Alien eggs, larvae	<ul style="list-style-type: none"> <li>Changed fish biomass</li> <li>Changed invertebrate biomass</li> <li>Changed species diversity</li> <li>Changed plant biomass</li> <li>Changes species diversity</li> <li>Disturbance of sensitive species</li> </ul>
	Vegetation	<ul style="list-style-type: none"> <li>Disease/infection</li> <li>Changed fish biomass</li> <li>Changed species diversity</li> <li>Change of fish community</li> <li>Loss of sensitive species</li> <li>Change in spawning habitat</li> </ul>

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<b>Issues</b>	<b>Sources of impact</b>	<b>Potential Impacts</b>
<b>Terrestrial Ecology</b>	<b>Vegetation</b>	<b>Changed habitat Change in plant biomass Changed riparian habitat</b>
<b>Human-Related</b>	<b>Fish</b>	<b>Health risks</b>
	<b>Alien eggs, larvae</b>	<b>Health risks</b>
	<b>Vegetation</b>	<b>Nuisances Changed flood risk</b>
<b>Visual Amenity</b>	<b>Vegetation</b>	<b>Changed aesthetic value</b>
<b>Recreation-Related</b>	<b>Fish</b>	<b>Change in angling quality</b>
	<b>Alien eggs, larvae</b>	<b>Change in angling quality</b>
	<b>Vegetation</b>	<b>Change in angling quality Disruption to users of water environment</b>

## REFERENCES

### NRA Documents

TE/FH/006 PM. Section 30 and Disease Procedures Draft 20 May 1994, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol.

### External Publications

### Other relevant scoping guidance

Fish Farms  
Interbasin Transfer of Flow  
Pest Species Control  
Vegetation Management

## Development Type: Groundwater Abstraction

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further guidance notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Surface Water Hydrology/Hydraulics	Over-pumping causing aquifer depletion	Low flows Changed surface water runoff Changed flow velocities
	Flow augmentation in recipient river	Regulated flow Changed flow velocities
Channel Morphology	Over-pumping causing aquifer depletion	Deposition/siltation Disturbance to bed forms (pools, riffles) Changed channel size Changed bed load
	Flow augmentation in recipient river	Degradation/erosion of bed and/or banks Changed bank/bed stability Changed turbidity Changed bed load
Groundwater Hydraulics	Over-pumping causing aquifer depletion	Changed flow Change in water-table (level) Effect on other abstractors Land subsidence
	Flow augmentation in recipient river	Change in water-table (level)
Surface Water Quality	Over-pumping causing aquifer depletion	Nutrient enrichment Change in oxygen content Changed dilution capacity
	Flow augmentation in recipient river	Changed dilution capacity Changed turbidity Changed temperature Organic pollution Chemical pollution Change in electrical conductivity/pH acidification
Groundwater Quality	Over-pumping causing aquifer depletion	Movement of contaminated water
	Flow augmentation in recipient river	Change in quality

Issues	Sources of impact	Potential Impacts
Aquatic Ecology	Over-pumping causing aquifer depletion	Altered habitat Changed fish biomass Changed invertebrate biomass Changed species diversity Effects on fish spawning Changed plant biomass
	Flow augmentation in recipient river	Altered habitat Effect on fish behaviour Disturbance of sensitive species
	Pumping tests	Effects on fish spawning Effects on availability of food sources for fish
Terrestrial Ecology	Over-pumping causing aquifer depletion	Changed habitat Loss of wildlife habitat Wetland changes Tree removal Loss of animal biomass
	Flow augmentation in recipient river	Wetland changes Changed habitat
Human-Related	Pumping station	Change in noise levels
	Over-pumping causing aquifer depletion	Changed water resource Disruption to commercial navigation
	Flow augmentation in recipient river	Changed water resource
Land Use Change	Over-pumping causing aquifer depletion	Change in grade of agricultural land
	Drying of land Flow augmentation in recipient river	Restriction to future developments Change in grade of agricultural land
Visual Amenity	Pumping station	Altered aesthetic value
	Over-pumping causing aquifer depletion	Altered aesthetic value
	Flow augmentation in recipient river	Altered aesthetic value

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<b>Issues</b>	<b>Sources of impact</b>	<b>Potential Impacts</b>
Recreation-Related	Over-pumping causing aquifer depletion	Altered facilities Disruption to users of the water environment Change in angling quality
	Flow augmentation in recipient river	Altered facilities Change in angling quality Disruption to users of water environment
Heritage & Archaeology	Over-pumping causing aquifer depletion	Change to historical landscape Disturbance and damage of known/unknown features

**Note:** Overpumping is defined as when abstraction exceeds the average recharge plus water required to maintain low flows.

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## REFERENCES

### NRA Documents

1992: Policy & Practice for the Protection of Groundwater. NRA, Rivers House, Water Drive, Aztec West, Almondsbury, Bristol.

Abstraction Licensing and Water Resources. A brief guide for potential abstractors. NRA, Rivers House, Water Drive, Aztec West, Almondsbury, Bristol.

### External Publications

Francis, C. (1995) Water Supply Infrastructure and Waste-water Treatment Works, in Environmental Assessment: a guide to the identification, evaluation and mitigation of environmental issues in construction schemes. Construction Industry Research and Information Association (CIRIA), 6 Storey's Gate, Westminster, London.

### Other relevant scoping guidance

Points of Large Abstraction  
Interbasin Transfer of Flow

### Development Type: Interbasin Transfer of Flow

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further guidance notes are available to provide greater detail where required.

Issues	Sources of Impact	Potential Impacts
Surface Water Hydrology/Hydraulics	Abstraction of water from donor river or water body	Changed flow velocities Low flows Changed surface water runoff
	Discharge of water into river or water body	Changed flow regime Changed flow velocities Changed frequency of flooding Regulated flow Changed level of flow
Channel Morphology/ Sediments	Abstraction of water from donor river or water body	Deposition/siltation Changed channel size
	Discharge of water into recipient river or water body	Degradation/erosion of bed and/or banks Changed channel size
Groundwater Hydraulics	Abstraction of water from donor river or water body	Changed flow Change in water-table (level)
	Leakage	Changed flow Change in water-table (level)
	Evaporation	Changed flow Change in water-table (level)
Surface Water Quality	Abstraction of water from donor river or water body	Changed dilution capacity Nutrient enrichment
	Discharge of water into recipient river or water body	Change in quality Changed dilution capacity Chemical pollution Changed water temperature Resuspension of contaminated sediments Change in electrical conductivity/pH acidification
Groundwater Quality	Abstraction of water from donor river or water body	Movement of contaminated water Change in quality

Issues	Sources of Impact	Potential Impacts
Aquatic Ecology	Abstraction of water from donor river or water body	Altered habitat Changed invertebrate biomass Changed fish biomass Changed species diversity Transfer of alien species between catchments Transfer of diseases between catchments Loss of sensitive species
	Discharge of water into recipient river or water body	Altered habitat Changed fish biomass Effects on fish spawning Effect on fish behaviour Transfer of alien species between catchments Transfer of diseases between catchments Changed invertebrate biomass Loss of sensitive species
Terrestrial Ecology	Abstraction of water from donor river or water body	Wetland changes Disturbance of sensitive species
	Discharge of water into recipient river or water body	Raise water table in adjacent fields Wetland changes Disturbance of sensitive species Flood field drains
Human-Related	Pumping Operations Abstraction of water from donor rivers or water body	Change in noise levels Disruption to users of water environment
	Discharge of water into recipient river or water body	Changed flood risk
Visual Amenity	Abstraction of water from donor river or water body	Altered aesthetic value
Recreation-Related	Abstraction of water from donor river or water body	Disruption to users of the water environment Change in angling quality
	Discharge of water into recipient river or water body	Altered facilities Change in angling quality

## REFERENCES

### NRA Documents

Abstraction Licensing and Water Resources., A brief guide for potential abstractors. NRA, Bristol, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol.

1994: Discharge Consents and Compliance., " The NRA's approach to control of discharges to water" WQ N° 17. NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol.

Howard Humphreys Consultants.(1994) National Water Resources Strategy, Comparative Environmental Appraisal of Strategic Options, (Vol. 1, Main Report, Vol. 2, Appendices). Brown Root Limited, 150 The Broadway, Wimbledon SW19 1RX.

### External Publications

Richards KS and Wood R (1977) "Urbanization, water distribution, and their effect on channel processes in River Channel Changes" ed. K J Gregory pp 369-388.

1995: Hydrological and Species Specific Responses to Water Transfers into the River Wear, North East England in Proceedings of an IAHS Symposium in Colorado (July 1995)

### Other relevant scoping guidance

Groundwater Abstraction  
Points of Large Abstraction  
Points of Large Discharge

## Development Type: Agriculture

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further guidance notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Surface Water Hydrology/Hydraulics	Silage stores	Changed surface water runoff Changed hydraulic roughness Riparian drainage affected
	Clear roof/yard water from farm buildings	Changed surface water runoff Changed magnitude of flooding Changed duration of flooding Changed hydraulic roughness Riparian drainage affected
	Arable farming	Changed surface water runoff Changed magnitude of flooding Changed hydraulic roughness Changed duration of flooding Riparian drainage affected
	Livestock grazing/watering	Changed surface water runoff Changed magnitude of flooding Changed duration of flooding Changed hydraulic roughness Riparian drainage affected
	Land drainage	Changed surface water runoff Changed flow velocities Changed magnitude of flooding Changed duration of flooding Changed hydraulic roughness Riparian drainage affected
	Irrigation	Changed surface water runoff Riparian drainage affected
	Abstraction	Changed flow velocities Changed magnitude of flooding Changed duration of flooding Low flows Riparian drainage affected
	Discharges	Changed flow velocities Changed duration of flooding Riparian drainage affected
	Access tracks	Changed surface water runoff Changed magnitude of flooding Changed duration of flooding Changed hydraulic roughness Riparian drainage affected

Issues	Sources of impact	Potential Impacts
Channel Morphology/ Sediments	Ditch clearance	<ul style="list-style-type: none"> <li>Changed flow velocities</li> <li>Changed magnitude of flooding</li> <li>Changed frequency of flooding</li> <li>Changed duration of flooding</li> <li>Changed hydraulic roughness</li> <li>Riparian drainage affected</li> </ul>
	Hedge cutting/removal	<ul style="list-style-type: none"> <li>Changed surface water runoff</li> </ul>
	Fencing	<ul style="list-style-type: none"> <li>Changed hydraulic roughness</li> </ul>
	Arable farming	<ul style="list-style-type: none"> <li>Changed suspended sediment load</li> </ul>
	Livestock grazing/watering	<ul style="list-style-type: none"> <li>Changed bank/bed stability</li> <li>Degradation/erosion of bed or banks</li> <li>Changed suspended sediment load</li> </ul>
	Land drainage	<ul style="list-style-type: none"> <li>Changed bank/bed stability</li> <li>Degradation/erosion of bed or banks</li> <li>Deposition/siltation</li> <li>Disturbance to bed forms (pools, riffles)</li> <li>Changed suspended sediment load</li> </ul>
	Irrigation	<ul style="list-style-type: none"> <li>Changed bank/bed stability</li> <li>Changed suspended sediment load</li> </ul>
	Abstraction	<ul style="list-style-type: none"> <li>Changed bank/bed stability</li> <li>Deposition/siltation</li> <li>Disturbance to bed forms (pools, riffles)</li> </ul>
	Discharges	<ul style="list-style-type: none"> <li>Changed bank/bed stability</li> <li>Degradation/erosion of bed or banks</li> <li>Change of bed slope</li> <li>Change of planform/pattern</li> <li>Disturbance to bed forms (pools, riffles)</li> <li>Changed suspended sediment load</li> <li>Changed bed load</li> </ul>
	Access tracks	<ul style="list-style-type: none"> <li>Changed bank/bed stability</li> </ul>
Groundwater Hydraulics	Ditch clearance	<ul style="list-style-type: none"> <li>Changed bank/bed stability</li> <li>Degradation/erosion of bed or banks</li> <li>Deposition/siltation</li> <li>Disturbance to bed forms (pools, riffles)</li> <li>Changed suspended sediment load</li> </ul>
	Hedge removal	<ul style="list-style-type: none"> <li>Deposition/siltation</li> <li>Changed suspended sediment load</li> </ul>
	Fishing	<ul style="list-style-type: none"> <li>Changed bank/bed stability</li> <li>Degradation/erosion of bed or banks</li> </ul>
	Silage stores	<ul style="list-style-type: none"> <li>Changed infiltration</li> <li>Change in pressure potential</li> </ul>

Issues	Sources of impact	Potential Impacts
	Clear roof/yard water from farm buildings	Changed flow Changed infiltration Changed direction of flow Barrier to flow Change in pressure potential Changed storage capacity Change in water-table (level)
	Arable farming	Changed infiltration Change in water-table (level) Change in pressure potential
	Slurry/storage/application	Changed flow Change in water-table (level)
	Land drainage	Changed infiltration Change in water-table (level)
	Irrigation	Changed flow Changed infiltration Change in water-table (level)
	Abstraction	Changed flow Change in water-table (level)
	Discharges	Changed flow Change in water-table (level)
	Access tracks	Changed infiltration Change in pressure potential Changed storage capacity
	Ditch clearance	Changed flow Change in water-table (level) Change in pressure potential
	Hedge cutting/removal	Changed infiltration Change in water-table (level)
Surface Water Quality	Clear roof/yard water from farm building	Change in quality rubbish/trash Chemical pollution Microbial contamination
	Silage store	Change in quality Changed turbidity Microbial contamination Organic pollution Change in oxygen content
	Leaching of fertilizer/pesticide residues	Change in quality Chemical pollution Nutrient enrichment Changed turbidity Microbial contamination Changed dilution capacity Organic pollution Change in oxygen content Change in electrical conductivity/pH/acidification

Issues	Sources of impact	Potential Impacts
	Arable farming	Change in quality
	Livestock grazing/watering	Change in quality Organic pollution Changed turbidity
	Fertilizer/pesticide/ storage and application	Microbial contamination Change in quality Chemical pollution
	Slurry storage/application	Change in quality Chemical pollution Nutrient enrichment Changed turbidity Microbial contamination Organic pollution Change in oxygen content Change in electrical conductivity/pH/acidification
	Land drainage	Change in quality Nutrient enrichment Change in residence/flushing time
	Irrigation	Change in quality Changed dilution capacity Change in residence/flushing time Change in oxygen content Change in electrical conductivity/pH/acidification
	Abstraction	Nutrient enrichment Changed dilution capacity Change in residence/flushing time
	Discharges	Change in quality Chemical pollution Changed turbidity Microbial contamination Changed dilution capacity Organic pollution Change in oxygen content Change in electrical conductivity/pH/acidification Change in temperature
	Vehicle use and maintenance	Change in quality Chemical pollution Rubbish/trash Changed dilution capacity Organic pollution Change in oxygen content Change in electrical conductivity/pH/acidification

Issues	Sources of impact	Potential Impacts
	Milking/meat production/ slaughter	Change in quality Chemical pollution Changed dilution capacity Organic pollution Change in residence/flushing time Change in oxygen content Change in electrical conductivity/pH/acidification Change in temperature
	Agrochemical/pesticide storage/ application	Change in quality Chemical pollution Changed dilution capacity Organic pollution Change in oxygen content Change in electrical conductivity/pH/acidification
	Ditch clearance	Change in quality Re-suspension of contaminated sediments Change in residence/flushing time
	Veterinary medicines	Change in quality Chemical pollution Changed dilution capacity Organic pollution Change in oxygen content Change in electrical conductivity/pH/acidification
	Fishing	Change in quality Chemical pollution Rubbish/trash
	Electrical fencing	Rubbish/trash
	Pest species control	Change in quality Chemical pollution Organic pollution
Groundwater Quality	Leaching of fertilizer/ pesticide residues	Movement of contaminated water Change in quality Chemical pollution Organic pollution
	Fertilizer storage/ application	Movement of contaminated water Change in quality Chemical pollution Organic pollution
	Slurry storage/application	Movement of contaminated water Change in quality Chemical pollution Organic pollution
	Land drainage	Movement of contaminated water
	Irrigation	Movement of contaminated water Change in quality
	Pipe distribution network	Change in pressure potential

Issues	Sources of impact	Potential Impacts
	Discharges	Change in quality Chemical pollution Organic pollution
	Vehicle use and maintenance	Change in quality Chemical pollution Organic pollution
	Milking/meat production/ slaughter	Change in quality Chemical pollution Organic pollution
	Agrochemical/pesticide storage/ application	Movement of contaminated water Change in quality Chemical pollution Organic pollution
	Veterinary medicines	Change in quality Chemical pollution Organic pollution
	Game	Chemical pollution
	Use of agrochemicals	Change in quality Chemical pollution Organic pollution
Aquatic Ecology	Leaching of fertilizer/ pesticide residues	Altered habitat Changed fish biomass Changed invertebrate biomass Changed plant biomass Changed species diversity Change in the fish community Disturbance/loss of sensitive species
	Livestock grazing/watering	Altered habitat Changed invertebrate biomass Disturbance/Loss of sensitive species
	Slurry storage/application spillage	Changed invertebrate biomass Changed plant biomass Changed species diversity Change in the fish community Disturbance/loss of sensitive species
	Land drainage	Altered habitat Effect on fish behaviour Effects on fish spawning Disturbance/loss of sensitive species Changed invertebrate biomass
	Irrigation	Disturbance of sensitive species Changed invertebrate biomass

