# J2 Scoping the environmental impacts of discharges to surface waters

**Explanatory note**

For projects which require Environmental Impact Assessment (EIA), a scoping exercise should be undertaken early in the planning stages of the project. This enables the project to be designed to avoid or minimise negative environmental impacts and provides an opportunity to incorporate positive environmental enhancements into the project. Early consultation with all interested parties, including the Environment Agency, is an essential part of scoping. Even if a project does not require EIA under EIA legislation, it may be advisable (and in some cases necessary) to undertake a scoping exercise in any case (e.g. to support applications for other relevant consents and authorisations needed to carry out the project).

This guidance note aims to promote a good practice approach to scoping as part of the EIA process which in some respects goes beyond the statutory EIA requirements. When scoping a project, developers, or their consultants, should satisfy themselves that they have addressed all the potential impacts and the concerns of all organisations and individuals with an interest in the project.

This guidance note provides information on the most likely potential environmental impacts of discharges to surface waters. However, each project must be considered on a case-by-case basis as the detailed characteristics of the proposal and the site will determine the potential impacts.

This guidance is based on the main legal requirements on EIA stemming from the EC Directive and the UK Regulations. However, developers should seek independent legal advice to ensure that the proposed development is carried out in compliance with the requirements of this and any other relevant legislation relating to planning as well as to pollution control.

**This guidance note must be read in conjunction with the *Scoping Handbook*, which provides general guidance on the EIA process and the scoping of projects.**

ENVIRONMENT AGENCY

**This guidance note must be read in conjunction with the *Scoping Handbook*, which provides general guidance on the EIA process and the scoping of projects.**

In addition, the following scoping guidance notes are relevant to *all* river channel works and bank protection projects:

- A1 Construction work
- A4 Vegetation management and conservation enhancements
- C4 Sea outfalls

The following scoping guidance notes *may* be relevant in certain circumstances:

- J5 Interbasin transfer of water

# Contents

# 1 Introduction

**1.1** This guidance note, in conjunction with the *Scoping Handbook* and the notes listed on the previous page, seeks to help developers and other interested parties identify the potential impacts of discharges to surface waters on the environment as a whole. It should be emphasised that the list of impacts is by no means exhaustive and that a full investigation into positive and negative impacts should be undertaken. Early consultation with the Environment Agency and other relevant organisations will enable the identification of environmental issues and constraints and the avoidance of sensitive areas, thus reducing the need for redesigning and mitigating avoidable impacts at a later stage.

**1.2** The Environment Agency has an interest in discharge proposals due not only to its responsibilities for water quality and as a licensing body, but also due to its responsibilities for water resources, fisheries, conservation, navigation and recreation.

**1.3** In order to comment on consent applications for large discharges, the Environment Agency will usually require an environmental report containing information from environmental studies on the potential impacts of the discharge. This report may take the form of an environmental statement or other form of EIA.

**1.4** Following this brief introduction, an overview of the legal requirements for EIA in relation to discharges to surface waters is provided. The potential environmental impacts of such activities are identified in Section 3. The text and summary table in this section will enable the reader to begin to identify the likely impacts arising from the particular proposal under consideration. The subsequent sections present the mitigation measures that may be relevant to discharge activities, followed by key references and further reading.

## Background to development type

**1.3** Discharges to surface waters will involve the construction of associated infrastructure, such as pump houses and outfalls. Large discharges, with which this guidance note is concerned, will primarily be point discharges to surface waters. Therefore, this note does not discuss diffuse discharges and those to land. Once the discharge station is no longer needed, decommissioning will have to be considered.

# 2 Development control and EIA

## Development control

**2.1** Discharges to surface waters are not specifically controlled by the town and country planning system. However, associated infrastructure such as pump houses and outfalls will be subject to development control and will require consent from one or more local planning authorities. Developers should contact their local planning authority to confirm whether their proposals require prior planning permission.