Issues	Sources of impact	Potential Impacts
	Abstraction	Altered habitat Changed fish biomass Changed invertebrate biomass Changed plant biomass Changed species diversity Effect on fish behaviour Fish kill Effects on fish spawning Disturbance of/loss sensitive species Loss of rheophilic flora and fauna
	Discharges	Altered habitat Changed fish biomass Changed invertebrate biomass Changed plant biomass Changed species diversity Effect on fish behaviour Fish kill Effects on fish spawning Disturbance/loss of sensitive species Loss of rheophilic flora and fauna
	Milking/meat production/ slaughter	Altered habitat Effect on fish behaviour Effects on fish spawning Disturbance/loss of sensitive species Changed invertebrate biomass
	Agrochemical/pesticide storage/ application/spillage	Altered habitat Changed fish biomass Changed invertebrate biomass Changed plant biomass Changed species diversity Effect on fish behaviour Change in the fish community Fish kill Effects on fish spawning Disturbance/loss of sensitive species
	Ditch clearance	Altered habitat Changed plant biomass Effect on fish behaviour Effects on fish spawning Disturbance/loss of sensitive species Changed invertebrate biomass
	Veterinary medicines	Effect on fish behaviour Effects on fish spawning Disturbance/loss of sensitive species Changed invertebrate biomass
	Fishing	Effect on fish behaviour Fish kill Disturbance/loss of sensitive species Changed invertebrate biomass

Issues	Sources of impact	Potential Impacts
	Farm buildings (runoff)	Altered habitat Changed fish biomass Changed invertebrate biomass Changed plant biomass Changed species diversity Effect on fish behaviour Effects on fish spawning Disturbance/loss of sensitive species
	Pest species control	Altered habitat Changed invertebrate biomass Loss of sensitive species
Terrestrial Ecology	Silage store	Changed habitat Loss of wildlife habitat Changed riparian habitat Disturbance of sensitive species
	Farm buildings	Changed habitat Loss of wildlife habitat Changed riparian habitat Disturbance of sensitive species
	Arable farming	Changed habitat Tree removal Loss of wildlife habitat Wetland changes Change in plant biomass Change in animal biomass Changed riparian habitat Disturbance of sensitive species Changed species diversity
	Livestock grazing/watering	Changed habitat Loss of wildlife habitat Change in plant biomass Change in animal biomass Changed riparian habitat Disturbance of sensitive species
	Fertilizer storage/ application	Changed riparian habitat Disturbance of sensitive species
	Slurry storage/application spillage	Changed riparian habitat Disturbance of sensitive species Changed species diversity
	Land drainage	Changed habitat Wetland changes Changed riparian habitat Disturbance of sensitive species Changed species diversity
	Irrigation	Changed habitat Wetland changes Change in plant biomass Changed riparian habitat Disturbance of sensitive species

Issues	Sources of impact	Potential Impacts
	Pipe distribution network	Changed habitat Loss of wildlife habitat Disturbance of sensitive species
	Abstraction	Wetland changes Changed riparian habitat Disturbance of sensitive species
	Discharges	Changed riparian habitat Disturbance of sensitive species
	Access tracks	Changed habitat Tree removal Loss of wildlife habitat Change in plant biomass Change in animal biomass Changed riparian habitat Disturbance of sensitive species
	Milking/meat production/ slaughter	Disturbance of sensitive species
	Ditch clearance	Changed riparian habitat Disturbance of sensitive species
	Hedge cutting/removal	Changed habitat Loss of wildlife habitat Change in plant biomass Change in animal biomass Changed riparian habitat Disturbance of sensitive species Changed species diversity
	Veterinary medicines	Disturbance of sensitive species Changed species diversity
	Game	Change in animal biomass Disturbance of sensitive species Changed species diversity
	Fishing	Change in animal biomass
	Electrical fencing	Changed riparian habitat Disturbance of sensitive species
	Agrochemical/pesticide storage/ application	Changed habitat Change in plant biomass Change in animal biomass Changed riparian habitat Disturbance of sensitive species Loss of sensitive species Changed species diversity
	Mechanical scarecrow	Disturbance of sensitive species

Issues	Sources of impact	Potential Impacts
Human-Related	Pest species control	Change in noise levels Health risks Nuisances
	Silage store	Adverse odour Disrupted access Health risks
	Farm buildings	Disrupted access
	Leaching of fertilizer/ pesticide residues	Adverse odour Disrupted access Health risks Changed water resource
	Arable farming	Change in noise levels Increased vibration Adverse odour Disrupted access Health risks Changed flood risk
	Livestock grazing/watering	Adverse odour Disrupted access Health risks
	Fertilizer storage/application	Health risks
	Slurry storage/application	Adverse odour Disrupted access Health risks
	Land drainage	Changed flood risk Flooding
	Irrigation	Change in noise levels Disrupted access
	Pipe distribution network	Disrupted access
	Abstraction	Adverse odour Changed flood risk Changed water resource Disruption to commercial navigation Increase in noise levels
	Discharges	Adverse odour Changed flood risk Changed water resource Flooding Health risk
	Access tracks	Changed flood risk
	Vehicle use and maintenance	Health risks
	Milking/meat production/ slaughter	Adverse odour Health risks

Issues	Sources of impact	Potential Impacts
	Agrochemical/pesticide storage/ application	Change in noise levels Disrupted access Health risks Changed water resource
	Ditch clearance	Changed flood risk
	Veterinary medicines	Health risks
	Game	Change in noise levels Disrupted access
	Electric fencing	Disrupted access Health risks
	Pest species control	Change in noise levels Health risks
	Mechanical scarecrow	Change in noise levels Nuisances
Land Use Change	Silage store	Loss of riparian land Change in grade of agricultural land
	Farm buildings	Increased urban area Loss of riparian land Development of floodplain
	Leaching of fertilizer/ pesticide residues	Restriction to future developments
	Arable farming	Arable intensification Loss of riparian land Change in grade of agricultural land Restriction to future developments
	Livestock grazing/watering	Loss of riparian land Change in grade of agricultural land
	Fertilizer storage/application	Arable intensification Restriction to future developments
	Slurry storage/application	Arable intensification Restriction to future developments
	Land drainage	Arable intensification Change in grade of agricultural land Restriction to future developments
	Irrigation	Arable intensification
	Access tracks	Loss of riparian land Change in grade of agricultural land
	Agrochemical/pesticide storage/ application	Arable intensification Restriction to future developments
	Ditch clearance	Arable intensification

Issues	Sources of impact	Potential Impacts
	Hedge cutting/removal	Arable intensification Loss of riparian land
	Veterinary medicines	Restriction to future developments
Visual Amenity	Silage store	Altered aesthetic value Altered landscape
	Farm buildings	Altered aesthetic value Altered landscape
	Leaching of fertilizer/ pesticide residues	Altered aesthetic value
	Arable farming	Altered landscape
	Livestock grazing/watering	Altered aesthetic value Altered landscape
	Slurry storage/application	Altered aesthetic value
	Land drainage	Altered aesthetic value Altered landscape
	Irrigation	Altered aesthetic value Altered landscape
	Pipe distribution network	Altered aesthetic value
	Abstraction	Altered aesthetic value
	Discharges	Altered aesthetic value
	Access tracks	Altered aesthetic value Altered landscape
	Ditch clearance	Altered aesthetic value Altered landscape
	Hedge cutting/removal	Altered aesthetic value Altered landscape
	Electric fencing	Altered aesthetic value
Recreation-Related	Silage store	Alterations to access Disruption to users of water environment
	Leaching of fertilizer/ pesticide residues/ sheepdip	Alterations to access Disruption to water users Change in angling quality Disruption to users of water environment
	Arable farming	Alterations to access Disruption to users of water environment Change in angling quality

Issues	Sources of impact	Potential Impacts
	Livestock grazing/watering	Alterations to access Disruption to users of water environment Change in angling quality
	Fertilizer storage/application	Alterations to access Disruption to users of water environment Change in angling quality
	Slurry storage/application	Alterations to access Disruption to users of water environment Change in angling quality
	Land drainage	Altered facilities Change in angling quality
	Irrigation	Alterations to access
	Pipe distribution network	Alterations to access Disruption to users of water environment
	Abstractions	Altered facilities Disruption to users of water environment Change in angling quality Changed boat use
	Discharges	Change in angling quality Disruption to users of water environment
	Access tracks	Alterations to access
	Vehicle use and maintenance	Disruption to users of water environment
	Milking/meat production/ slaughter	Altered facilities Change in angling quality
	Agrochemical/pesticide storage/ application	Altered facilities Change in angling quality Disruption to users of water environment
	Ditch clearance	Change in angling quality
	Veterinary medicines	Change in angling quality Disruption to users of water environment
	Game	Alterations to access Disruption to users of water environment
	Fishing	Change in angling quality Disruption to users of water environment
	Electric fencing	Alterations to access Disruption to users of water environment
Heritage & Archaeology	Livestock grazing	Disturbance and amage of known/unknown features Change in historic landscape
	Farm buildings	Disturbance and damage of known/unknown features Change to historic landscape

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<b>Issues</b>	<b>Sources of impact</b>	<b>Potential Impacts</b>
	Arable farming	Disturbance and damage of known/unknown features Change to historic landscape
	Land drainage	Disturbance and damage of known/unknown features Change to historic landscape
	Irrigation pipes	Disturbance and damage of known/unknown features Change to historic landscape
	Abstraction of groundwaters	Disturbance and damage of known/unknown features Change to historic landscape
	Access tracks	Disturbance and damage of known/unknown features Change to historic landscape
	Hedge cutting/removal	Disturbance and damage of known/unknown features Change to historic landscape

## REFERENCE

### NRA Documents

1992 : The influence of agriculture on the quality of natural waters in England and Wales - Water Quality Series No.6, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol.

1994 : The Disposal of Sheep Dip Waste - Effects on Water Quality. R&D Report 11, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol.

1995 : Investigations of Farm Pollution Impacts and Development of a Control Strategy, R & D Note 373, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol.

Pollution Prevention Guidance Note 9, Pesticides, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 2UD.

Pollution Prevention Guidance Note 12, Sheep Dip, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 2UD.

Pollution Prevention Guidance Note 19, Dairies, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 2UD.

### External Publications

Barron J (1993) Waste Management, in Environmental Assessment: a guide to the identification, evaluation and mitigation of environmental issues in construction schemes. Pre-publication draft, Construction Industry Research and Information Association (CIRIA), 6 Storey's Gate, Westminster, London.

### Other relevant scoping guidance

Generic Impacts of Construction  
Fish Farms  
Intensive Livestock/Poultry Units  
Kennels, Catteries, Stables  
Bait Digging  
Pipelines  
Points of Large Abstraction  
Points of Large Discharge

## Development Type: Kennels, Catteries, Stables

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further guidance notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Surface Water Hydrology/Hydraulics	Animal Housing Associated developments	Changed surface water runoff Changed flow velocities Changed magnitude of flooding Changed frequency of flooding Changed duration of flooding Changed hydraulic roughness Riparian drainage affected Changed flow regime
	Washings	Changed surface water runoff Riparian drainage affected
	Poaching/Puddling	Changed surface water runoff Changed hydraulic roughness
	Grazing	Changed surface water runoff Changed magnitude of flooding Changed duration of flooding Changed hydraulics roughness Riparian drainage affected
Channel Morphology/ Sediments	Animal Housing Associated developments	Changed bank/bed stability Degradation/erosion of bed or banks Deposition/siltation Disturbance to bed forms (pools, riffles) Changed turbidity Changed bed load
	Poaching/Puddling	Changed bank/bed stability Degradation/erosion of bed or banks Change of planform/pattern Disturbance to bed forms (pools, riffles) Changed suspended sediment load
	Grazing	Changed bank/bed stability Change of planform/pattern
	Intensive Animal Rearing	Changed suspended sediment load

Issues	Sources of impact	Potential Impacts
Groundwater Hydraulics	Animal Housing Associated developments	<ul style="list-style-type: none"> <li>Changed flow</li> <li>Changed infiltration</li> <li>Changed direction of flow</li> <li>Change in water-table (level)</li> <li>Barrier to flow</li> <li>Change in pressure potential</li> <li>Changed storage capacity</li> </ul>
	Washings	<ul style="list-style-type: none"> <li>Changed infiltration</li> <li>Change in water-table (level)</li> </ul>
	Poaching/Puddling	<ul style="list-style-type: none"> <li>Change infiltration</li> <li>Change in pressure potential</li> <li>Changed storage capacity</li> </ul>
Surface Water Quality	Washings	<ul style="list-style-type: none"> <li>Change in quality</li> <li>Chemical pollution</li> <li>Nutrient enrichment</li> <li>Changed turbidity</li> <li>Microbial contamination</li> <li>Changed dilution capacity</li> <li>Organic pollution</li> <li>Change in residence/flushing time</li> <li>Change in oxygen content</li> <li>Change in electrical conductivity/pH/acidification</li> <li>Change in temperature</li> </ul>
	Poaching/Puddling	<ul style="list-style-type: none"> <li>Change in quality</li> </ul>
	Animal Housing Associated developments	<ul style="list-style-type: none"> <li>Altered salinity</li> <li>Change in quality</li> <li>Chemical pollution</li> <li>Nutrient enrichment</li> <li>Changed turbidity</li> <li>Microbial contamination</li> <li>Stratification</li> <li>Re-suspension of contaminated sediments</li> <li>Rubbish/trash</li> <li>Changed dilution capacity</li> <li>Organic pollution</li> <li>Change in residence/flushing time</li> <li>Change in oxygen content</li> <li>Change in electrical conductivity/pH/acidification</li> <li>Change in temperature</li> </ul>
	Grazing	<ul style="list-style-type: none"> <li>Change in quality</li> <li>Change in organic pollution</li> <li>Changed turbidity</li> <li>Microbial contamination</li> <li>Nutrient enrichment</li> </ul>

Issues	Sources of impact	Potential Impacts
	Veterinary Medicines	Change in quality Chemical pollution Changed dilution capacity Organic pollution Change in residence/flushing time Change in oxygen content Change in electrical conductivity/pH/acidification
Ground Water Quality	Washings	Change in quality Chemical pollution Organic pollution
	Veterinary Medicines	Change in quality Chemical pollution Organic pollution
	Intensive animal rearing	Organic pollution Chemical pollution
	Animal housing Associated developments	Movement in contaminated water Change in quality Saline intrusion Chemical pollution Organic pollution
Aquatic Ecology	Animal housing Associated developments	Altered habitat Changed fish biomass Changed invertebrate biomass Changed plant biomass Changed species diversity Effect on fish behaviour Change in the fish community Fish kill Effects on fish spawning Disturbance/loss of sensitive species Loss of rheophilic flora and fauna Barrier to mammals
	Washings	Altered habitat Changed fish biomass Changed invertebrate biomass Changed plant biomass Changed species diversity Effect on fish behaviour Change in the fish community Fish kill Effects on fish spawning Disturbance/loss of sensitive species Loss of rheophilic flora and fauna

Issues	Sources of impact	Potential Impacts
	Poaching/Puddling	Altered habitat Changed plant biomass Effect on fish behaviour Disturbance of sensitive species Changed invertebrate biomass
	Grazing	Altered habitat Changed fish biomass Changed invertebrate biomass Changed plant biomass Changed species diversity Effect on fish behaviour Change in the fish community Effects on fish spawning Disturbance/loss of sensitive species
	Veterinary Medicines	Effect on fish behaviour Effects on fish spawning Disturbance/loss of sensitive species Changed invertebrate biomass
	Intensive Animal Rearing	Disturbance of sensitive species Changed invertebrate biomass
Terrestrial Ecology	Animal Housing	Altered habitat Tree removal Loss of wildlife habitat Wetland changes Change in plant biomass Change in animal biomass Changed riparian habitat Disturbance of sensitive species Changed species diversity
	Washings	Changed riparian habitat Disturbance of sensitive species
	Poaching/Puddling	Changed habitat Change in plant biomass Disturbance of sensitive species
	Grazing	Changed habitat Loss of wildlife habitat Change in plant biomass Changed riparian habitat Disturbance of sensitive species Changed species diversity
	Veterinary Medicines	Disturbance of sensitive species Changed species diversity

Issues	Sources of impact	Potential Impacts
	Intensive Animal Rearing	Disturbance of sensitive species Changed species diversity
Human Related	Washings	Adverse odour Health risks
	Poaching/Puddling	Disrupted access
	Veterinary Medicines	Health risks
	Intensive Animal Rearing	Change in noise levels Adverse odour Disrupted access Health risks Nuisances
Land Use Change	Animal Housing	Loss of riparian land
Visual Amenity	Animal Housing	Altered aesthetic value Altered landscape
	Intensive Animal Rearing	Altered aesthetic value
Recreation-Related	Animal Housing	Disruption to users of water environment
	Washings	Change in angling quality Disruption to users of water environment
	Poaching/Puddling	Alterations to access Change in angling quality
	Veterinary Medicines	Change in angling quality Disruption to users of water environment
	Intensive Animal Rearing	Alterations to access Altered facilities Disruption to users of water environment
Heritage & Archaeology	Animal Housing	Construction Change of historic landscape
	Intensive animal rearing	Construction Change of historic landscape

## REFERENCES

### NRA Documents

- 1992: The influence of agriculture on the quality of natural waters in England and Wales. NRA, Bristol, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol.
- 1995: Investigations of Farm Pollution Impacts and Redevelopment of a Control Strategy, R & D Note 373, NRA Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol.

### External Publications

#### Other relevant scoping guidance

Generic Impacts of Construction  
Agriculture  
Intensive Livestock/Poultry Units

**Development Type: Intensive Livestock/Poultry Units**

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further guidance notes are available to provide greater detail where required.