## Environmental Impact Assessment

**2.2** Discharges to surface waters are not included as a discrete development type within the Town and Country Planning (Environmental Impact Assessment) (England and Wales) 1999 (SI 1999 No. 293). However, the development which results in the discharge may well be included in either Schedule 1 or Schedule 2 of these Regulations.

**2.3** Although formal EIA of proposed discharges to surface waters may not be required, the Environment Agency (e.g. for discharge consent) and other statutory consultees and regulators may request environmental information concerning such activities. An EIA may provide the most appropriate method for a developer to collate the necessary information.

## Other licences, consents and authorisations

**2.4** The discharge of sewage or trade effluent to surface waters will normally require a discharge consent from the Environment Agency and works affecting a riverbank will also generally be necessary. It is recommended that the developer seek independent legal advice and liaise with the Environment Agency during project design and subsequent stages to identify the consents, licences and authorisations that will be required.

# 3 Potentially significant environmental effects

**3.1** The EIA Directive requires the EIA to "identify, describe and assess the direct and indirect effects of a project on the following factors: human beings, fauna and flora; soil, water, air, climate and the landscape; material assets and the cultural heritage; [and] the interaction between the factors". Socio-economic issues, health and safety in the workplace, material assets and cultural heritage are all considered in EU *Guidance on scoping* (ERM, 2001a) but are not impact categories for which the Environment Agency is the principal competent authority. Advice on these issues is presented in this guidance note without prejudice to the advice of the relevant competent authority, but the relevant competent authority should be consulted for each of these categories in all cases (further advice on the appropriate competent authority to contact is given in the *Scoping Handbook*).

**3.2** The issues arising for all environmental receptors will change over time as the project matures. Developers and site operators, therefore, should consider the impacts arising from construction, maintenance and the end state.

**3.3** In this guidance note, potential impacts are discussed here in broad terms only, as their nature and intensity will depend on the physical characteristics of the project and current state of the development site. An EIA of proposed discharges to surface waters should take these factors into account in assessing potential impacts on the environment.

**3.4** The following paragraphs should be read in conjunction with Table J2. This outlines the main activities involved in improvement works and the impacts arising from them.

### Water environment

**3.5** Construction activities may lead to the disturbance of the river channel with associated changes in morphology, flow rates and bank instability. Compaction of top soil by heavy vehicles and machinery may alter surface water drainage. Runoff from vehicles and access roads and incidents with the storage and handling of chemicals and construction materials may lead to water pollution. Increased levels of suspended sediments may result from construction activities and there is a risk of disturbing contaminated soils which may pollute the watercourse.

**3.6** The potential impacts of a discharge on the quality of the receiving water will be related to the relative quality as well as volume and flow of the discharge to the receiving water.

**3.7** Plant nutrients, such as phosphates and nitrates, may cause eutrophication and the prolific growth of algae. The resulting algal blooms may produce toxins and other chemicals which may affect water quality. The collapse of algal blooms may lead to deoxygenation through algal decay. Intense photosynthetic activity from algae and plants can change both the chemical and physical nature of the water.

**3.8** Sewage effluents typically contain organic material, ammonia and suspended solids. Organic material can have a serious deoxygenating effect as can ammonia from its transition to nitrate. Suspended solids can alter substrate characteristics through sedimentation.

**3.9** Thermal discharges may also cause indirect effects through changes in water chemistry and stratification of water bodies.

**3.10** Large discharges may substantially increase river flow and generally alter the flow regime or hydrology of receiving waters. Sediment transport patterns may change leading to change substrate quality and general river geomorphology. Changes in the depth of water tables may arise, altering adjacent land use and wetlands. Increased water depth and flow may cause downstream areas to have an increased risk and frequency of flooding. Consideration also needs to be given to abstraction points and potential impacts at times of low flow.

## Land

**3.11** The construction of associated infrastructure will require some land-take. This may include agricultural land, natural habitat or sites of environmental or archaeological interest.

**3.12** The use of machinery and vehicles during construction may cause short- and medium-term adverse impacts to landscape character. This could take the form of loss of natural features or features of visual interest, or loss or change in vegetative cover.