Issue	Source of Impact	Potential Impacts
Surface Water Hydrology/Hydraulics	Intensive livestock rearing	Riparian drainage affected
	Buildings	Changed surface water runoff Changed magnitude of flooding Changed duration of flooding Changed hydraulic roughness Riparian drainage affected
	Washings/roof runoff *	Changed surface water runoff
Channel Morphology/Sediments	Intensive livestock rearing	Changed turbidity
	Washings/roof runoff *	Changed turbidity
Groundwater Hydraulics	Intensive livestock rearing/ animal housing	Changed infiltration Change in pressure potential
Surface Water Quality	Intensive livestock rearing/ buildings	Change in quality Chemical pollution Nutrient enrichment Changed turbidity Microbial contamination Changed dilution capacity Organic pollution Change in oxygen content Change in electrical conductivity/pH/ acidification Change in temperature
	Washings/roof run off *	Change in quality Chemical pollution Eutrophication Microbial contamination Rubbish/trash Changed dilution capacity Organic pollution Change in oxygen content Change in electrical conductivity/pH/ acidification Change in temperature

Issue	Source of Impact	Potential Impacts
	Agrochemicals, animal feed & veterinary medicines	Change in quality Chemical pollution Nutrient enrichment Changed dilution capacity Organic pollution Change in oxygen content Change in electrical conductivity/pH/acidification
Groundwater Quality	Intensive livestock rearing/buildings	Change in quality Chemical pollution Organic pollution Microbial pollution
	Washings/roof runoff *	Change in quality Chemical pollution Organic pollution Microbial pollution
	Agrochemicals/animal feed & veterinary medicines	Change in quality Chemical pollution Organic pollution
Aquatic Ecology	Intensive livestock rearing/buildings	Altered habitat Changed fish biomass Changed invertebrate biomass Changed plant biomass Changed species diversity Effect on fish behaviour Change in the fish community Fish kill Effects on fish spawning Disturbance/loss of sensitive species Loss of rheophilic flora and fauna Barrier to mammals
	Washings/roof runoff *	Altered habitat Changed fish biomass Changed invertebrate biomass Changed plant biomass Changed species diversity Effect on fish behaviour Fish kill Effects on fish behaviour Fish kill Effects on fish spawning Disturbance/loss of sensitive species

Issue	Source of Impact	Potential Impacts
	Agrochemicals/animal feed & veterinary medicines	Altered habitat Disturbance of sensitive species Effect on fish behaviour Changed invertebrate biomass
Terrestrial Ecology	Intensive livestock rearing/ buildings	Altered habitat Tree removal Loss of wildlife habitat Wetland changes Change in plant biomass Change in animal biomass Changed riparian habitat Disturbance of sensitive species Changed species diversity
	Washings/roof runoff	Escaped species (mink etc) Changed riparian habitat Disturbance of sensitive species
	Agrochemicals/animal feed & veterinary medicines	Changed habitat Disturbance of sensitive species
Human-Related	Intensive livestock rearing/ buildings	Change in noise levels Adverse odour Disrupted access Health risks Nuisances Changed flood risk
	Washings/roof runoff *	Adverse odour Health risks
	Agrochemicals/animal feed & veterinary medicines	Adverse odour Health risks
Land Use Change	Intensive livestock rearing/ buildings	Restriction to future developments Loss of riparian land
Visual Amenity	Intensive livestock rearing/ buildings	Altered aesthetic value Altered landscape
Recreation-Related	Intensive livestock rearing/ buildings	Alterations to access Altered facilities Change in angling quality
	Washings/roof runoff *	Change in angling quality
	Agrochemicals/animal feed & veterinary medicines	Change in angling quality

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Issue	Source of Impact	Potential Impacts
Heritage & Archaeology	Intensive livestock rearing/ buildings	Disturbance and damage of <u>known/unknown</u> features Change to historic landscape

\* Note: Use of extractor fans in intensive livestock rearing units and the subsequent accumulation of organic materials on the surrounding external wall can cause roof run off to have similar impacts to washings.

## REFERENCES

### NRA Documents

1992: The influence of agriculture on the quality of natural waters in England and Wales. NRA, Bristol, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol.

1994: The disposal of sheep dip waste - effects on water quality - R&D 11. NRA, Bristol, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol.

Pollution Prevention Guidance Note 9, Pesticides, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 2UD.

Pollution Prevention Guidance Note 12, Sheep Dip, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 2UD.

Pollution Prevention Guidance Note 19, Dairies, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 2UD.

### External Publications

Barran, J. (1994) Waste Management, in Environmental Assessment: A guide to the identification and mitigation of environmental issues in construction schemes. Construction Industry Research and Information Association (CIRIA), 6 Storey's Gate, Westminster, London.

### Other relevant scoping guidance

Generic Impacts of Construction  
Agriculture  
Kennels, Catteries and Stables

**Development Type: Tipping/Dumping**

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further guidance notes are available to provide greater detail where required.

Issues	Source of Impact	Potential Impact
Surface Water Hydrology/Hydraulics	Waste/Refuse Accumulation	Changed surface water runoff Changed magnitude of flooding Changed duration of flooding Changed hydraulic roughness Riparian drainage affected
	Manipulation/Burial of Waste	Changed hydraulic roughness
Channel Morphology/ Sediments	Waste/Refuse Accumulation (run-off)	Deposition/siltation Disturbance to bed forms (pools, riffles)
	Vehicular Access	Change suspended sediment load
Groundwater Hydraulics	Waste/Refuse Accumulation	Changed infiltration Change in pressure potential Changed storage capacity
	Vehicular Access	Change in pressure potential Changed storage capacity
	Manipulation/Burial of Waste	Changed infiltration Change in pressure potential Changed storage capacity
Surface Water Quality	Waste/Refuse Accumulation (run-off)	Change in quality Chemical pollution Nutrient enrichment Microbial contamination Rubbish/trash Changed dilution capacity Organic pollution Change in oxygen content Change in electrical conductivity/pH/ acidification Changed turbidity
	Manipulation/Burial of Waste	Change in quality Chemical pollution Microbial contamination Rubbish/trash Changed turbidity

Issues	Source of Impact	Potential Impact
Groundwater Quality	Waste/Refuse Accumulation (run-off)	Change in quality Chemical pollution Organic pollution
	Manipulation/Burial of Waste	Change in quality Chemical pollution Organic pollution
Aquatic Ecology	Waste/Refuse Accumulation (run-off)	Altered habitat Changed fish biomass Changed invertebrate biomass Changed plant biomass Changed species diversity Effect on fish behaviour Fish kill Effects on fish spawning Disturbance of sensitive species Changed sensitive species
	Manipulation/Burial of Waste	Altered habitat Changed fish biomass Changed invertebrate biomass Changed plant biomass Changed species diversity Effect on fish behaviour Fish kill Effects on fish spawning Disturbance of sensitive species Changed sensitive species
	Vehicular Access	Disturbance of sensitive species Changed invertebrate biomass
Terrestrial Ecology	Waste/Refuse Accumulation (run-off)	Altered habitat Loss of wildlife habitat Disturbance of sensitive species Changed species diversity
	Manipulation/Burial of Waste	Altered habitat Disturbance of sensitive species Changed species diversity
	Vehicular Access	Disturbance of sensitive species
Land Use Change	Waste/Refuse Accumulation (run-off)	Restriction to future developments
Visual Amenity	Waste/Refuse Accumulation	Altered aesthetic value Altered landscape

Issues	Source of Impact	Potential Impact
Recreation-Related	Waste/Refuse Accumulation (run-off)	Alterations to access Altered facilities Disruption to users of water environment Change in angling quality
	Vehicular Access	Alterations to access Altered facilities Disruption to users of water environment
Heritage & Archaeology	Waste/Refuse Accumulation	Change to historic landscape
	Vehicular Access	Disturbance and damage of known/unknown features

## REFERENCES

### NRA Documents

Pollution Prevention Guidance 1, General Guide to the Prevention of Pollution of Controlled Waters, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 2UD.

### External Publications

Wanielista, M.P. "Municipal Solid Waste: Land Disposal", in National Technical Information Service, Report No. PB 80-114291, US Environmental Protection Agency Report.

Barron, J. (1994), Waste Management, in Environmental Assessment: A guide to the identification and mitigation of environmental issues in construction schemes. Construction Industry Research and Information Association (CIRIA), 6 Storey's Gate, Westminster, London.

### Other relevant scoping guidance

Mineral Restoration - Landfill  
Large Industrial/Manufacturing Development & Operations  
Pest Species Control

## Development Type: Camping & Caravan Sites

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further guidance notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Surface Water Hydrology/Hydraulics	Site for camping/caravaning	Changed surface water runoff Changed hydraulic roughness
	Caravans/tents	Changed surface water runoff Changed hydraulic roughness
	Site buildings/shops/offices	Changed surface water runoff Changed flow velocities Changed magnitude of flooding Changed frequency of flooding Changed duration of flooding Changed hydraulic roughness Riparian drainage affected Changed flow regime
	Sanitary station	Changed surface water runoff Changed flow velocities Changed magnitude of flooding Changed frequency of flooding Changed duration of flooding Changed hydraulic roughness Riparian drainage affected Changed flow regime
	Leakage/spillage from sanitary station	Changed surface water runoff
	Refuse facility	Changed surface water runoff Changed hydraulic roughness
Channel Morphology/ Sediments	Caravans/tents	Changed bank/bed stability Degradation/erosion of bed or banks
	Site buildings/shops/offices	Changed bank/bed stability Degradation/erosion of bed or banks Deposition/siltation Disturbance to bed forms (pools, riffles)
	Access to water's edge	Changed bank/bed stability Degradation/erosion of bed or banks Changed suspended sediment load
	Refuse facility	Changed suspended sediment load

Issues	Sources of impact	Potential Impacts
Groundwater Hydraulics	Caravans/tents	Changed infiltration
	Site buildings/shops/offices	Changed infiltration Barrier to flow Change in pressure potential
	Sanitary station	Changed infiltration Change in pressure potential Changed storage capacity
	Refuse facility	Changed infiltration Change in pressure potential
Surface Water Quality	Site buildings/shops/offices	Change in quality Chemical pollution Changed turbidity Re-suspension of contaminated sediments Rubbish/trash Organic pollution
	Site for camping/caravanning	Changed turbidity Change in quality Rubbish/trash
	Domestic animals	Microbial contamination Organic pollution
	Access to water's edge	Rubbish/trash
	Leakage/spillage from sanitary station	Change in quality Chemical pollution Changed turbidity Microbial contamination Changed dilution capacity Organic pollution Change in oxygen content
	Refuse facility	Change in quality Chemical pollution Changed turbidity Microbial contamination Rubbish/trash Changed dilution capacity Organic pollution
Groundwater Quality	Leakage/spillage from sanitary station	Change in quality Chemical pollution Organic pollution
	Refuse facility	Chemical pollution Organic pollution

Issues	Sources of impact	Potential Impacts
Aquatic Ecology	Site buildings/shops/offices	Movement in contaminated water Change in quality Saline intrusion Chemical pollution Organic pollution
	Domestic animals	Effect on fish behaviour Disturbance of sensitive species Changed invertebrate biomass
	Access to water's edge	Altered habitat Effect on fish behaviour Disturbance of sensitive species Changed invertebrate biomass
	Leakage/spillage from sanitary station	Altered habitat Changed fish biomass Changed invertebrate biomass Changed plant biomass Changed species diversity Effect on fish behaviour Change in the fish community Fish kill Effects on fish spawning Disturbance/loss of sensitive species Loss of rheophilic flora and fauna
Terrestrial Ecology	Refuse facility	Altered habitat Disturbance of sensitive species Changed invertebrate biomass
	Site for camping/caravaning	Altered habitat Changed species diversity Disturbance of sensitive species Change in plant biomass Changed animal biomass Changed riparian habitat
	Caravans/tents	Altered habitat Changed species diversity Disturbance of sensitive species Change in plant biomass Changed animal biomass Changed riparian habitat
	Site buildings/shops/offices	Altered habitat Changed species diversity Disturbance of sensitive species Change in plant biomass Changed animal biomass Changed riparian habitat
	Domestic animals	Disturbance of sensitive species

Issues	Sources of impact	Potential Impacts
	Access to water's edge	Disturbance of sensitive species Changed riparian habitat
	Sanitary station	Altered habitat
	Leakage/spillage from sanitary station	Disturbance of sensitive species
	Refuse facility	Altered habitat Disturbance of sensitive species
<b>Human Related</b>	Caravans/tents	Disrupted access Nuisances
	Site buildings/shops/offices	Change in noise levels Disrupted access Changed flood risk Changed water resource Flooding
	Domestic animals	Change in noise levels Adverse odour Health risks Nuisances
	Access to water's edge	Health risks
	Sanitary station	Adverse odour
	Leakage/spillage from sanitary station	Adverse odour Health risks
	Refuse facility	Adverse odour Health risks Nuisances
<b>Land Use Change</b>	Site for camping/caravanning	Increased urban area
	Site buildings/shops/offices	Increased urban area
	Refuse facility	Restriction to future developments
<b>Visual Amenity</b>	Site for camping/caravanning	Altered aesthetic value
	Caravans/tents	Altered aesthetic value
	Site buildings/shops/offices	Altered aesthetic value
	Access to water's edge	Altered aesthetic value
	Refuse facility	Altered aesthetic value

Issues	Sources of impact	Potential Impacts
Recreation Related	Caravans/tents	Altered facilities
	Site buildings/shops/offices	Altered facilities
	Domestic animals	Disruption to users of water environment
	Access to water's edge	Altered facilities Change in angling quality
	Sanitary station	Altered facilities
	Leakage/spillage from sanitary station	Change in angling quality Disruption to users of water environment
Heritage & Archaeology	Site buildings/shops/offices	Disturbance and damage of known/unknown features Change to historic landscape
	Access to water's edge	Disturbance and damage of known/unknown features
	Sanitary station	Disturbance and damage of known/unknown features

## REFERENCES

### NRA Documents

1992: Policy & Practice for the Protection of Groundwater. NRA, Bristol, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol.

Pollution Prevention Guidance 4, Disposal of Sewage where no main drainage is available, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 2UD.

### External Publications

Barron J. (1994), Waste Management in Environmental Assessment: A guide to the identification and mitigation of environmental issues in construction schemes. Construction Industry Research and Information Association (CIRIA), 6 Storey's Gate, Westminster, London.

### Other relevant scoping guidance

Generic Impacts of Construction  
Septic Tanks/Cesspits etc  
Swimming Pools  
Roads & Road Widening  
Pipelines

## Development Type: Septic Tanks/Cesspits etc

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further guidance notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Surface Water Hydrology/Hydraulics	Storage tank (above ground)	<ul style="list-style-type: none"> <li>Changed surface water runoff</li> <li>Changed magnitude of flooding</li> <li>Changed duration of flooding</li> <li>Changed hydraulic roughness</li> <li>Riparian drainage affected</li> </ul>
	Service access routes	<ul style="list-style-type: none"> <li>Changed surface water runoff</li> <li>Changed magnitude of flooding</li> <li>Changed duration of flooding</li> <li>Changed hydraulic roughness</li> <li>Riparian drainage affected</li> </ul>
Groundwater Hydraulics	Storage tank (above ground)	<ul style="list-style-type: none"> <li>Changed infiltration</li> </ul>
	Impermeable storage pit	<ul style="list-style-type: none"> <li>Changed infiltration</li> <li>Changed direction of flow</li> <li>Change in water table (level)</li> <li>Barrier to flow</li> <li>Change in pressure potential</li> <li>Changed storage capacity</li> </ul>
	Service access routes	<ul style="list-style-type: none"> <li>Changed infiltration</li> <li>Changed storage capacity</li> </ul>
Surface Water Quality	Leakage of waste	<ul style="list-style-type: none"> <li>Change in quality</li> <li>Chemical pollution</li> <li>Nutrient enrichment</li> <li>Changed turbidity</li> <li>Microbial contamination</li> <li>Changed dilution capacity</li> <li>Organic pollution</li> <li>Change in residence/flushing time</li> <li>Change in oxygen content</li> <li>Change in electrical conductivity/pH/acidification</li> <li>Change in temperature</li> </ul>
	Service access routes	<ul style="list-style-type: none"> <li>Change in quality</li> <li>Changed turbidity</li> </ul>
	Vehicular access	<ul style="list-style-type: none"> <li>Change in quality</li> <li>Chemical pollution</li> <li>Organic pollution</li> </ul>

Issues	Sources of impact	Potential Impacts
Groundwater Quality	Leakage of waste	Change in quality Chemical pollution Organic pollution
	Vehicular access	Change in quality Chemical pollution Organic pollution
Aquatic Ecology	Leakage of waste	Altered habitat Changed fish biomass Changed invertebrate biomass Changed plant biomass Changed species diversity Effect on fish behaviour Change in the fish community Fish kill Effects on fish spawning Disturbance/loss of sensitive species Loss of rheophilic flora and fauna Barrier to mammals
	Vehicular access	Disturbance of sensitive species Changed invertebrate biomass
Terrestrial Ecology	Storage tank (above ground)	Changed habitat Loss of wildlife habitat Disturbance of sensitive species
	Impermeable storage pit	Changed habitat
	Leakage of waste	Disturbance of sensitive species
	Service access routes	Changed habitat Loss of wildlife habitat
	Vehicular access	Changed habitat Loss of wildlife habitat Disturbance of sensitive species
Human Related	Storage tank (above ground)	Disrupted access Health risks
	Storage of liquid waste	Adverse odour Health risks
	Leakage of waste	Adverse odour Health risks
	Vehicular access	Change in noise levels Increased vibration Disrupted access Health risks Nuisances

Issues	Sources of impact	Potential Impacts
Land Use Change	Storage tank (above ground)	Increased urban area
	Impermeable storage pit	Change in grade of agricultural land Restriction to future developments
	Leakage of waste	Restriction to future developments
Visual Amenity	Storage tank (above ground)	Altered aesthetic value Altered landscape
	Leakage of waste	Altered aesthetic value
	Service access routes	Altered aesthetic value Altered landscape
Recreation Related	Storage tank (above ground)	Alterations to access
	Leakage of waste	Disruption to users of water environment Change in angling quality
	Service access routes	Alterations to access
	Vehicular access	Alterations to access Disruption to users of water environment
Heritage & Archaeology	Storage tank (above ground)	Disturbance and damage of known/unknown features Change to historic landscape
	Impermeable storage pit	Disturbance and damage of known/unknown features
	Service access routes	Disturbance and damage of known/unknown features Change to historic landscape
	Vehicular access	Disturbance and damage of known/unknown features

## REFERENCES

### NRA Documents

1992: NRA Policy and Practice for the Protection of Groundwater. NRA, Bristol, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol.

March 1994: Discharge Consents and Compliance - WQ.17. NRA, Bristol, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol.

Pollution Prevention Guidance 4, Disposal of Sewage where no mains drainage is available, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 2UD.

### External Publications

Barron, J. (1993) Waste Management, in Environmental Assessment: a guide to the identification, evaluation and mitigation of environmental issues in construction schemes. Construction Industry Research and Information Association (CIRIA), 6 Storey's Gate, Westminster, London.

### Other relevant scoping guidance

Generic Impact of Construction  
Sewage Treatment Works

## Development Type: Vehicle Parks/Plant Hire

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further guidance notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Surface Water Hydrology/Hydraulics	Service buildings	Changed surface water runoff Changed magnitude of flooding Changed duration of flooding Changed hydraulic roughness
	Vehicular access routes/ forecourt	Changed surface water runoff Changed magnitude of flooding Changed duration of flooding Changed hydraulic roughness
	Washings, detergents	Changed surface water runoff
Channel Morphology/ Sediments	Service buildings	Disturbance to bed forms (pools, riffles)
	Vehicular access routes/ forecourt	Disturbance to bed forms (pools, riffles)
Groundwater Hydraulics	Service buildings	Changed infiltration Barrier to flow Change in pressure potential
	Vehicular access routes/ forecourt	Changed infiltration Change in pressure potential
	Leakage of fuels/lubricants/ solvents	Chemical pollution Organic pollution
	Washings, detergents	Changed infiltration Change in pressure potential
Surface Water Quality	Leakage of fuels/lubricants/ solvents	Change in quality Chemical pollution Changed turbidity Changed dilution capacity Organic pollution Change in residence/flushing time Change in oxygen content Change in electrical conductivity/pH/acidification
	Vehicular access	Change in quality Chemical pollution Organic pollution

Issues	Sources of impact	Potential Impacts
Groundwater Quality	Washings, detergents	Chemical pollution Eutrophication Changed turbidity Changed dilution capacity Organic pollution Change in residence/flushing time
Aquatic Biology	Washings, detergents	Chemical pollution Organic pollution
	Service buildings	Altered habitat Changed fish biomass Changed invertebrate biomass Changed plant biomass Changed species diversity Effect on fish behaviour Change in the fish community Fish kill Effects on fish spawning Disturbance/loss of sensitive species
	Leakage of fuels/lubricants/solvents	Altered habitat Changed fish biomass Changed invertebrate biomass Changed plant biomass Changed species diversity Effect on fish behaviour Change in the fish community Fish kill Effects on fish spawning Disturbance/loss of sensitive species
	Vehicular access	Disturbance of sensitive species Changed invertebrate biomass
	Washings, detergents	Altered habitat Changed fish biomass Changed invertebrate biomass Changed plant biomass Changed species diversity Effect on fish behaviour Change in the fish community Fish kill Effects on fish spawning Disturbance/loss of sensitive species
Terrestrial Ecology	Service buildings	Changed habitat Disturbance of sensitive species
	Vehicular access routes/forecourt	Changed habitat Disturbance of sensitive species

Issues	Sources of impact	Potential Impacts
	Leakage of fuels/lubricants/ solvents	Changed habitat Disturbance of sensitive species
	Vehicular access	Changed habitat
	Washings, detergents	Changed habitat Disturbance of sensitive species
Human-Related	Service buildings	Disrupted access
	Leakage of fuels/lubricants/ solvents	Adverse odour Health risks
	Vehicular access	Change in noise levels Increased vibration Health risks Nuisances
	Washings, detergents	Health risks
Land Use Change	Service buildings	Increased urban area
	Vehicular access routes/ forecourt	Increased urban area
	Leakage of fuels/lubricants/ solvents	Restriction to future developments
	Washings, detergents	Restriction to future developments
Visual Amenity	Service buildings	Altered aesthetic value Altered landscape
	Vehicular access routes/ forecourt	Altered aesthetic value Altered landscape
	Leakage of fuels/lubricants/ solvents	Altered aesthetic value
Recreation-Related	Service buildings	Alterations to access Disruption to users of water environment
	Vehicular access routes/ forecourt	Alterations to access Altered facilities
	Leakage of fuels/lubricants/ solvents	Change in angling quality Disruption to users of water environment
	Vehicular access	Alterations to access Change in angling quality Disruption to users of water environment
	Washings, detergents	Alterations to access Change in angling quality

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Issues	Sources of impact	Potential Impacts
Heritage & Archaeology	Service buildings	Disturbance and damage of known/unknown features Change to historic landscape
	Vehicular access routes/ forecourt	Disturbance and damage of known/unknown features Change to historic landscape
	Leakage of fuels/lubricants/ solvents	Disturbance and damage of known/unknown features

## REFERENCES

### NRA Documents

NRA Video: Pollution Prevention Pays, video offer, Freepost (B54345), NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol.

Pollution Prevention Guidance 1, General Guide to the Prevention of Pollution of Controlled Water, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 2UD.

Pollution Prevention Guidance 2, Above Ground Oil Storage Tanks, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 2UD.

Pollution Prevention Guidance 3, The Use and Design of Oil Separators in Surface Water Drainage Systems, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 2UD.

Pollution Prevention Guidance 5, Works in near or liable to affect watercourses, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 2UD.

Pollution Prevention Guidance 22, Garages (draft) NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 2UD.

### External Publications

Renger, M. (1994) Built Development in Environmental Assessment: A Guide to the Identification and Mitigation of environmental issues in construction schemes. Construction Industry Research and Information Association (CIRIA), 6 Storey's Gate, Westminster, London.

### Other relevant scoping guidance

#### Roads and Road Widening

Large Industrial/Manufacturing Development of Operations

Petrol Stations

Chemical Storage Units

## Development Type: Swimming Pools

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further guidance notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Surface Water Hydrology/Hydraulics	Buildings/Pavements/Car Parks/ Service Roads	Changed surface water runoff Changed flow velocities Changed magnitude of flooding Changed frequency of flooding Changed duration of flooding Changed hydraulic roughness Riparian drainage affected Changed flow regime
Channel Morphology/ Sediments	Buildings/Pavements/Car Parks/ Service Roads	Changed bank/bed stability Degradation/erosion of bed or banks Deposition/siltation Change of planform/pattern Downstream erosion Changed channel size Changed turbidity Changed bed load
Groundwater Hydraulics	Buildings/Pavements/Car Parks/ Service Roads	Changed infiltration Change in water-table (level) Barrier to flow Change in pressure potential
Surface Water Quality	Vehicular/pedestrian access	Change in quality Chemical pollution Organic pollution Rubbish/Trash
	Oil/Effluent/detergent disposal/leakage	Change in quality Chemical pollution Microbial contamination Organic pollution Change in temperature
	Rural/Private Pools	Dechlorination
Groundwater Quality	Effluent/detergent disposal/ leakage	Chemical pollution Organic pollution
Aquatic Ecology	Buildings/Pavements/Car Parks/ Service Roads	Altered habitat Changed fish biomass Changed invertebrate biomass Changed plant biomass Changed species diversity Effect on fish behaviour Change in the fish community Fish kill Effects on fish spawning Disturbance of sensitive species Loss of sensitive species

Issues	Sources of impact	Potential Impacts
	Effluent/detergent disposal/ leakage	Altered habitat Changed fish biomass Changed invertebrate biomass Changed plant biomass Changed species diversity Effect on fish behaviour Change in the fish community Fish kill Effects on fish spawning Disturbance of sensitive species Loss of sensitive species
Terrestrial Ecology	Vehicular/pedestrian access	Altered habitat Disturbance of sensitive species
	Buildings/Pavements/Car Parks/ Service Roads	Altered habitat Tree removal Loss of wildlife habitat Wetland changes Change in plant biomass Change riparian habitat Disturbance of sensitive species Changed species diversity
	Effluent/detergent disposal/ leakage	Disturbance of sensitive species Change in plant biomass Change in animal biomass
Human-Related	Vehicular/pedestrian access	Change in noise levels Increased vibration Health risks Nuisances Disrupted access
	Buildings/Pavements/Car Parks/ Service Roads	Adverse odour Disrupted access Changed flood risk Changed water resource
	Effluent/detergent disposal/ leakage	Adverse odour Health risks
Land Use Change	Buildings/Pavements/Car Parks/ Service Roads	Increased urban area
Visual Amenity	Buildings/Pavements/Car Parks/ Service Roads	Altered aesthetic value Altered landscape
Recreation-Related	Vehicular/pedestrian access	Alterations to access Change in angling quality Disruption to users of water environment
	Buildings/Pavements/Car Parks/ Service Roads	Alterations to access Altered facilities
	Effluent/detergent disposal/ leakage	Change in angling quality

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Issues	Sources of impact	Potential Impacts
Heritage & Archaeology	Buildings/Pavements/Car Parks/ Roads	Construction Change to historic landscape

## REFERENCES

### Development Type : Swimming Pools

#### NRA Documents

1992: Policy & Practice for the Protection of Groundwater. NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol.

Renger, M. (1994) Built Development in Environmental Assessment: A guide to the identification and mitigation of environmental issues in construction schemes. Construction Industry Research and Information Association (CIRIA), 6 Storey's Gate, Westminster, London.

#### External Publications

HMSO (1994) "Planning and Pollution Control", PPG23.

Wozniak, S. (1994) "Environmental Assessment of Building Developments". in 5th Annual Conference on Advances in Environmental Impact Assessment Documentation 24/25 November 1994 organized by IBC Technical Services Ltd, Gilmoora House, 5761 Mortimar St, London WIN 8JX.

#### Other relevant scoping guidance

Generic Impacts of Construction Work  
Vehicle Parks/Plant Hire  
Other Recreation  
Points of Large Discharge  
Roads and Road Widening

## Development Type: Chemical Storage Units

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further guidance notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Surface Water Hydrology/Hydraulics	Buildings/stores/ Access roads	Changed surface water runoff Changed magnitude of flooding Changed duration of flooding Changed hydraulic roughness
Groundwater Hydraulics	Buildings/stores/ Access roads	Changed infiltration Change in pressure potential
Surface Water Quality	Leakage of stored chemicals	Change in quality Chemical pollution Nutrient enrichment Changed turbidity Changed dilution capacity Organic pollution Change in oxygen content Change in electrical conductivity/pH acidification Change in temperature
	Fire	Catastrophic loss of contents
	Vehicular access	Change in quality Chemical pollution Organic pollution
Groundwater Quality	Buildings/stores/ Access roads	Change in quality Chemical pollution Changed turbidity Re-suspension of contaminated sediments Rubbish/trash Changed dilution capacity Organic pollution
	Leakage of stored chemicals	Change in quality Chemical pollution Organic pollution
	Buildings/stores/ Access roads	Chemical pollution
Aquatic Ecology	Leakage of stored chemicals	Altered habitat Changed fish biomass Changed invertebrate biomass Changed plant biomass Changed species diversity Effect on the fish community Fish kill Effects on fish spawning Loss of sensitive species

Issues	Sources of impact	Potential Impacts
Terrestrial Ecology	Buildings/stores/ Access roads	Altered habitat Tree removal Loss of wildlife habitat Wetland changes Change in plant biomass Change riparian habitat Disturbance of sensitive species Changed species diversity
	Leakage of stored chemicals	Change in plant biomass Change in animal biomass Disturbance of sensitive species
	Vehicular access	Disturbance of sensitive species
Human-Related	Buildings/stores	Disrupted access
	Leakage of stored chemicals	Adverse odour Health risks
	Vehicular access	Change in noise levels Increase vibration Disrupted access Nuisances
Land Use Change	Buildings/stores Access roads	Loss of riparian land Increased urban area
	Leakage of stored chemicals	Restriction to future developments
Visual Amenity	Buildings/stores Access roads	Altered aesthetic value Altered landscape
	Leakage of stored chemicals	Altered aesthetic value
	Restricted access (eg. fencing)	Altered aesthetic value
Recreation-Related	Buildings/stores Access roads	Alterations to access Altered facilities
	Leakage of stored chemicals	Disruption to users of water environment

## REFERENCES

### NRA Documents

NRA Video: Pollution Prevention Pays, video offer, Freepost (B54345), NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol.

Pollution Prevention Guidance 2, Above Ground Storage Tanks Dairies, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 2UD.

Pollution Prevention Guidance 8, Safe Storage and Disposal of Used Oils, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 2UD.

Pollution Prevention Guidance 18, Spillage & Fire Fighting Run-off, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 2UD.

### External Publications

Barron, J (1994) Waste Management, in Environmental Assessment: a guide to the identification, evaluation and mitigation of environmental issues in construction schemes. Construction Industry Research and Information Association (CIRIA), 6 Storey's Gate, Westminster, London.

### Other relevant scoping guidance

Septic Tanks/Cesspits etc  
Tipping/Dumping  
Oil Refineries/Oil Exploration

## Development Type: Petrol Stations

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further guidance notes are available to provide greater detail where required.

Issues	Source of Impact	Potential Impacts
Surface Water Hydrology/Hydraulics	Station Buildings & Forecourt	<ul style="list-style-type: none"> <li>Changed surface water runoff</li> <li>Changed flow velocities</li> <li>Changed magnitude of flooding</li> <li>Changed frequency of flooding</li> <li>Changed duration of flooding</li> <li>Changed hydraulic roughness</li> <li>Riparian drainage affected</li> <li>Changed flow regime</li> </ul>
	Car Washing	<ul style="list-style-type: none"> <li>Changed surface water runoff</li> </ul>
Channel Morphology/ Sediments	Station Buildings & Forecourt	<ul style="list-style-type: none"> <li>Changed turbidity</li> <li>Changed channel size</li> <li>Changed bank/bed stability</li> <li>Degradation/erosion of bed or banks</li> <li>Deposition/siltation</li> <li>Change of planform/pattern</li> <li>Downstream erosion</li> <li>Changed channel size</li> <li>Changed turbidity</li> <li>Changed bed load</li> </ul>
	Car Washing	<ul style="list-style-type: none"> <li>Changed bank/bed stability</li> <li>Degradation/erosion of bed or banks</li> <li>Deposition/siltation</li> <li>Change of planform/pattern</li> <li>Downstream erosion</li> <li>Changed channel size</li> <li>Changed turbidity</li> <li>Changed bed load</li> </ul>
Groundwater Hydraulics	Station Buildings & Forecourt	<ul style="list-style-type: none"> <li>Changed infiltration</li> <li>Change in pressure potential</li> <li>Changed storage capacity</li> </ul>
	Fuel Storage Tanks	<ul style="list-style-type: none"> <li>Changed infiltration</li> <li>Barrier to flow</li> <li>Change in pressure potential</li> <li>Changed storage capacity</li> </ul>

Issues	Source of Impact	Potential Impacts
Surface Water Quality	Station Buildings & Forecourt	Change in quality Chemical pollution Changed turbidity Re-suspension of contaminated sediments Rubbish/trash Changed dilution capacity Organic pollution
	Use of Specialist Fluids (lubrication, cleaning, battery etc)	Change in quality Chemical pollution Changed dilution capacity Organic pollution Change in oxygen content Change in electrical conductivity/pH/acidification
	Car Washing	Change in quality Chemical pollution Changed turbidity Changed dilution capacity Organic pollution Changed in residence/flushing time Change in oxygen content Change in electrical/conductivity/pH/acidification Change in temperature
Groundwater Quality	Fuel Storage Tanks	Chemical pollution Organic pollution
	Use of Specialist Fluids (lubrication, cleaning, battery etc)	Chemical pollution Organic pollution
	Car Washing	Chemical pollution Organic pollution
Aquatic Ecology	Station Buildings & Forecourt	Altered habitat Changed fish biomass Changed invertebrate biomass Changed plant biomass Changed species diversity Effect on fish behaviour Change in the fish community Fish kill Effects on fish spawning Disturbance of sensitive species Loss of sensitive species

Issues	Source of Impact	Potential Impacts
	Use of Specialist Fluids (lubrication, cleaning, battery etc)	Altered habitat Changed fish biomass Changed invertebrate biomass Changed plant biomass Changed species diversity Effect on fish behaviour Change in the fish community Fish kill Effects on fish spawning Disturbance of sensitive species Loss of sensitive species
	Car Washing	Altered habitat Changed fish biomass Changed invertebrate biomass Changed plant biomass Changed species diversity Effect on fish behaviour Change in the fish community Fish kill Effects on fish spawning Disturbance of sensitive species Loss of sensitive species
Terrestrial Ecology	Station Buildings & Forecourt	Altered habitat Tree loss Loss of wildlife habitat Change in plant biomass Change in animal biomass Disturbance of sensitive species
	Use of Specialist Fluids (lubrication, cleaning, battery etc)	Altered habitat Disturbance of sensitive species Changed species diversity
	Car Washing	Disturbance of sensitive species
Human-Related	Use of Specialist Fluids (lubrication, cleaning, battery etc)	Health risks
	Vehicular Usage/Access	Change in noise levels Increased vibration Adverse odour Disrupted access Health risks Nuisances

Issues	Source of Impact	Potential Impacts
Land Use Change	Station Buildings & Forecourt	Increased urban area
	Fuel Storage Tanks	Restriction to future developments
	Use of Specialist Fluids (lubrication, cleaning, battery etc)	Restriction to future development
	Car Washing	Restriction to future developments
Visual Amenity	Station Buildings & Forecourt	Altered aesthetic value
	Vehicular Usage/Access	Altered aesthetic value
Recreation-Related	Station Buildings & Forecourt	Altered facilities
	Use of Specialist Fluids (lubrication, cleaning, battery etc)	Change in angling quality
	Vehicular Usage/Access	Disruption to users of water environment
Heritage & Archaeology	Station Buildings & Forecourt	Disturbance and damage of known/unknown features
	Fuel Storage Tanks	Disturbance and damage of known/unknown features
	Use of Specialist Fluids (Lubrication, cleaning, battery etc)	Disturbance and damage of known/unknown features
	Car Washings	Disturbance and damage of known/unknown features

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## REFERENCES

### NRA Documents

Video: Pollution Prevention Pays, video offer, free post (B54345) NRA, Bristol, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol.