**3.13** The magnitude of such visual impacts will depend on the siting, purpose and design of the project. Works undertaken in a manner sympathetic to the surrounding area are likely to reduce impact on the landscape character.

**3.14** The use of vehicles and machinery may cause compaction of soils and a change in soil structure. Soils may become exposed during construction, leading to increased erosion. Construction may also involve the removal or mixing of soils on site which may have an impact on soil characteristics. During construction and maintenance, soils may become contaminated from spills or leaks of fuel and oil and the potential for contamination via runoff from roads and hardstandings must also be addressed. The importing of soils may lead to the introduction of invasive species and this should be avoided.

## Air and climatic factors

**3.15** During construction works and maintenance, local air quality may decline somewhat as a result of on- and off-site dust created by construction works.

## Ecology

**3.16** Construction of infrastructure associated with discharge points may involve direct land-take resulting in disturbance or destruction of the riparian and aquatic environment with associated habitat loss. Sensitive species may be displaced leading to a change in the composition of the community. Increased sedimentation caused by construction may result in damage to fauna and reduced plant growth.

**3.17** Large discharges may substantially increase river flow which may have direct effects on river ecology, with a switch to more flow-tolerant species, and indirect effects due to changes in the substrate. Shallow water habitats may be lost. Raised water levels may affect riparian flora and fauna.

**3.18** Increased flow in rivers may reduce the penetration of saline water into estuaries, thus affecting estuarine ecology. Migratory fish may alter their behaviour as a result of flow changes. Large flows from points of discharge may attract migratory fish which may attempt to enter discharge outlets.

**3.19** Algal blooms may occur as a result of nutrient-rich discharges which can become more successful than other, more sensitive, species leading to a change in the aquatic community. The composition of the aquatic community may also change as a result of thermal discharges which

may raise the ambient temperature above the limits tolerated by particular organisms.

**3.20** An increased level of suspended solids can cause direct damage to organisms through abrasion and smothering. Indirect effects include reduced visibility of prey and reduced plant growth. Sedimentation within gravels used by salmon and trout may affect the survival of eggs and, therefore, fisheries.

**3.21** Certain substances such as ammonia, cyanide, cadmium and zinc, which may be released in discharges, can be directly toxic to fish and other aquatic life. Pesticides can also be toxic, particularly to target and related species or species groups. Both pesticides and metals may persist in the environment by accumulating within organisms in the food chain (bioaccumulation). Bioaccumulation, therefore, can affect both aquatic and terrestrial habitats. Accumulation in sediments can also take place and contaminants may continue to be released after discharges have stopped or may be released in large volumes, e.g. during a flood event.

**3.22** Changes to aquatic life may indirectly affect other species, such as otters and kingfishers, which may be seriously affected by the loss or contamination of food species.

### Human environment

**3.23** Construction of the infrastructure associated with discharge points may cause temporary disturbance and disruption to local residents, farmers, tourists, businesses and other users of the area. This may be due to noise or dust emanating from a development site, or by closure of roads or footpaths while construction work is undertaken. The works may result in a loss of amenity for water users and restriction of access to the river. Sites of archaeological or historical interest may be disturbed by construction or their foundations affected by raised groundwater.

**3.24** The colour, flow, odour and presence of litter and other debris may be aesthetically displeasing and reduce the amenity value of the watercourse. Changes in flow and the presence of bacteria, litter, and algal growth may compromise recreational use. For example, water contact sports may become particularly unpleasant or may be banned by health authorities. Changes in water depth, flow and fish species may affect angling quality. However, Increased water depth may benefit navigation and watersports.

### Table J2

**3.25** The impact identification table highlights:

- sources of impact (development activities);
- potential impacts;
- receptors for these impacts.

**3.26** It is recommended that the table is annotated and used during consultations with other interested parties. Reference should also be made to the prompt lists detailing impacts and sources of impacts in the *Scoping Handbook*.