Policy & Practice for the Protection of Groundwater. NRA, Bristol, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol.

Pollution Prevention Guidance 1, General Guide to the Prevention of Pollution of Controlled Water NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 2UD.

Pollution Prevention Guidance 7, Fuelling Stations: Construction and Operation, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 2UD.

Pollution Prevention Guidance 22, Garages, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol BS12 2UD.

### External Publications

Health & Safety Executive, Petrol Filling Stations, HS(G) 41 ISBN 0-11-885449-6

Renger, M. (1994), Bin Environmental Assessment: A guide to the identification and mitigation of environmental issues in construction schemes, Construction Industry Research and Information Association (CIRIA), 6 Storey's Gate, Westminster, London.

### Other relevant scoping guidance

Generic Impact of Construction  
Roads & Road Widening  
Chemical Storage Units  
Vehicle Parks/Plant Hire  
Construction

**Development Type: Peat Extraction**

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further guidance notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Surface Water Hydrology/Hydraulics	Access roads	Changed surface water runoff Changed magnitude of flooding Changed duration of flooding Changed hydraulic roughness Riparian drainage affected
	Peat drainage	Changed surface water runoff Changed magnitude of flooding Changed frequency of flooding Changed duration of flooding Riparian drainage affected
	Drainage/discharge into surface water	Changed flow velocities Changed magnitude of flooding Changed duration of flooding
	Peat removal	Changed surface water runoff Changed magnitude of flooding Changed duration of flooding Changed hydraulic roughness
Channel Morphology/ Sediments	Peat drainage	Changed turbidity
	Drainage/discharge into surface water	Changed bank/bed stability Disturbance to bed forms (pools, riffles) Changed turbidity
Groundwater Hydraulics	Access roads	Changed infiltration Change in pressure potential Changed storage capacity
	Peat drainage	Changed flow Changed infiltration Changed direction of flow Change in water table (level) Change in pressure potential Changed storage capacity
	Peat removal	Changed infiltration Change in pressure potential
Surface Water Quality	Vehicular access	Change in quality Chemical pollution Changed turbidity Changed dilution capacity Organic pollution Change in electrical conductivity/pH/acidification

Issues	Sources of impact	Potential Impacts
Groundwater Quality	Drainage/discharge into surface water	Change in quality Chemical pollution Nutrient enrichment Changed turbidity Changed dilution capacity Organic pollution Change in residence/flushing time Change in oxygen content Change in electrical conductivity/pH/acidification
Groundwater Quality	Vehicular access	Organic pollution
Groundwater Quality	Peat drainage	Movement of contaminated water Change in quality Saline intrusion Chemical pollution Organic pollution
Aquatic Ecology	Drainage/discharge into surface water	Change in quality
Aquatic Ecology	Vehicular access	Disturbance of sensitive species Changed invertebrate biomass
Aquatic Ecology	Peat drainage	Altered habitat Changed invertebrate biomass Loss of sensitive species
Aquatic Ecology	Drainage/discharge into surface water	Altered habitat Changed fish biomass Changed plant biomass Changed invertebrate biomass Effect on fish behaviour Disturbance/loss of sensitive species Changed species diversity
Terrestrial Ecology	Access roads	Changed habitat Loss of wildlife habitat Change in plant biomass
Terrestrial Ecology	Vehicular access	Changed habitat Disturbance of sensitive species
Terrestrial Ecology	Peat drainage	Changed habitat Wetland changes Disturbance of sensitive species Loss of sensitive species Changed species diversity
Terrestrial Ecology	Mechanical dewatering	Disturbance of sensitive species
Terrestrial Ecology	Drainage/discharge into surface water	Wetland changes

Issues	Sources of impact	Potential Impacts
	Mechanical peat cutting	Disturbance of sensitive species Loss of sensitive species
	Peat removal	Loss of wildlife habitat Wetland changes Change in plant biomass Disturbance of sensitive species Changed species diversity
	Distribution pipelines	Changed habitat Disturbance of sensitive species
Human Related	Vehicular access	Change in noise levels Increased vibration Disrupted access Nuisances
	Peat drainage	Changed flood risk
	Mechanical dewatering	Change in noise levels Increased vibration Disrupted access
	Drainage/discharge into surface water	Health risks
	Mechanical peat cutting	Change in noise levels Increased vibration
	Distribution pipelines	Nuisances
Land Use Change	Access roads	Loss of riparian land
	Peat removal	Loss of riparian land Change in grade of agricultural land
Visual Amenity	Access roads	Altered aesthetic value Altered landscape
	Vehicular access	Altered aesthetic value
	Peat drainage	Altered aesthetic value
	Peat removal	Altered aesthetic value Altered landscape
	Distribution pipelines	Altered aesthetic value
Recreation Related	Access roads	Alterations to access
	Vehicular access	Alterations to access Disruption to users of water environment
	Peat drainage	Disruption to users of water environment

Issues	Sources of impact	Potential Impacts
	Drainage/discharge into surface water	Change in angling quality
	Peat removal	Disruption to users of water environment
	Distribution pipelines	Alterations to access Altered facilities Disruption to users of water environment
Heritage & Archaeology	Access roads	Disturbance and damage of known/unknown features Change to historic landscape
	Vehicular access	Disturbance and damage of known/unknown features
	Peat drainage	Disturbance and damage of known/unknown features Change to historic landscape
	Peat removal	Disturbance and damage of known/unknown features Change to historic landscape
	Distribution pipelines	Disturbance and damage of known/unknown features

## REFERENCES

### NRA Documents

### External Publications

RSPB: The Peat Report, The Peatland Campaign, Out of the Mire, RSPB, The Lodge, Sandy Bedfordshire.

### Other relevant scoping guidance

Pipelines

## Development Type: Bait Digging

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further guidance notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Coastal Morphology/ Sediments	Non-mechanical digging	Changed suspended sediment load
	Mechanical digging	Changed suspended sediment load
Channel Morphology/ Sediments	Non-mechanical digging	Changed suspended sediment load
	Mechanical digging	Changed suspended sediment load
Surface Water Quality	Site access	Rubbish/trash
		Changed suspended sediment load
Aquatic Ecology	Site access	Altered habitat
		Disturbance of sensitive species
		Changed invertebrate biomass
	Non-mechanical digging	Altered habitat
		Changed invertebrate biomass
		Changed species diversity
Effect on fish behaviour		
Mechanical digging	Disturbance of sensitive species	
	Loss of sensitive species	
	Altered habitat	
	Changed invertebrate biomass	
Terrestrial Ecology	Site access	Changed species diversity
		Effect on fish behaviour
	Non-mechanical digging	Disturbance of sensitive species
		Loss of sensitive species
		Changed habitat
		Disturbance of sensitive species
Mechanical digging	Changed habitat	
	Change in animal biomass	
	Disturbance of sensitive species	
Human-Related	Mechanical digging	Disturbance of birds roosting and feeding
		Disturbance of commercial shell fisheries
		Change in noise levels
		Disrupted access
Visual Amenity	Mechanical digging	Altered Aesthetic value

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<b>Issues</b>	<b>Sources of impact</b>	<b>Potential Impacts</b>
<b>Recreation-Related</b>	Non-mechanical digging	Disruption to users of water environment
	Mechanical digging	Alterations to access Change in angling quality Disruption to users of water environment
<b>Heritage &amp; Archaeology</b>	Mechanical digging	Disturbance and damage of known/unknown features

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## REFERENCES

### NRA Documents

### External Publications

Fowler, S.L. (1992) Survey of Bait Collection in Britain. Joint Nature Conservancy Council Committee Report No. 107 (English Nature, Peterborough).

### Other relevant scoping guidance

Beach Nourishment

## Development Type: Pest Species Control

This checklist has been produced to show how this development may affect the water environment. National Rivers Authority concerns are listed under Issues; consultation is recommended to discuss precise requirements peculiar to a site or location. Additional checklists have been prepared for associated activities and are listed at the end of this document. Further guidance notes are available to provide greater detail where required.

Issues	Sources of impact	Potential Impacts
Surface Water Quality	Shooting	Change in quality Chemical pollution Changed dilution capacity Change in electrical conductivity/pH/acidification
	Toxins	Change in quality Chemical pollution Changed dilution capacity Organic pollution
	Entrapment	Rubbish/trash
Channel Morphology/ Sediments	Hunting/baiting	Changed bank/bed stability Degradation/erosion of bed or banks
Surface Water Quality	Hunting/baiting	Change in quality Changed turbidity Microbial contamination Organic pollution
Groundwater Quality	Shooting	Chemical pollution
Aquatic Ecology	Shooting	Altered habitat Changed species diversity Disturbance/loss of sensitive species Changed invertebrate biomass
	Toxins	Altered habitat Changed fish biomass Changed invertebrate biomass Changed plant biomass Effect on fish behaviour Effects on fish spawning Disturbance/loss of sensitive species
	Introduction of predator species	Disturbance of sensitive species Changed invertebrate biomass
	Hunting/baiting	Fish kill Disturbance of sensitive species Changed invertebrate biomass
Terrestrial Ecology	Shooting	Changed habitat Changed riparian habitat Disturbance of sensitive species Changed species diversity

Issues	Sources of impact	Potential Impacts
	Toxins	Changed habitat Change in plant biomass Change in animal biomass Changed riparian habitat Disturbance of sensitive species Changed species diversity
	Entrapment	Changed riparian habitat Disturbance of sensitive species Changed species diversity
	Introduction of predator species	Change in plant biomass Change in animal biomass Changed riparian habitat Disturbance of sensitive species Changed species diversity
	Hunting/baiting	Disturbance of sensitive species
Human Related	Shooting	Change in noise levels Disrupted access Health risks Nuisances
	Toxins	Health risks
	Entrapment	Health risks
	Hunting/baiting	Change in noise levels Health risks Nuisances
Recreation Related	Shooting	Alterations to access Disruption to users of water environment
	Entrapment	Alterations to access Disruption to users of water environment
	Hunting/baiting	Disruption to water users
Heritage & Archaeology	Hunting/baiting	Disturbance and damage of known/unknown features

## REFERENCES

### NRA Documents

1992: The influence of agriculture on the quality of natural waters in England and Wales. NRA, Bristol, NRA, Rivers House, Waterside Drive, Aztec West, Almondsbury, Bristol.

### External Publications

### Other relevant scoping guidance

Deliberate Introduction of Species  
Agriculture

## Appendix A            Legal Requirements

The legislative framework within which much of the statutory environmental assessment is carried out by external bodies in England and Wales is that of the Town and Country Planning (Assessment of Environmental Effects) Regulations 1988 (SI 1988 No. 1199) which is available from HMSO. This implemented much of the EC Council Directive on the assessment of the environmental effects of certain public and private projects on the environment (85/337/EEC), a copy of which is enclosed at the end of this Section. A number of other Regulations also implemented the Directive, as indicated in the regularly updated DoE/WO publication *Environmental assessment: a guide to the procedures* (DoE/WO 1989). Note that there are proposals to amend the Directive, and a copy of these proposals as at May 1994 are also included at the end of this Section.

The legislative framework within which the NRA operate is primarily that of the Water Resources Act 1991 (WRA 1991). As such, the Act largely determines responses to development proposals and applications for licences/consents. In the context of EA, relevant Sections of WRC 1991 are summarised below.

### 4.1    General duties and functions

In general, Section 2 of the Act establishes the functions of the NRA with respect to: water resources; water pollution; flood defence and land drainage; fisheries; and navigation. The Section also lays down the general duty to promote conservation and recreation. Later Sections of the Act define NRA duties and powers in more detail.

### 4.2    Water resources

The legislation with respect to water resources and the responsibilities of the NRA are laid down in Sections 19 - 84 of the WRA 1991.

The NRA's responsibility for the general management of water resources is set out by the duty under Section 19 to take action as considered necessary for the purposes:-

- of conserving, redistributing or otherwise augmenting water resources in England and Wales; and
- of securing the proper use of water resources in England and Wales.

The power to ask the Secretary of State to set minimum acceptable flows, levels or volumes for inland water is set out in Section 21.

The restrictions applying to water abstraction are set out in Section 24. Without a licence or outside the provisions of a licence it is an offence to:-

- abstract water from any source of water; or
- cause or permit any other person so as to abstract any water.

In respect of groundwater abstraction, it is similarly an offence, without a licence or consent to:-

- construct any well, borehole or other work by which water may be abstracted from those strata;
- extend any such well, borehole or other work; or
- install or modify any machinery or apparatus by which additional quantities of water may be abstracted from those strata by means of a well, borehole or other work.

Section 25 of the WRA 1991 sets out the restrictions applying to impounding water. It is an offence, without a licence, to construct or alter any impounding works at any point in any inland water that may obstruct or impede the flow of that water.

Note that under Section 26, navigation, harbour and conservation authorities are exempt from the restrictions on abstraction and impounding works in the carrying out of their functions as such an authority. Exceptions to the restrictions applied to abstraction also occur under Section 27 for cases of small-scale abstractions and those for domestic supply, and under Section 29 for abstraction for the purpose of land drainage.

Licensing arrangements are covered by a number of Sections of the WRA 1991. The NRA *Licensing Manual (Water Resources)* explains these in some detail.

#### **4.3 Water quality/pollution control**

The NRA's management of water quality is based on legislation with respect to the control of pollution of water resources.

Under the WRA 1991, the Secretary of State for the Environment has powers to set up a system for classifying water quality (Section 82) and to establish Statutory Water Quality Objectives for controlled waters (Section 83). The NRA is then under a duty under Section 84 to use its powers to ensure that these objectives are achieved and must monitor the extent of pollution.

Under Section 85 of the WRA 1991, a pollution offence occurs if a person knowingly permits:-

- any poisonous noxious or polluting matter or any solid matter to enter any controlled waters;
- any matter, other than trade effluent or sewage effluent, to enter controlled water by being discharged from a drain or sewer in contravention of a prohibition notice;
- any trade effluent or sewage effluent to be discharged into any controlled water or from land, through a pipe, into the sea outside the seaward limits of controlled waters;
- any trade effluent or sewage effluent to be discharged, in contravention of a prohibition notice, from a building or from a fixed plant onto or into any land, or into any waters of a lake or pond which are not inland freshwaters; or

- any matter whatever to enter any inland freshwaters so as to tend to impede the proper flow of the waters.

Under Section 86 the NRA may impose prohibition notices to prohibit discharges being made or continued. Depending on the nature of the notice, it can be an offence to contravene such a notice by making a discharge or failing to meet the specific conditions of a notice. Discharges containing a prescribed substance or those from a prescribed process also will be in contravention of a prohibition notice.<sup>1</sup>

Sections 88 and 89 of the WRA 1991 sets out the conditions under which discharges may be made, and hence an offence of polluting controlled waters does not occur. As such, the NRA permits and controls discharges primarily through a system of discharge consents.

#### 4.4 Flood defence

The WRA 1991 sets out the NRA's duties with respect to flood defence. The Land Drainage Act 1991 defines the responsibilities of the NRA with respect to main rivers and ordinary watercourses, the NRA having strong control over the former. Under Sections 109 of the WRA 1991 and without the consent of the NRA, no person shall:-

- erect a structure in, over or under a watercourse which is part of a main river;
- carry out any work of alteration or repair on any structure in, over or under a watercourse which is part of a main river; or
- erect or alter any structure designed to contain or divert the floodwaters of any part of a main river.

Consents are issued by the NRA under Section 110 of the WRA 1991, which also specifies that consents:-

- shall not be unreasonably withheld;
- shall be deemed to have been given if it is neither given nor refused within the relevant period (ie two months, subject to conditions); and
- may be given subject to any reasonable conditions as to the time at which and the manner in which any works is to be carried out.

#### 4.4 Fisheries

Section 114 of the WRA 1991 sets out the general fisheries duty of the NRA, ie to maintain, improve and develop salmon fisheries, trout fisheries, freshwater fisheries and eel fisheries.

The NRA is also the competent body under Section 30 of the Salmon and Freshwater Fisheries Act 1975 to issue consents for the introduction of fish to inland waters.

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<sup>1</sup> Discharges of prescribed substances (from prescribed processes) are subject to controls by Her Majesty's Inspectorate of Pollution under the Environmental Protection Act 1990.

#### 4.5 Conservation and recreation

Under Section 2 of the WRA 1991, the NRA has a general duty to promote:-

- the conservation and enhancement of the natural beauty and amenity of inland and coastal waters and of land associated with such waters;
- the conservation of flora and fauna which are dependent on an aquatic environment; and
- the use of such waters and land for recreational purposes.

In addition, the need to further conservation is defined under Section 16 of the WRA and Section 12 of the Land Drainage Act 1991. The NRA is obliged, in formulating or considering any proposals relating to any of its functions, to:-

- further the conservation and enhancement of natural beauty and the conservation of flora, fauna and geological and physiographical (landform) features of special interest;
- have regard to the desirability of protecting and conserving buildings, sites and objects of archaeological and historic interest; and
- take into account the effect which the proposals would have on the beauty or amenity of any rural or urban area or on any such flora, fauna, buildings, sites or objects.

The need to preserve public access is also defined under Section 16 of the WRA 1991, ie the duties when formulating or considering proposals relating to the functions of the Authority:-

- to have regard to the desirability of preserving for the public any freedom of access to areas of woodland, mountains, moor, heath, down, cliff or foreshore and other places of natural beauty;
- to have regard to the desirability of maintaining the availability to the public of any facility for visiting or inspecting any building, site or object of archaeological, architectural or historic interest; and
- to take into account any effect which the proposals would have on any such freedom of access or on the availability of any such facility.

Under Section 18 of the WRA 1991 the NRA should follow codes of practice with respect to environmental and recreational duties; the current government guidance is the *Code of Practice on Conservation, Access and Recreation* issued in 1989.

# COMMISSION OF THE EUROPEAN COMMUNITIES

COM(93) 575 final  
Brussels, 16.03.1994

94/0078 (SYN)

Proposal for a  
COUNCIL DIRECTIVE  
amending Directive 85/337/EEC on the assessment of the effects of  
certain public and private projects on the environment

(presented by the Commission)

## ANNEX III

## INFORMATION REFERRED TO IN ARTICLE 5 (1)

1. Description of the project, including in particular:
  - a description of the physical characteristics of the whole project and the land-use requirements during the construction and operational phases,
  - a description of the main characteristics of the production processes, for instance, nature and quantity of the materials used,
  - an estimate, by type and quantity, of expected residues and emissions (water, air and soil pollution, noise, vibration, light, heat, radiation, etc.) resulting from the operation of the proposed project.
2. Where appropriate, an outline of the main alternatives studied by the developer and an indication of the main reasons for his choice, taking into account the environmental effects.
3. A description of the aspects of the environment likely to be significantly affected by the proposed project, including, in particular, population, fauna, flora, soil, water, air, climatic factors, material assets, including the architectural and archaeological heritage, landscape and the inter-relationship between the above factors.
4. A description (\*) of the likely significant effects of the proposed project on the environment resulting from:
  - the existence of the project,
  - the use of natural resources,
  - the emission of pollutants, the creation of nuisances and the elimination of waste;and the description by the developer of the forecasting methods used to assess the effects on the environment.
5. A description of the measures envisaged to prevent, reduce and where possible offset any significant adverse effects on the environment.
6. A non-technical summary of the information provided under the above headings.
7. An indication of any difficulties (technical deficiencies or lack of know-how) encountered by the developer in compiling the required information.

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(\*) This description should cover the direct effects and any indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative effects of the project.

**4. Processing of metals**

- (a) Iron and steelworks, including foundries, forges, drawing plants and rolling mills (unless included in Annex I).
- (b) Installations for the production, including smelting, refining, drawing and rolling, of non-ferrous metals, excluding precious metals.
- (c) Pressing, drawing and stamping of large castings.
- (d) Surface treatment and coating of metals.
- (e) Boilermaking, manufacture of reservoirs, tanks and other sheet-metal containers.
- (f) Manufacture and assembly of motor vehicles and manufacture of motor-vehicle engines.
- (g) Shipyards.
- (h) Installations for the construction and repair of aircraft.
- (i) Manufacture of railway equipment.
- (j) Swaging by explosives.
- (k) Installations for the roasting and sintering of metallic ores.

**5. Manufacture of glass****6. Chemical industry**

- (a) Treatment of intermediate products and production of chemicals (unless included in Annex I).
- (b) Production of pesticides and pharmaceutical products, paint and varnishes, elastomers and peroxides.
- (c) Storage facilities for petroleum, petrochemical and chemical products.

**7. Food industry**

- (a) Manufacture of vegetable and animal oils and fats.
- (b) Packing and canning of animal and vegetable products.
- (c) Manufacture of dairy products.
- (d) Brewing and malting.
- (e) Confectionery and syrup manufacture.
- (f) Installations for the slaughter of animals.
- (g) Industrial starch manufacturing installations.
- (h) Fish-meal and fish-oil factories.
- (i) Sugar factories.

**8. Textile, leather, wood and paper industries**

- (a) Wool scouring, degreasing and bleaching factories.
- (b) Manufacture of fibre board, particle board and plywood.
- (c) Manufacture of pulp, paper and board.
- (d) Fibre-dyeing factories.
- (e) Cellulose-processing and production installations.
- (f) Tannery and leather-dressing factories.

**9. Rubber industry**

Manufacture and treatment of elastomer-based products.

**10. Infrastructure projects**

- (a) Industrial-estate development projects.
- (b) Urban-development projects.
- (c) Ski-lifts and cable-cars.
- (d) Construction of roads, harbours, including fishing harbours, and airfields (projects not listed in Annex I).
- (e) Canalization and flood-relief works.
- (f) Dams and other installations designed to hold water or store it on a long-term basis.
- (g) Tramways, elevated and underground railways, suspended lines or similar lines of a particular type, used exclusively or mainly for passenger transport.
- (h) Oil and gas pipeline installations.
- (i) Installation of long-distance aqueducts.
- (j) Yacht marinas.

## ANNEX I

## PROJECTS SUBJECT TO ARTICLE 4 (1)

1. Crude-oil refineries (excluding undertakings manufacturing only lubricants from crude oil) and installations for the gasification and liquefaction of 500 tonnes or more of coal or bituminous shale per day.
2. Thermal power stations and other combustion installations with a heat output of 300 megawatts or more and nuclear power stations and other nuclear reactors (except research installations for the production and conversion of fissionable and fertile materials, whose maximum power does not exceed 1 kilowatt continuous thermal load).
3. Installations solely designed for the permanent storage or final disposal of radioactive waste.
4. Integrated works for the initial melting of cast-iron and steel.
5. Installations for the extraction of asbestos and for the processing and transformation of asbestos and products containing asbestos: for asbestos-cement products, with an annual production of more than 20 000 tonnes of finished products, for friction material, with an annual production of more than 50 tonnes of finished products, and for other uses of asbestos, utilization of more than 200 tonnes per year.
6. Integrated chemical installations.
7. Construction of motorways, express roads (\*) and lines for long-distance railway traffic and of airports (†) with a basic runway length of 2 100 m or more.
8. Trading ports and also inland waterways and ports for inland-waterway traffic which permit the passage of vessels of over 1 350 tonnes.
9. Waste-disposal installations for the incineration, chemical treatment or land fill of toxic and dangerous wastes.

(\*) For the purposes of the Directive, 'express road' means a road which complies with the definition in the European Agreement on main international traffic arteries of 15 November 1975.

(†) For the purposes of this Directive, 'airport' means airports which comply with the definition in the 1944 Chicago Convention setting up the International Civil Aviation Organization (Annex 14).

To this end Member States may *inter alia* specify certain types of projects as being subject to an assessment or may establish the criteria and/or thresholds necessary to determine which of the projects of the classes listed in Annex II are to be subject to an assessment in accordance with Articles 5 to 10.

#### Article 5

1. In the case of projects which, pursuant to Article 4, must be subjected to an environmental impact assessment in accordance with Articles 5 to 10, Member States shall adopt the necessary measures to ensure that the developer supplies in an appropriate form the information specified in Annex III inasmuch as:

- (a) the Member States consider that the information is relevant to a given stage of the consent procedure and to the specific characteristics of a particular project or type of project and of the environmental features likely to be affected;
- (b) the Member States consider that a developer may reasonably be required to compile this information having regard *inter alia* to current knowledge and methods of assessment.

2. The information to be provided by the developer in accordance with paragraph 1 shall include at least:

- a description of the project comprising information on the site, design and size of the project,
- a description of the measures envisaged in order to avoid, reduce and, if possible, remedy significant adverse effects,
- the data required to identify and assess the main effects which the project is likely to have on the environment,
- a non-technical summary of the information mentioned in indents 1 to 3.

3. Where they consider it necessary, Member States shall ensure that any authorities with relevant information in their possession make this information available to the developer.

#### Article 6

1. Member States shall take the measures necessary to ensure that the authorities likely to be concerned by the project by reason of their specific environmental responsibilities are given an opportunity to express their opinion on the request for development consent. Member States shall designate the authorities to be consulted for this purpose in general terms or in each case when the request for consent is made. The information gathered pursuant to Article 5 shall be forwarded to these authorities. Detailed arrangements for consultation shall be laid down by the Member States.

2. Member States shall ensure that:

- any request for development consent and any information gathered pursuant to Article 5 are made available to the public,
- the public concerned is given the opportunity to express an opinion before the project is initiated.

3. The detailed arrangements for such information and consultation shall be determined by the Member States, which may in particular, depending on the particular characteristics of the projects or sites concerned:

- determine the public concerned,
- specify the places where the information can be consulted,
- specify the way in which the public may be informed, for example by bill-posting within a certain radius, publication in local newspapers, organization of exhibitions with plans, drawings, tables, graphs, models,
- determine the manner in which the public is to be consulted, for example, by written submissions, by public enquiry,
- fix appropriate time limits for the various stages of the procedure in order to ensure that a decision is taken within a reasonable period.

#### Article 7

Where a Member State is aware that a project is likely to have significant effects on the environment in another Member State or where a Member State likely to be significantly affected so requests, the Member State in whose territory the project is intended to be carried out shall forward the information gathered pursuant to Article 5 to the other Member State at the same time as it makes it available to its own nationals. Such information shall serve as a basis for any consultations necessary in the framework of the bilateral relations between two Member States on a reciprocal and equivalent basis.

#### Article 8

Information gathered pursuant to Articles 5, 6 and 7 must be taken into consideration in the development consent procedure.

#### Article 9

When a decision has been taken, the competent authority or authorities shall inform the public concerned of:

- the content of the decision and any conditions attached thereto,
- the reasons and considerations on which the decision is based where the Member States' legislation so provides.

## COUNCIL DIRECTIVE

of 27 June 1985

on the assessment of the effects of certain public and private projects on the environment

(85/337/EEC)

THE COUNCIL OF THE EUROPEAN COMMUNITIES,

Having regard to the Treaty establishing the European Economic Community, and in particular Articles 100 and 235 thereof,

Having regard to the proposal from the Commission<sup>(1)</sup>,

Having regard to the opinion of the European Parliament<sup>(2)</sup>,

Having regard to the opinion of the Economic and Social Committee<sup>(3)</sup>,

Whereas the 1973<sup>(4)</sup> and 1977<sup>(5)</sup> action programmes of the European Communities on the environment, as well as the 1983<sup>(6)</sup> action programme, the main outlines of which have been approved by the Council of the European Communities and the representatives of the Governments of the Member States, stress that the best environmental policy consists in preventing the creation of pollution or nuisances at source, rather than subsequently trying to counteract their effects; whereas they affirm the need to take effects on the environment into account at the earliest possible stage in all the technical planning and decision-making processes; whereas to that end, they provide for the implementation of procedures to evaluate such effects;

Whereas the disparities between the laws in force in the various Member States with regard to the assessment of the environmental effects of public and private projects may create unfavourable competitive conditions and thereby directly affect the functioning of the common market; whereas, therefore, it is necessary to approximate national laws in this field pursuant to Article 100 of the Treaty;

Whereas, in addition, it is necessary to achieve one of the Community's objectives in the sphere of the protection of the environment and the quality of life;

<sup>(1)</sup> OJ No C 169, 9. 7. 1980, p. 14.

<sup>(2)</sup> OJ No C 66, 15. 3. 1982, p. 89.

<sup>(3)</sup> OJ No C 185, 27. 7. 1981, p. 8.

<sup>(4)</sup> OJ No C 112, 20. 12. 1973, p. 1.

<sup>(5)</sup> OJ No C 139, 13. 6. 1977, p. 1.

<sup>(6)</sup> OJ No C 46, 17. 2. 1983, p. 1.

Whereas, since the Treaty has not provided the powers required for this end, recourse should be had to Article 235 of the Treaty;

Whereas general principles for the assessment of environmental effects should be introduced with a view to supplementing and coordinating development consent procedures governing public and private projects likely to have a major effect on the environment;

Whereas development consent for public and private projects which are likely to have significant effects on the environment should be granted only after prior assessment of the likely significant environmental effects of these projects has been carried out; whereas this assessment must be conducted on the basis of the appropriate information supplied by the developer, which may be supplemented by the authorities and by the people who may be concerned by the project in question;

Whereas the principles of the assessment of environmental effects should be harmonized, in particular with reference to the projects which should be subject to assessment, the main obligations of the developers and the content of the assessment;

Whereas projects belonging to certain types have significant effects on the environment and these projects must as a rule be subject to systematic assessment;

Whereas projects of other types may not have significant effects on the environment in every case and whereas these projects should be assessed where the Member States consider that their characteristics so require;

Whereas, for projects which are subject to assessment, a certain minimal amount of information must be supplied, concerning the project and its effects;

Whereas the effects of a project on the environment must be assessed in order to take account of concerns to protect human health, to contribute by means of a better environment to the quality of life, to ensure maintenance of the diversity of species and to maintain the reproductive capacity of the ecosystem as a basic resource for life;

### 1.1.1 Scope

One of the key criteria for assessing practical implementation of the Directive are the data on the total number and types of projects assessed. These figures clearly indicate that the differences in the annual number of assessments are attributable to differences in the extent of the obligations imposed by the national legislation for Annex II projects and to the thresholds applied for such projects.

However, as currently defined in Article 4, the scope of the Directive covers both projects for which assessment is a mandatory requirement (Annex I projects) and those for which assessment must be performed only where Member States so deem necessary on the basis of the project's characteristics (Annex II projects).

Taking issue with the way certain Member States have interpreted this latter provision, the Commission believes that giving Member States this discretionary power should not devalue the general provision in Article 2(1) which requires all projects referred to in both Annexes I and II of the Directive to be assessed if they are liable to have a significant environmental impact.

As the Commission sees it, the reason for the difference in approach to Annex I and Annex II projects in Article 4 is essentially the following: whereas it is unanimously acknowledged that Annex I projects have to be subjected to mandatory systematic analysis, in the case of Annex II projects it has been agreed that the detailed arrangements for assessing environmental impact should be determined by the Member States in keeping with their individual constitutional and administrative procedures.

In this connection, the report stresses that besides the fears that Annex II projects are not fully covered, there are also grounds to fear the opposite since the adoption of very low thresholds (or no thresholds at all) could result in large numbers of relatively minor projects being submitted for assessment.

The Commission is therefore proposing to amend paragraph 2 of Article 4 so as to clarify:

- (i) the circumstances in which Annex II projects will be required to undergo an environmental assessment, i.e. where they are liable to have a significant effect on special protection areas designated by Member States and communicated to the Commission in accordance with the Community Directives on environmental protection;
- (ii) the selection procedure for Annex II projects which Member States must apply in all other cases in order to ascertain whether an assessment is necessary, using criteria defined and agreed at Community level. Where appropriate these criteria can be accompanied by thresholds to be laid down by the Member States in line with the principles of subsidiarity and shared responsibility.

### 1.1.2 Content of the impact study

The current practices for determining the information provided for in Article 5 vary considerably from one Member State to another. In most cases, however, the result is that the impact assessments contain only the minimum information required by Article 5(2), thereby failing to satisfy the requirement in paragraph 1 that the information, under certain circumstances, must be that specified in Annex III.

To ensure that the information collected is more relevant to the type of project being considered and to improve the quality of that information, the Commission believes the application of this article could be clarified by introducing the concept of scoping.

specified in Annex III should be gathered and submitted by the developer. In any event this information should include a description of the alternatives being considered by the developer.

The developer will henceforth have access to the data held by any authority, in accordance with Directive 90/313/EEC on the freedom of access to information on the environment<sup>(6)</sup>, Article 3 of which requires public authorities to make available information relating to the environment to any natural or legal person at his request and without his having to prove an interest.

### 1.1.3. Monitoring

The report highlighted the technical shortcomings of the assessment procedure provided for by the Directive, which makes no provision for monitoring the effects on the environment due to the implementation of the project.

However, imposition of such monitoring would have a beneficial effect when it comes to implementing the project by enabling the competent authorities and the developer to take the necessary measures to soften or compensate for the impact at the earliest possible stage, thereby improving the cost-benefit ratio for the measures.

Moreover, it would enable the environmental authorities and the public to take a more favourable view if the impact assessments revealed uncertainties or gaps in the information about a project since they could be reconsidered during the monitoring phase.

A clause to this effect has already been included in the Espoo Convention which the Member States and the Community must observe as regards the transfrontier impact.

However, the Commission considers that there is no need, at the moment, to adapt the Community Directive to the rules laid down in the Directive, by providing for systematic monitoring of the circumstances in which the development consent decision was taken and the proposed corrective measures so as to avoid, reduce or offset the adverse effects on the environment.

Before submitting specific proposals it intends to examine in greater depth the costs and benefits of such adaptation and its compatibility with the subsidiarity principle.

1.1.4. These new provisions are consistent with the experience of environmental assessment at international level and in a number of Member States. They should, in the Commission's view, make this procedure more efficient and yield greater benefits in terms of safeguarding the environment.

## 1.2 Compatibility with the fifth environmental action programme and with the White Paper on growth, competitiveness and employment

The fifth programme acknowledges the central role of the environmental impact assessment in decision-making with regard to both individual projects and the underlying development strategies.

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<sup>(6)</sup> OJ No L 158, 23.6.1990.

It provides decision-makers with the information needed in order to evaluate the environmental impact of the necessary investment more accurately, especially in the sectors which are given priority in the first programme<sup>(2)</sup> and in the White Paper on growth, competitiveness and employment<sup>(3)</sup>.

In particular, the rules in force and those proposed enable the Member States to take the appropriate measures to simplify and concentrate the existing national consent procedures and to avoid unnecessary delays during planning and implementation of priority projects identified and adopted at Community level, particularly as part of the trans-European networks.

More systematic and better coordinated application of the EIA procedure can also help reduce distortion to which the widely differing national practices may give rise.

## 2. Costs and benefits of the proposal

2.1. The potential benefits of the new provisions, which are explained in detail under point 1.1, are considerable:

- more relevant and selective gathering of the information required from the developer based on the particulars supplied by the competent authority in agreement with the environmental authorities responsible and in consultation with the developer. It should be emphasized here that involving the public in appropriate ways at this stage of the assessment procedure can only improve public relations and make the necessary consensus on the project easier to achieve;
- easier access to relevant existing data for those who need it;
- better control over the quality of impact assessments and the conclusions drawn from them;
- closer attention to attenuation measures which tend not to be properly integrated into the project design;
- fewer assessments of very small projects (where they are unlikely to have any environmental impact).

2.2. The cost of putting these new measures into effect can be broken down into three categories: funding, time and personnel. Since these three parameters will be dependent on the number and type of assessments to be conducted, it is impossible to put forward accurate estimates at this stage.

Experience gained in the Member States shows that generally the financial cost of conducting an impact assessment is a minute fraction of the total project cost. Only in exceptional cases for small projects requiring heavy capital investment will they be more than 1% of the total cost of the project<sup>(4)</sup>.