## Table J2 Summary of key potential impacts of discharges to surface waters

| Potential receptors of impact | | Activities and potential impacts | | |
|---|---|---|---|---|
| | | Construction | Operation/ongoing site maintenance | Decommissioning/post-operation |
| **WATER** | Surface water hydrology and channel morphology | **Use of vehicles and machinery**<br>• Compaction of topsoil may alter surface water drainage<br>• Bank instability<br>**Construction of outfall and pump house**<br>• Disturbance of river channel<br>• Change in morphological variability<br>• Alteration in river flow rates<br>• Bank instability | **Discharges to watercourse**<br>• Fluctuation in flow regime and velocities<br>• Change to patterns of erosion and deposition<br>• Releases with high levels of suspended solids may alter substrate characteristics through sedimentation<br>• Alteration in morphological variability<br>• Increased flow may reduce the penetration of saline water into estuaries<br>• Increased water depth and flow may cause downstream areas to have an increased risk and frequency of flooding<br>**Use of pump house**<br>• Bank instability | **Cessation of discharges**<br>• Return to previous flow regime<br>• Change to patterns of erosion and deposition<br>• Alteration in flooding regime<br>**Removal of infrastructure**<br>• Bank instability |
| | Surface water quality | **Use of vehicles and machinery**<br>• Oil and suspended solids in runoff from vehicles and access roads may pollute watercourse<br>**Construction of outfall and pump house**<br>• Incidents with storage and handling of cement may lead to water pollution<br>• Bankside and benthic sediments may be disturbed leading to increased levels of suspended solids<br>• Disturbance of contaminated land may lead to pollutants leaching into surface water | **Discharges to watercourse**<br>• Releases with high levels of nutrients may cause eutrophication<br>• Algal blooms may produce toxins and chemicals that affect water quality<br>• Collapse of algal blooms may lead to deoxygenation of water<br>• Chemical nature of water may change through intense photosynthetic activity of algae<br>• Release of sewage effluents with high levels of organic pollutants may cause deoxygenation | **Cessation of discharges**<br>• Reduction in impacts on water quality from discharges<br>• Gradual return of water quality to more stable condition<br>**Materials management**<br>• Pollution from spills or leaks of fuel and oil from vehicles and machinery used in decommissioning |

| Potential receptors of impact | | Activities and potential impacts | | |
|---|---|---|---|---|
| | | **Construction** | **Operation/ongoing site maintenance** | **Decommissioning/post-operation** |
| **WATER** *continued* | Surface water quality *continued* | • Risk of sediment input into river<br>**Materials management**<br>• Bad storage, handling and disposal of chemicals and containers, oil and fuel may lead to water pollution | • Releases containing ammonia may have a deoxygenating effect<br>• pH may have an indirect effect on water chemistry by influencing the toxicity of some chemicals<br>• Metals may persist in sediments<br>• Thermal discharges may lead to temperature changes and stratification of water bodies<br>**Materials management**<br>• Accidental spillage of chemicals may affect water quality | |
| | Groundwater hydrology | | **Discharges to watercourse**<br>• Possible changes in level of water table<br>**Discharges to watercourse**<br>• Possible changes in groundwater quality | **Cessation of discharge**<br>• Possible changes in level of water table |
| | Groundwater quality | **Materials management**<br>• Contamination from spills or leaks of fuel and oil | | **Cessation of discharge**<br>• Possible changes in groundwater quality<br>**Materials management**<br>• Contamination from spills or leaks of fuel and oil |