It therefore seems perfectly reasonable to assume that normally the cost of such an assessment will remain below the 1% threshold.

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<sup>(2)</sup> COM(92) 23 final, 12.6.1992, pages 26-27.

<sup>(3)</sup> COM(93) 700 final, 5.12.1993.

<sup>(4)</sup> See Report on the implementation of Directive 85/337/EEC (COM(93) 28 final, pp. 55-57).

The cost of attenuation measures varies appreciably from one project to another and is usually dictated by environmental constraints. Where the environmental protection standards to be attained are the same, the necessary attenuation measures can be taken into account from the beginning of the project design, which should permit a reduction in the overall capital cost.

Similarly, the time taken for the environmental impact assessment seems to make little difference to the total time needed to implement the project as it can be included in the consent procedure.

Secondly, it is clear that the time required for the scoping exercise, if it is well managed, will be more than offset by savings at later stages in the development consent process.

2.3. Lastly, given that the implementation of these provisions will create certain additional needs in terms of training people to conduct assessments and in terms of drafting appropriate guidelines, the Commission has already initiated a programme of technical assistance to that end in conjunction with the Member States.

### 3. Subsidiarity and proportionality

3.1. The main purpose of harmonizing the provisions on environmental impact assessment is to establish at Community level a general frame of reference to ensure that action by Member States to protect the environment is following similar lines.

The same is true of the new provisions contained in this proposal, insofar as the proposed amendments do not alter the actual scope of the Member States' obligations under the directive.

It is for the Member States, working within their own administrative and organizational structures, but on the basis of principles laid down at Community level, to:

- define the required content and form of the information to be supplied by the developer;
- explain the manner in which the outcome of the assessment is taken into consideration;
- examine, in certain circumstances, whether the likely environmental impact of Annex II projects makes an assessment necessary.

3.2. Consequently, these provisions are consistent with the principle of subsidiarity enshrined in Article 130r of the Treaty and restated in the fifth environmental action programme.

### 4. Consultation of socio-economic interests

Consulting the Economic and Social Committee under Article 198 of the Treaty will guarantee a wide-ranging debate with the representatives of the various economic and socio-professional groups.

### 5. Legislative situation in the Member States

Although the new provisions on screening and scoping have not yet been fully incorporated into the laws of the Member States, some of the practices involved are already being applied to differing degrees in a number of Member States, and in certain non-Community countries. The following tables give an idea of the experience gained and the extent to which the procedures mentioned above, and monitoring have been formalized.

TABLE A

LEGISLATIVE SITUATION IN MEMBER STATES REGARDING SCREENING, SCORING AND MONITORING

MEMBER STATES	SCREENING	SCORING	MONITORING
Belgium	Single list of projects subject to EIA in Flawobes (I & 7 of EIA administrative order) Without more individual evaluation of projects to assess requirement for EIA.	No mandatory provision in Flawobes regulation. P/A's enquiry provided for projects initiated by a public body.	Industrial installations conditions of Flawobes may require that monitoring is carried out.
Denmark	List of projects requiring EIA in several Acts, as screening procedure.	Mandatory provision. Informal discussion in ES preparation.	Local authorities undertake monitoring requirements as part of planning process.
Netherlands	List of projects requiring EIA in section C of EIA Decree, as screening procedure.	Competent authority draws up guidelines after mandatory consultation of other authorities. Independent EIA Commission and the public. No final provision at present. Binding arrangements in preparation.	Legislators require monitoring of effects detailed in EIA.
France	Two lists of projects (Group I & Group 2); all projects require EIA but the two groups have different ES content requirements, as screening procedure.		Only occasional monitoring and post-auditing undertaken by FEMA.
Germany	List of projects requiring EIA at both federal and regional (Länder) level; screening of significance of effects in the case of modifications to projects.	Discussion of substantive requirements between developer and competent authority mandatory at federal level; in some "Länder" mandatory public	Some projects monitored, under EIA act and consent agency may require additional monitoring.

Ireland	Single list of projects EIA mandatory when project above threshold, case-by-case screening possible when under threshold.	No formal provision at present. Proposed EPA to provide screening guidelines for EIS submission on project cases.	No formal system for screening under EIA regulations. Proposed EPA may have a screening and evaluation criteria.
Italy	Single list of projects requiring EIA; no screening procedure.	No mandatory provisions.	Consent may be conditional on execution of monitoring network.
France	List of projects requiring EIA in several AMLC, no screening procedure.	No mandatory provisions for formal, systematic screening.	All "industries classified" subject to monitoring by external inspectors. All other projects not subject.
Portugal	Annex of D.L. No.30/76, project list and thresholds (14 types of projects)	No mandatory provision.	No formal provision for monitoring.
Spain	List of projects requiring EIA in several acts, both at the national level and the level of autonomous communities (list of additional projects requiring EIS); no screening procedure.		Voluntary screening only (takes place in most cases). Monitoring required by programme of Environmental Surveillance. Conditional in distribution of Environmental Impact.

UK

No mandatory provisions. The regulations provide for case by case consideration of projects by competent authorities.

No mandatory provisions.

Inter-departmental authorities consultation recommended by DoE.

No mandatory provision, but monitoring conditions may be attached to certain consent procedures.

Luxembourg

Projects covered by "concrete Law" (Annex I) & most of Annex II) are screened for full-EIA requirements on the basis of preliminary EIA, other projects case-by-case screening.

No formal provision for scoping, check lists drawn by CA for specific projects. No new legislation envisaged.

Some monitoring carried out under the "concrete-law".

**LEGISLATIVE SITUATION REGARDING SCREENING, SCOPING AND MONITORING  
IN COUNTRIES CANDIDATE FOR THE MEMBERSHIP OF THE UNION**

COUNTRY	SCREENING	SCOPING	MONITORING
Austria	Single list of projects	Competent authority, after consultation of other authorities & public, decides on acceptability of a draft EIS content prepared by the developer	Mandatory monitoring under the responsibility of the competent authority; results must be communicated to other authorities
Finland (NR. proposal for EIA Act)	Single list of projects; in addition possibility for a case-by-case screening by Minister of Environment	The competent authority decides, following public consultation and involving the developer, on the content of the EIS	Monitoring of projects mandatory under national acts; monitoring programme mandatory part of EIS; monitoring information is public
Norway	Single list of projects in principle requiring EIA; for projects not listed possibility of case-by-case screening by Minister of Environment	The competent authority, after consultation of public and Minister of Environment, on the need for a full EIS and sets guidelines for its content	Monitoring programme mandatory part of EIS; every client authority established programme, after consultation of public & Minister of Environment; programme responsibility of developer
Sweden	In principle, according to the Natural Resources Management Act, all projects needing a permit under 13 different Acts require EIA	Each Competent Authority has the power to determine the scope of each assessment but screening procedures are not yet contained in legislation	No specific EIA provisions or procedures for monitoring. Some more general provisions for monitoring project implementation may exist under specific permitting procedures

TABLE C

LEGISLATIVE SITUATION REGARDING SCREENING, SCOPING AND MONITORING IN CERTAIN COUNTRIES

COUNTRY	SCREENING	SCOPING	MONITORING
Canada	Yes	Yes	Yes
United States	Yes	Yes	Variable - only in certain cases
New Zealand	Yes	No	Yes
Australia	Yes	Yes	Variable - generally no
Switzerland	Yes	Yes	No specific provisions in ordinance

o. Legal basis

The main reason for choosing Article 130s(1) was the fact that the Directive dates back to 1985 when it was based on Article 100, in view of the distortion which could arise from the diverging impact assessment requirements in the different Member States, and on Article 235 in view of the lack of any provision explicitly on the environment in the Treaty of Rome. This proposal is being submitted after the entry into force of the Treaty on European Union and places the emphasis on the Community's environmental obligations with regard to impact assessment and, hence, is covered by Article 130s(1).

The environmental assessment procedure not only plays a crucial role in the proper functioning of the internal market; its purpose, above all, is to provide the competent authorities with the information they need to reach an informed decision on any given project. This makes it a basic instrument of environmental policy.

The possibility that the costs of the environmental assessment procedure could create unequal conditions of competition and give rise to market distortions between Member States is only a secondary consideration with regard to the need for this common step, since the cost of the procedure is not such as would sway the investor's choice as to the site of the project.

7. Commentary on the individual articles of the proposal

Article 1 announces the amendments to the following Articles of Directive 85/337/EEC:

Article 1

The proposal is to transfer and clarify the definition of "modifications to projects" which appears as a project class in Annex II to the Directive. This operation is felt to be necessary because in practice the interpretation of "modifications to projects" has given rise to problems regarding the scope of the proposed modification (restructuring of a project) and changes to the conditions under which the project has been authorized.

Article 4

The aim of the amendments to this Article is to initiate the screening procedure to be applied by the Member States for identifying Annex II projects which require assessment.

Article 5

This Article introduces the concept of scoping, the main purpose of which is to facilitate the exchange of information between the various parties concerned and to improve the quality of the assessment.

Article 6

It is made clear in paragraph 1 that the environmental authorities must be consulted not only on the developer's application for development consent, but also on the information supplied by the developer.

Similarly, it is made clear in paragraph 2 that the public must be consulted before development consent is granted rather than before the work actually commences. In practice, development consent may be granted a long time before work begins, which in turn may be at a time when the consent can no longer be withdrawn. Consultation of the public would then be pointless.

#### Article 7

In accordance with the Espoo Convention, this proposal advocates a major improvement in bilateral relations between the Member States as regards consultation of the authorities of any Member State liable to be particularly affected and the latter's participation in the environmental assessment procedure.

The Member States affected by the project must therefore conduct a joint examination of the transboundary effects of the project and the measures to reduce or offset them, all this on the basis of the opinions of the authorities responsible for the environment and their respective nationals. This should ensure closer cooperation between the Member States, in view of the fact that pollution, as is stressed in the fifth environmental action programme<sup>(10)</sup>, does not stop at frontiers.

#### Article 8

The report highlighted another difficulty in implementing the Directive, namely the extent to which the environmental assessment procedure can exert pro-environmental pressure on the development consent decision.

It would appear that the attention given to the findings of the assessment procedure in terms of preventing or offsetting the effects on the environment is not properly reflected in the decisions taken by the competent authorities.

The requirement that express account be taken of the opinions given by the environment authority and the public concerned should, to some extent, lead to greater transparency in the decisions taken by the competent authority.

#### Article 9

The main aim of the amendment is to require justification of the decisions taken by the competent authority so that the public may be aware of the effects of the environmental assessment on these decisions.

#### Article 11

The new wording of Article 4 of Directive 85/337/EEC makes Article 11(2) of that Directive redundant. The latter is therefore deleted.

#### Article 12

The new wording of Article 2 of the proposal makes Article 12 of the Directive redundant. The latter is therefore deleted.

#### Article 13

Article 13 is to be deleted, since Article 130t of the Treaty now allows Member States to lay down stricter rules on environmental protection.

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<sup>(10)</sup> COM(92) 23 final, 12.6.1992.

## Annex I

Two new categories of project are introduced: installations for the reprocessing of irradiated nuclear fuel, and temporary storage of radioactive waste.

The inclusion of reprocessing installations is justified by the fact that more radioactive waste is produced by this type of installation than by the nuclear power stations already listed in the Annex. Similarly, the temporary storage of waste which presents such a danger to human health must also be assessed prior to authorization.

Lastly, the proposed amendment clarifies the definition of integrated chemical installations.

## Annex II

The main purpose of the amendments to this Annex is to amalgamate certain categories of project and to tighten up some of the definitions.

It is proposed, for instance, that the agricultural projects category be restructured by transferring the projects for the use of uncultivated land and for the reclamation of land from the sea into a new land use category.

Another new category, "Tourism and leisure", will now encompass the construction of ski-runs and bobsleigh tracks, ski-lifts, golf courses, marinas, camp sites and caravan sites, holiday villages and leisure and cultural centres.

Other amendments cover the infrastructure projects category.

All these amendments are aimed at a clearer definition of the practical scope of the Directive.

## Annex IIa (new Annex)

The objective of adding this new Annex to Directive 85/337/EEC is to allow application of the new provision in Article 4(3).

This Annex lays down selection criteria to allow Member States to appraise, on an identical basis, whether or not Annex II projects are likely to have a significant impact on the environment.

## Annex III

Point 2 of the Annex is amended to make the examination of the main alternatives to the project compulsory. This is to make the Directive more effective and to harmonize the relevant national provisions.

## Annex IV

The objective of this new Annex is to define the procedure for consultation between the Member States and the information considered appropriate in the case of projects with a transboundary impact.

Proposal for a  
**COUNCIL DIRECTIVE**  
amending Directive 85/337/EEC on the assessment of the effects of  
certain public and private projects on the environment

THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty establishing the European Community, and in particular Article 130s(1) thereof,

Having regard to the proposal from the Commission<sup>(1)</sup>,

In cooperation with the European Parliament<sup>(2)</sup>,

Having regard to the opinion of the Economic and Social Committee<sup>(3)</sup>,

Whereas the main purpose of the environmental assessment procedure under Council Directive 85/337/EEC<sup>(4)</sup> is to provide the competent authorities with relevant information to enable them to make a decision on a specific project in full knowledge of the facts regarding the project's probable impact on the environment; whereas the assessment procedure is therefore a fundamental instrument of environmental policy as defined in Article 130r of the Treaty;

Whereas a sufficient degree of environmental protection must be ensured at Community level by laying down a general assessment framework and criteria for defining those projects which must be submitted for an environmental assessment; whereas, however, in accordance with the subsidiarity principle, the Member States are in the best position to apply those criteria in specific instances;

Whereas the report on the implementation of Directive 85/337/EEC, as adopted by the Commission on 2 April 1993, shows that there are problems in applying the Directive; whereas certain provisions of the Directive should therefore be clarified so that the assessment procedure may produce greater benefits, but without altering the actual scope of the Member States' obligations under the Directive;

Whereas it would, nevertheless, appear necessary to introduce provisions designed to improve the rules on the assessment procedure;

Whereas additions should be made to the list of projects which have significant effects on the environment and which must on that account be made subject to systematic assessment;

Whereas it should also be made clear that such assessment is compulsory for the projects listed in Annex II to the Directive which may have a significant effect on the specific environmental protection objectives laid down by mutual agreement at Community level; whereas in all other cases, however, it falls to the Member States to determine whether assessment is necessary in accordance with the selection criteria set out in this Directive;

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<sup>(1)</sup> OJ No C

<sup>(2)</sup> OJ No C

<sup>(3)</sup> OJ No C

<sup>(4)</sup> OJ No L 175, 5.7.1985, p. 40.

Whereas some of these measures bring the provisions of the Directive into line with the Convention on environmental impact assessment in a transboundary context (Espoo Convention), which the Community signed at the same time as the Member States on 25 February 1991,

HAS ADOPTED THIS DIRECTIVE:

Article 1

Directive 85/337/EEC is hereby amended as follows:

1. In Article 1(2), the following definition is inserted after the first definition:

"modifications to projects" means:

any restructuring of a project which affects it substantially or any substantial change in the conditions of execution or operation of a project;"

2. Article 4 is replaced by the following:

"Article 4

1. Subject to Article 2(3), projects listed in Annex I shall be assessed in accordance with Articles 5 to 10.
2. Subject to Article 2(3), projects listed in Annex II shall be assessed in accordance with Articles 5 to 10 where they are liable to have a significant effect on the special protection areas designated by Member States pursuant to Community law.
3. In all other cases, projects listed in Annex II shall be examined by the competent authority to determine, on the basis of thresholds set, where appropriate, by Member States and of the selection criteria laid down in Annex IIa, whether their probable environmental impact necessitates assessment in accordance with Articles 5 to 10.

Member States shall ensure that decisions taken by the competent authority are published."

3. Article 5(1) is replaced by the following:

"1. In the case of projects which, pursuant to Article 4, must undergo environmental impact assessment in accordance with Articles 5 to 10, Member States shall adopt the necessary measures to ensure that the competent authority defines, in agreement with the authorities referred to in Article 6 and in consultation with the developer, the information specified in Annex III which the developer is required to provide, in an appropriate form, in so far as:

- (a) the information is relevant to a given stage of the development consent procedure and to the specific characteristics of a particular project or type of project, or those of the environmental features liable to be affected;
- (b) a developer may reasonably be required to gather this information having regard, inter alia, to current knowledge and methods of assessment."

4. Article 5(2) is deleted.

5. Article 5(3) is replaced by the following:
  - "3. Member States shall ensure that any authorities holding relevant information, regard being had in particular to Article 3, shall make this information available to the developer."
6. Article 6(1) is replaced by the following:
  - "1. Member States shall take the measures necessary to ensure that the authorities likely to be concerned by the project by reason of their specific environmental responsibilities are given an opportunity to express their opinion on the information supplied by the developer and on the request for development consent. To this end, Member States shall designate the authorities to be consulted, either in general terms or on a case-by-case basis, when the request for development consent is made. The information gathered pursuant to Article 5 shall be forwarded to those authorities. Detailed arrangements for consultation shall be laid down by the Member States."
7. In Article 6(2), the words "before the project is initiated" are replaced by the words "before development consent is granted".
8. Article 7 is replaced by the following:

#### "Article 7

1. Where a Member State considers that a project referred to in Article 4 is liable to have significant adverse effects on the environment of another Member State, or where a Member State whose environment is liable to be significantly affected so requests, the Member State on whose territory the project is located shall communicate to the other Member State, at the latest when it informs its own nationals, the information specified in Annex IV.
2. The Member States concerned shall enter into consultations, setting a reasonable timetable for:
  - (i) the main alternative solutions to the project which have been examined;
  - (ii) the measures which may be taken to avoid, reduce and, if possible, offset the adverse transboundary effects;
  - (iii) possible forms of mutual assistance to lessen any major harmful transboundary impact caused by the proposed project;
  - (iv) the measures which may be taken to ensure the monitoring of the transboundary effects of the project at the expense of the Member State in which the project is proposed.
3. The authorities of the Member State whose environment is liable to be significantly affected shall hold consultations with the authorities concerned and with the public, in accordance with the provisions of Article 6 and shall, within the time limit provided for in paragraph 2, communicate their opinion on the project to the authorities of the Member State on whose territory the project is located.

However, failure by the authorities of the Member State whose environment is liable to be affected to deliver the opinion mentioned in paragraph 1 within the time limit and in the form specified above, those authorities having been properly informed pursuant to paragraph 2, shall not provide grounds which may be invoked in support of a challenge to the validity of the competent authorities' decision regarding the project."

9. Article 8 is replaced by the following:

"Article 8

The opinions and the information gathered pursuant to Articles 5, 6 and 7 must be taken into consideration in the development consent procedure."

10. Article 9 is replaced by the following:

"Article 9

When a decision has been taken, the competent authority or authorities shall publish it and, where appropriate, inform the other Member State which has been consulted pursuant to Article 7 thereof, indicating:

- the content of the decision and any conditions attached thereto;
- the reasons and considerations on which its decision to refuse to grant development consent, or to grant development consent despite receiving unfavourable opinions pursuant to Articles 6 and 7, is based;
- a description, where necessary, of the measures to avoid, reduce and, if possible, offset the major adverse effects."

11. Article 11(2) is hereby deleted.

12. Article 13 is hereby deleted.

13. The Annexes are amended as shown in the Annex hereto.

Article 2

1. Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with this Directive by 30 June 1996 at the latest. They shall forthwith inform the Commission thereof.

When Member States adopt these provisions, these shall contain a reference to this Directive or shall be accompanied by such reference at the time of their official publication. The procedure for such reference shall be adopted by Member States.

2. If a request for development consent has been submitted to a competent authority before 1 July 1996, the provisions of Directive 85/337/EEC prior to these amendments shall continue to apply.

Article 3

This Directive shall enter into force on the twentieth day following that of its publication in the Official Journal of the European Communities.

Article 4

This Directive is addressed to the Member States.

Done at Brussels,

For the Council  
The President

1. Point 3 in Annex I is replaced by the following:
  - "3. (a) Installations for the reprocessing of irradiated nuclear fuel.
  - (b) Installations designed solely for the permanent storage or final disposal of radioactive waste and centralized temporary storage installations for radioactive waste or irradiated nuclear fuel."
2. Point 6 in Annex I is replaced by the following:

"6. Integrated chemical installations: installations located in a geographical area in which several units for the industrial production of chemical products, not necessarily belonging to the same company, are juxtaposed and are functionally linked to one another."
3. Point 8 in Annex I is replaced by the following:
  - "8. (a) Inland waterways which permit the passage of vessels of over 1 350 tonnes;
  - (b) Trading ports and port installations, including offshore installations, and ports and installations for inland-waterway traffic which permit the passage of vessels of over 1 350 tonnes."
4. Point 1 in Annex II is replaced by the following:
  - "1. Agriculture
    - (a) Projects for the restructuring of rural land holdings.
    - (b) Irrigation and land drainage projects.
    - (c) Afforestation, reafforestation, deforestation.
    - (d) Intensive stockfarming.
    - (e) Production of exotic species of flora and fauna.
    - (f) Intensive fish or shellfish farming."
5. Letter (h) under point 3 in Annex II is deleted.
6. Point 10 in Annex II is replaced by the following:
  - "10. Infrastructure projects
    - (a) Industrial estate development projects.
    - (b) Urban development projects, including the construction of shopping centres and car parks.
    - (c) Doubling, electrification and adjustment to standard gauge of railway lines or tracks for combined transport, construction of railway and intermodal transshipment facilities, and of intermodal terminals.

- (d) Construction of airfields and extension of the airport capacity of airfields (projects not listed in Annex I).
- (e) Construction and upgrading of roads (widening and alternative routes), harbours and port installations, including fishing harbours (projects not listed in Annex I).
- (f) Inland-waterway construction, canalization and flood-relief works.
- (g) Dams and other installations designed to hold water or store it on a long-term basis.
- (h) Tramways, elevated and underground railways, suspended lines or similar lines of a particular type, used exclusively or mainly for passenger transport.
- (i) Oil and gas pipeline installations.
- (j) Installation of long-distance aqueducts.
- (k) Coastal work to combat erosion and maritime works capable of altering the coast through the construction, for example, of dykes, moles, jetties and other sea defence works."

7. Point 11 in Annex II is replaced by the following:

**"11. Other projects**

- (a) Permanent racing and test tracks for cars and motor cycles.
- (b) Installations for the disposal of industrial and domestic waste (unless included in Annex I).
- (c) Waste-water treatment plants.
- (d) Sludge-deposition sites.
- (e) Storage of scrap iron.
- (f) Test benches for engines, turbines or reactors.
- (g) Manufacture of artificial mineral fibres.
- (h) Manufacture, packing, loading or placing in cartridges of gunpowder and explosives.
- (i) Knackers' yards."

8. The following points are added to Annex II:

**"11a Tourism and leisure**

- (a) Ski-runs, bobsleigh tracks and ski-lifts and artificial snow installations.
- (b) Golf courses and associated developments.
- (c) Marinas.

- (d) Holiday villages, hotel complexes and associated developments.
- (e) Camp sites and caravan sites
- (f) Leisure centres.

**11b Land-use projects**

- (a) Changes in the use of uncultivated land, semi-natural areas and natural or semi-natural forests.
- (b) Reclamation of land from the sea."

**9. Point 12 in Annex II is replaced by the following:**

"12. Modifications to projects listed in Annex I or Annex II and projects in Annex I undertaken exclusively or mainly for the development and testing of new methods or products and not used for more than two years."

**10. A new Annex IIa is inserted, as follows.**

**"ANNEX IIa**

**SELECTION CRITERIA REFERRED TO IN ARTICLE 4(3)**

**1. Characteristics of the project**

The characteristics of the project must be considered having regard, in particular, to:

- the size of the project<sup>(1)</sup>;
- the use of natural resources;
- the production of waste;
- pollution and nuisances;
- the risk of accidents;
- the impact on the natural and historical heritage having regard to the existing functions of the areas likely to be affected (such as tourism, urban settlement, agriculture).

**2. Location of the project**

The environmental sensitivity of geographical areas likely to be affected by the project must be considered, having regard, in particular, to:

- the relative abundance, quality and regenerative capacity of natural resources in the area;
- the absorption capacity of the natural environment, paying particular attention to the following areas:
  - (a) wetlands;
  - (b) coastal zones;
  - (c) mountain and forest areas;
  - (d) nature reserves and parks;

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<sup>(1)</sup> The size of the project must be considered in relation to the duration, frequency and reversibility of its likely impacts.

- (e) areas already classified or protected under Member States' legislation;
- (f) areas in which the environmental quality standards laid down in Community legislation have already been exceeded;
- (g) densely populated areas;
- (h) landscapes of historical, cultural or archaeological significance."

11. Point 2 in Annex III is replaced by the following:

"2. A description of the main alternatives which might be envisaged and an indication of the main reasons for the developer's choice, taking into account the environmental effects."

12. A new Annex IV is added, as follows:

#### "ANNEX IV

#### INFORMATION REFERRED TO IN ARTICLE 7

1. A description of the project together with any available information on the possible transboundary impact.
2. Information on the nature of the decision which may be taken.
3. A reasonable time limit within which the other Member State must indicate whether it intends to take part in the assessment procedure. Notification of such intention shall be accompanied by all available relevant information on the environment in that part of the territory which might be affected.
4. The information gathered pursuant to Article 5.
5. An indication of the date on which a decision will be taken on the project and the time limit, calculated on a reasonable basis, within which the Member State likely to be affected must communicate its opinion to the Member State on whose territory the project is located."

## IMPACT ASSESSMENT FORM

### THE IMPACT OF THE PROPOSAL ON BUSINESSES

Title of proposal: Amendment of Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment.

#### The Proposal

The proposal does not impose new obligations beyond those already present in the existing Directive 85/337/EEC, but further Community legislation is necessary in this area for the following reasons:

- to remove uncertainties from the existing Directive as revealed by the review of its implementation (COM(93) 28 final);
- to provide for implementation of the Convention on transboundary EIA (Espoo Convention: COM(92) 93 final), which requirements do not go beyond the existing Article 7 of the Directive;
- to improve the effectiveness of the Directive by making more explicit provision for screening Annex II projects for their need for EIA and for scoping and monitoring of the assessment. Since some Member States have adopted these provisions and others have not, both environmental protection and distortion of the market are affected in the absence of legislation at Community level;
- to clarify various terms used in the Directive (for example "integrated chemical installation").

#### The impact on businesses

##### Who will be affected by the proposal?

Bearing in mind that no new obligations concerning the procedure which is to be applied are imposed by this proposed modification:

- there are three additions to Annex I requiring compulsory assessment which will affect only those businesses engaged in the treatment of spent nuclear fuel and those carrying out projects listed in Annex II, capable of affecting the special protection areas (SPAs) provided for in Community environmental protection legislation;
- in the main, therefore, the additions to Annex I will have impacts only upon a very small number of projects by the large-scale nuclear industry. As regards Annex II projects located in or affecting SPAs, it is impossible to identify whether these will be carried out by large, medium or small-scale businesses.
- the new screening provision will avoid the application of EIA for (mostly small) Annex II projects without likely significant environmental impacts;
- the benefit of the scoping provision will be that the process of producing an environmental impact statement in accordance with the requirements of Annex III to the Directive is likely to be accelerated, since the coverage required by the statement will have been set and agreed upon in advance of its production rather than after it has been submitted to the competent authority. This has been welcomed by, among others, the electricity generating and distribution industry in Europe;

- no particular type of business is affected by the proposed insertion of a requirement to provide details of monitoring of impacts, although it will not really affect certain types of finite project as much as those with a continuing impact on the environment.

What will businesses have to do to comply with the proposal?

In the vast majority of cases, no more than they do currently under the existing Directive on EIA. Except for the obligation to submit certain projects (i.e. spent nuclear fuel reprocessing and those affecting protected zones) to an assessment, there is no great increase in the numbers of EIAs that will be required of businesses in the Member States. The screening process, as well as some of the clarifications to the projects listed in Annex II, will serve to reduce the burdens on certain businesses.

The new requirement concerning scoping of the assessment is expected to speed up the process of information-gathering. Also it will reduce the need for late and expensive additional work to a submitted environmental impact statement, since its scope will have been set in advance.

What economic effects is the proposal likely to have?

On employment:

- since the purpose of EIA is not to prevent development but to provide decision-makers with better information on impacts, mitigatory measures and alternative locations and developments, the impact on employment is likely to be negligible other than in local terms where there may be some relocation of projects as a result of EIA. Also some increase in consultancy work can be expected.

On investment and the creation of businesses:

- given clearer information on the impact of a proposal, both investors and entrepreneurs will be better informed of the risks inherent in a particular project;

On the competitive position of businesses:

- within the Community, assuming correct transposition by all Member States, the effect should be neutral. As regards other countries, the effect will depend upon the regimes operated there since certain countries, e.g. Canada and the USA, have similar if not more advanced systems of EIA (including assessment in certain cases at the higher levels of policy, plan and programme-making). Assessment in the developing countries is usually less well-developed.

Does the proposal contain measures to take account of the specific situation of small and medium-sized firms (reduced or different requirements etc.)?

Under the terms of the new Article 4 it is the competence of Member States to determine, on the basis of specified criteria, whether their probable impact gives rise to the need for assessment. This gives Member States the opportunity to specify levels of activity which would exclude small or medium-sized enterprises being required to carry out an EIA for projects normally contemplated by such size of businesses. It is unlikely that SMEs would be carrying out an Annex I project.

Consultation

Outside the Commission the Member States Experts Working Group has considered the proposal at three meetings and has amended it in a number of significant respects as a result (for example, by the removal of a number of projects introduced into Annex I).

Also comments made by UNICE have resulted in other amendments to the proposal, in particular concerning the definition of integrated chemical installations.

Within the Commission it was anticipated that other DGs might be in the position to bring into the discussion the major considerations to be expected in their respective policy sectors.

However, consultations with the Economic and Social Committee under Article 198 of the Treaty will guarantee a wide-ranging debate with the socio-economic groups involved.

**Appendix B Regional EA Contacts**

Region	Contact Address	Tel. No.	Fax No.
Anglian	Kingfisher House Goldhay Way Orton Goldhay Peterborough PE2 0ZR	01733 371811	01733 231840
Northumbria & Yorkshire	Rivers House 21 Park Square South Leeds LS1 2GQ	01132 440191	01132 461889
North West	Richard Fairclough House Knutsford Road Warrington WA4 1HG	01925 653999	01925 415961
Severn-Trent	Sapphire East 550 Streetsbrook Road Solihull West Midlands B91 1QT	0121 7112324	0121 7115824
Southern	Guildbourne House Chatsworth Road Worthing West Sussex BN11 1LD	01903 820692	01903 821832
Thames	Kings Meadow House Kings Meadow Road Reading Berkshire RG1 8DQ	01734 535000	01734 500388
Welsh	Rivers House St Mellons Business Park St Mellons Cardiff CF3 0EG	01222 770088	01222 798555
Head Office	Rivers House Waterside Drive Aztec West Almondsbury Bristol BS12 4UD	01454 624400	01454 624409

**Appendix C            Planning Liaison Contacts**

<b>Region/Area</b>	<b>Contact Address</b>	<b>Tel. No.</b>	<b>Fax No.</b>
<b>Anglian</b>			
<b>Northern Area</b>	Area Planning Manager NRA Anglian Aqua House Harvey Street Lincoln LN1 1TF	01522 513100	01522 512927
<b>Central Area</b>	Area Planning Manager NRA Anglian Bromholme Lane Brampton Huntingdon Cambs PE18 8NE	01480 414581	01480 413381
<b>Eastern Area</b>	Area Planning Manager NRA Anglian Cobham Road Ipswich IP3 PJE	01473 727712	01473 724205
<b>Northumbria &amp; Yorkshire</b>			
<b>Northumbria Area</b>	Planning Liaison Officer NRA Northumbria & Yorkshire Tyneside House Skinnerburn Newcastle Business Park Newcastle Upon Tyne NE4 7AR	0191 2034000	0191 2034004
<b>Dales Area</b>	Planning Liaison Officer NRA Northumbria & Yorkshire Coverdale House Aviator Court Amy Johnson Way Clifton Moor York	01904 692296	01904 693748
<b>Southern Yorkshire</b>	Planning Liaison Officer NRA Northumbria & Yorkshire Olympia House Gelderd Lane Gelderd Road Leeds LS12 6DD	01132 440191	01132 312116

Region/Area	Contact Address	Tel. No.	Fax No.
<b>North West</b> Northern Area	Planning and Services Manager NRA North West Chertsey Hill London Road Carlisle CA1 2QX	01228 25151	01228 49734
Central Area	Planning and Services Manager NRA North West Lutra House Dodd Way Walton Summitt Bamber Bridge Preston PR5 8BX	01772 39882	01772 627730
Southern Area	Planning and Services Manager NRA North West Mirwell Carrington Lane Sale M33 5NL	0161 9732237	0161 9734601
<b>Severn-Trent</b> Upper Severn Area	Senior Planning Liaison Officer NRA Severn-Trent Hafren House Welshpool Road Shelton Shrewsbury SY3 8BB	01217 112324	01217 115824
Lower Severn Area	Senior Planning Liaison Officer NRA Severn-Trent Riversmeet House Northway Lane Tewkesbury GL20 8JG	01684 850951	01684 293599
Upper Trent Area	Senior Planning Liaison Officer NRA Severn-Trent Sentinel House 9 Wellington Crescent Fradley Park Lichfield Staffs SW13 8RR	01543 444141	01543 444161

Region/Area	Contact Address	Tel. No.	Fax No.
Lower Trent Area	Senior Planning Liaison Officer NRA Severn-Trent Trenside Office Scarrington Road West Bridgford Nottingham NG2 5FA	01159 455722	01159 817743
Southern Hampshire & Isle of Wight	Planning Liaison Manager NRA Southern Sarum Court Sarum Road Winchester Hants	01962 713267	01962 841573
Kent Area	Planning Liaison Manager NRA Southern Millbrook House 114 Mill Street East Malling Maidstone Kent ME19 6BU	01732 875587	01732 875057
Sussex Area	Planning Liaison Manager NRA Southern 3 Liverpool Gardens Worthing West Sussex BN11 1TF	01903 215835	01903 215884
South Western Cornwall Area	Regulation Officer NRA South Western Sir John Moore House Victoria Square Bodmin Cornwall PL31 1EB	01208 78301	01208 78825
Devon Area	Regulation Officer NRA South Western Manley House Kestrel Way Exeter EX2 7LQ	01392 444000	01392 444238
North Wessex Area	Regulation Officer NRA South Western Rivers House East Quay Somerset TA6 4YS	01278 457333	01278 452985
Region/Area	Contact Address	Tel. No.	Fax No.

<b>South Wessex Area</b>	Regulation Officer, NRA South Western Rivers House Sunrise Business Park High Shaftesbury Road Blandford DT11 8ST	01258 456080	01258 455998
<b>Thames North East</b>	Senior Planning Liaison Officer NRA Thames Gade House London Road Rickmansworth Herts WD3 1RS	01992 635666	01992 645451
<b>South East</b>	Senior Planning Liaison Officer NRA Thames Sunbury Yard Riverside Works Fordbridge Road Sunbury on Thames TW16 6AP	01932 789833	01932 786463
<b>West Area</b>	Senior Planning Liaison Officer NRA Thames Isis House Howberry Park Wallingford Oxon OX10 8BD	01734 535000	01734 535900
<b>Welsh Northern</b>	Development Liaison Officer NRA Welsh Bryn Menai Holyhead Road Bangor Gwynedd LL57 2EF	01248 370970	01248 370747
<b>South Eastern Area</b>	Development Liaison Officer NRA Welsh c/o Rivers House St Mellons Business Park St Mellons Cardiff CF3 0LT	01222 770088	01222 798555

Region/Area	Contact Address	Tel. No.	Fax No.
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