| Potential receptors of impact | | Activities and potential impacts | | |
|---|---|---|---|---|
| | | **Construction** | **Operation/ongoing site maintenance** | **Decommissioning/post-operation** |
| **LAND** | Landscape | **Use of vehicles and machinery**<br>• Visual impact<br>• Temporary reduction in landscape quality<br>**Construction of outfall and pumphouse**<br>• Visual impact<br>• Change in landscape character | **Use of pump house**<br>• Change in landscape character<br>• Visual impact | **Presence of infrastructure**<br>• Visual impact during decommissioning works<br>• If pump house/outfall left in situ, possible misuse and vandalism may result<br>• Change in character of landscape |
| | Soils | **Use of vehicles and machinery**<br>• Compaction<br>• Erosion<br>• Bank instability<br>**Construction of outfall and pump house**<br>• Erosion of exposed soil<br>• Removal or alteration of soils on site<br>**Materials management**<br>• Contamination from spills or leaks of fuel and oil | **Discharges to watercourse**<br>• Alteration of erosion/deposition regime downstream<br>**Use of pump house**<br>• Use of vehicles and machinery for maintenance may cause soil compaction and erosion<br>**Materials management**<br>• Contamination from spills or leaks of fuel and oil | **Materials management**<br>• Contamination from spills or leaks of fuel and oil |
| **AIR** | Local air quality | **Use of vehicles and machinery**<br>• Dust<br>**Construction of outfall and pump house**<br>• Dust from construction works | | **Use of vehicles and machinery**<br>• Dust |

| Potential receptors of impact | | Activities and potential impacts | | |
|---|---|---|---|---|
| | | Construction | Operation/ongoing site maintenance | Decommissioning/post-operation |
| **FLORA AND FAUNA** | Aquatic ecology | **Use of vehicles and machinery**<br>• Habitat loss<br>• Bank instability and compaction may disturb or destroy aquatic communities<br>**Construction of outfall and pump house**<br>• Direct land-take resulting in disturbance or destruction of riparian and aquatic habitat<br>• Reduction in plant growth due to increased turbidity<br>• Change in species composition and displacement of sensitive species<br>• In-channel work may act as barrier to migrating fish<br>• Loss of conservation value<br>• Reduction in ecological diversity<br>**Materials management**<br>• Risk of damage from spills or leaks of fuel, oil and chemicals | **Discharges to watercourse**<br>• Species may be out-competed by algal blooms<br>• Ammonia may be directly toxic, particularly to fish<br>• Increased nitrate levels may stimulate plant and algal growth<br>• Suspended solids may affect organisms through abrasion and smothering<br>• Increased suspended solids may reduce the visibility of prey, attenuate light and reduce plant growth<br>• Spawning gravels may be affected by increased sedimentation<br>• Releases containing substances such as cyanide and metals, may be directly toxic to aquatic life<br>• Metals may persist in the environment through bioaccumulation<br>• Pesticides may persist and bioaccumulate within food chains<br>• Temperature changes may be lethal to particular organisms<br>• Some organisms, such as otters or kingfishers, may be seriously affected by the contamination of fish<br>• Raised water levels may affect riparian habitats<br>• Patterns of migratory behaviour may change<br>• Fish may be attracted to points of discharge<br>**Materials management**<br>• Risk of damage from spills or leaks of fuel, oil and chemicals | **Cessation of discharge**<br>• Reduction in impacts on aquatic community from discharges<br>• Gradual return of community to more stable condition<br>• Return of species previously out-competed<br>**Materials management**<br>• Risk of damage from spills or leaks of fuel, oil and chemicals |

| Potential receptors of impact | | Activities and potential impacts | | |
|---|---|---|---|---|
| | | **Construction** | **Operation/ongoing site maintenance** | **Decommissioning/post-operation** |
| **FLORA AND FAUNA** *continued* | Terrestrial ecology | **Use of vehicles and machinery**<br>• Felling of trees.<br>• Trimming or lopping of tree branches.<br>• Change in species composition and displacement of sensitive species.<br>**Construction of outfall and pump house**<br>• Direct land-take resulting in disturbance or destruction of terrestrial habitat<br>• Loss of conservation value<br>• Change in terrestrial community | **Discharges to watercourse**<br>• Terrestrial habitat may be affected by changes in water table | **Presence of infrastructure**<br>• Removal of infrastructure may create opportunity for enhancement of nature conservation value |
| **HUMAN ENVIRONMENT** | Socio-economic[1] | • Creation of employment opportunities<br>• Temporary direct land-take<br>• Closure of roads or footpaths | • Loss of land | |
| | Health and safety[1] | • Risk of injury on unsecured site | • Level of bacteria and viruses in water body may present health risk | • Risk of accidents due to site being used for unauthorised purposes |
| | Amenity | • Temporary or permanent loss of amenity value<br>• Reduction in angling quality<br>• Adverse visual impact<br>• Closure of roads or footpaths | • Change in pedestrian access<br>• Change in angling quality<br>• Colour, flow, odour and litter and other debris may be aesthetically displeasing and reduce the amenity value of the watercourse<br>• Changes in flow and the presence of bacteria, litter and algal growth affecting recreation<br>• Increased water depth may benefit navigation | |

[1] The Agency considers that key impacts to be identified and assessed are likely to include the following, but further advice and guidance should be sought from the relevant competent authority, as indicated in the *Scoping Handbook*.

| Potential receptors of impact | | Activities and potential impacts | | |
|---|---|---|---|---|
| | | **Construction** | **Operation/on-going site maintenance** | **Decommissioning / post-operation** |
| **HUMAN ENVIRONMENT** *continued* | Nuisance | • Noise<br>• Dust<br>• Closure of roads or footpaths | • Displeasing odour<br>• Noise from pumping machinery<br>• Reduction in recreational or amenity use | • If infrastructure is left *in situ*, may lead to misuse and vandalism |
| | Architectural and archaeological heritage[1] | • Damage<br>• Direct land-take | • Raised groundwater levels may affect the foundations of buildings | |

[1] The Agency considers that key impacts to be identified and assessed are likely to include the following, but further advice and guidance should be sought from the relevant competent authority, as indicated in the *Scoping Handbook*.

Additional site-specific issues:

# 4 Mitigation measures

**4.1** Following the scoping exercise and the identification of potential environmental effects, mitigation measures should be proposed to avoid or reduce potential negative impacts to air, water, land, ecology and humans, or to introduce positive aspects to the development.

**4.2** A primary consideration in impact mitigation must be the design and location of a discharge point. The development site should be selected to avoid damage to important ecological sites and high quality landscapes.

## Mitigating the impacts of construction activities

**4.3** Construction activities have the potential to affect all environmental receptors. However, the following list summarises the mitigation measures most relevant to discharge points:

- on-site supervision of working practices should follow the appropriate guidelines (Environment Agency, 1998a, 2000c);
- sensitive periods, such as the fish spawning and bird breeding seasons should be avoided;
- sensitive terrestrial habitats and trees should be avoided during construction work;
- downstream siltation should be reduced by construction of a temporary silt and sediment trap;
- appropriate design and use of construction materials;
- chemicals, fuel and oil should be suitably stored in areas with adequate bunding away from watercourses. Drip trays should be used with pumps and other machinery to catch leaking oil.

## Mitigating the impacts of the operational phase

**4.4** Although sensitive siting and design of discharge points are the primary means for avoiding or reducing environmental impacts, further measures can be introduced to minimise impacts occurring from the site. An overall consideration for the proposed scheme is that its design and operation are in accordance with planning conditions and other relevant legislation. Developers should seek independent legal advice to ensure that all legal requirements are identified and complied with.

- a proposed discharge point should avoid sensitive areas such as rivers and river corridors of high ecological or amenity value, rivers supporting potentially valuable fisheries and upland areas of catchments with particular sensitivities;
- impacts on water quality may be reduced by improved treatment before discharge by using, for example, treatment works, settling lagoons and reed beds;
- wherever possible, sustainable urban drainage schemes should be used for stormwater drainage;
- hardstandings should be constructed of permeable materials;
- impacts of water flow may be mitigated by reducing the volume of discharges by utilising on-site recycling systems and flow regulation of intermittent discharges using balancing lagoons;
- discharge outlets should be designed so as to discourage the entry of migratory fish;
- risk of pollution from vandalism and theft should be reduced by using tamper-proof valves, adequate fencing and security;
- Discharges should be designed to thoroughly disperse the pollutants effectively in the receiving waters.

# 5 References and further reading

1 **Construction Industry Research and Information Association (2001)** *Sustainable Urban Drainage Systems – Best Practice Guide.* C523, CIRIA, London.

2 **Construction Industry Research and Information Association (2000)** *Sustainable Urban Drainage Systems – Design Manual for England and Wales.* C522, CIRIA, London.

3 **Construction Industry Research and Information Association (1997)** *Review of the Design and Management of Constructed Wetlands.* CIRIA, London.

4 **Construction Industry Research and Information Association (1994)** *Environmental Assessment. Special Publication 96.* CIRIA, London.

5 **Department for Environment, Food & Rural Affairs (2000)** *Integrated Pollution Prevention and Control: a Practical Guide.* Available from: http://www.defra.gov.uk/environment/ppc/ippcguide/index.htm. DEFRA, London.

6 **Department of the Environment (1995)** *Preparation of Environmental Statements for Planning Projects that Require Environmental Assessment – A Good Practice Guide.* HMSO, London.

7 **Department of the Environment, Transport and the Regions (2001)** *Planning Policy Guidance Note 25: Development and Flood Risk.* Stationery Office, London.

8 **Department of the Environment, Transport and the Regions (2000)** *Environmental Impact Assessment: A Guide to the Procedures.* Thomas Telford Publishing, London.

9 **Department of the Environment, Transport and the Regions (1997)** *Mitigation Measures in Environmental Statements.* DETR, Rotherham.

10 **Environment Agency (2001)** *Environment Agency Policies: Sustainable Drainage Systems. Document Ref. EAS/0102/1/1.* Environment Agency, Bristol.

11 **Environment Agency (2000a)** *Works In, Near or Liable to Affect Watercourses. Pollution Prevention Guidelines No. 5.* Environment Agency, Bristol.

12 **Environment Agency (2000b)** *Pollution Incident Response Planning. Pollution Prevention Guidelines No. 21.* Environment Agency, Bristol.

13 **Environment Agency (2000c)** *General Guide to the Prevention of Water Pollution. Pollution Prevention Guidelines No. 1.* Environment Agency, Bristol.

14 **Environment Agency (2000d)** *Control of Spillages and Fire Fighting Run-off. Pollution Prevention Guidelines No. 18.* Environment Agency, Bristol.

15 **Environment Agency (1999a)** *Maintenance of Structures over Water. Pollution Prevention Guidelines No. 23.* Environment Agency, Bristol.

16 **Environment Agency (1999b)** *Disposal of Sewage Where No Mains Drainage is Available. Pollution Prevention Guidelines No. 4.* Environment Agency, Bristol.

17 **Environment Agency (1998a)** *Policy and Practice for the Protection of Groundwater (second edition).* Environment Agency, Bristol.

18 **ERM (2001a)** *Guidance on EIA – Scoping.* Prepared by ERM for the European Commission in June 2001. Available from: http://europa.eu.int/comm/environment/eia/eia-support.htm. Commission of the European Communities, Brussels.

19 **ERM (2001b)** *Guidance on EIA – Screening.* Prepared by ERM for the European Commission in June 2001. Available from: http://europa.eu.int/comm/environment/eia/eia-support.htm. Commission of the European Communities, Brussels.

20 **ERM (2001c)** *Guidance on EIA – EIS Review.* Prepared by ERM for the European Commission in June 2001. Available from: http://europa.eu.int/comm/environment/eia/eia-support.htm. Commission of the European Communities, Brussels.

21 **National Rivers Authority (1994)** *Discharges Consents and Compliance – the NRA's Approach to Control of Discharges to Water.* Water Quality Series No. 17. HMSO, London.

22 **Solomon, D.J. (1992)** *Diversion and Entrapment of Fish at Water Intakes and Outfalls. NRA R&D Report 1.* HMSO, London.