



**RESTORING SUSTAINABLE
ABSTRACTION TECHNICAL
GUIDANCE**

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ENVIRONMENT AGENCY



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EA: Water Resources-Box 2

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1 RESTORING SUSTAINABLE ABSTRACTION PROGRAMME

1.1 Introduction

The aim of the Restoring Sustainable Abstraction Programme (RSAP) is to identify over-abstraction in rivers and wetland sites and, where possible, put it right.

1.1.1 What is it?

RSAP was set up in 1999 to catalogue the number of rivers and wetland sites suspected of being affected by over-abstraction in England and Wales, and establish a remedial strategy. A number of environmental groups have voiced concern about over-abstraction and the European Birds and Habitats Directives requires the Agency to pay heed to over-abstraction by reviewing consents in designated areas.

1.1.2 The Agency's role

The Agency's commitment to restoring flows stretches back to the 1989-92 drought that highlighted the effect of abstraction in many catchments. In 1992 the Agency published its list of '*Top 40 Low Flow Rivers*' and, since then, many schemes to restore flow have been carried out at these and other sites.

In May 1997 at the government's Water Summit, a commitment was made to reverse the damage caused by past decisions by instructing the Agency to use its powers to revoke damaging licences and, where possible, to work with the abstractors to get voluntary agreement for change. This was confirmed in '*Taking Water Responsibly*', the Government's proposals for reviewing the abstraction licensing system. In 2000 OFWAT included funding to remedy the effects of water companies' over-abstraction in the Periodic Review of water company prices.

In October 1998 the Water Resources Function held a workshop to discuss the risks involved with the programme, and what actions we should take to minimise them. The RSAP Technical Group was set up to devise a consistent and fair methodology for investigating and prioritising sites and solving the problems caused by abstraction.

1.1.3 What the RSA Programme contains

There are two aspects of the RSA Programme: the RSA Catalogue of sites (the Agency's definitive list of sites suspected of being affected by over-abstraction) and the Technical Guidance and toolkit that recommends processes for solving those problems.

The guidance:

- specifies which sites should be included in the catalogue
- provides a methodology for prioritising the sites so that resources can be directed at those most at risk
- provides a step-by-step approach, with methodologies and tools, to investigate sites and implement solutions in the most cost-effective way, to the satisfaction of both the Agency and the abstractor

There are 6 chapters:

- Identification
- Prioritisation
- Investigation
- Options identification and appraisal
- Options selection and implementation
- Project management

The guidance is designed to give consistency and, at the same time, flexibility to allow for regional differences in water resources, abstractors' requirements and environmental problems. It is not intended to be a prescriptive document but a way to ensure that all the necessary steps have been taken to treat abstractors fairly and consistently across the country. It will also provide an audit trail in the event of an appeal.

1.1.4 Staffing

To keep the reporting structure of RSAP and the individual schemes working smoothly, staff should be nominated for each of these roles:

- **Head Office Catalogue Controller:** responsible for updating the national master copy of the RSAP Catalogue and issuing new versions to the Regional Catalogue Controller. Also responsible for reporting to WRMs, the WR Business Planner and Corporate Planning on progress and targets.
- **Regional Controller:** responsible for compiling the regional prioritisation sheets and tracking progress and responsible for regional updates of the RSAP Catalogue, and for sending updates to the HO Catalogue Controller
- **Area Co-ordinator:** responsible for overseeing all the projects in the Area.
- **Project Manager: (Area/Region)–** each project must be allocated a project manager to oversee the work through each stage; responsible for: the individual site prioritisation sheets, tracking progress and budgets and ensuring the agreed work programme is carried out according to plan and to the agreed timetable. The project manager is responsible for ensuring that the targets have been set for each stage and achieved at the end of the stage. There may be a different project manager for different stages of the project, but changes should be recorded in the project plan.

1.2 Identification

This chapter provides guidance on which sites should be included in the RSA catalogue. The most important point about this is that the RSA Programme is only intended to rectify problems caused by over-abstraction. Don't include sites known to have environmental damage from other causes such as drought, land drainage or water quality problems.

The sites to include are likely to come from the following sources:

- European Directives like the Habitats or Birds Directives: these directives require the Agency to review all consents that may be affecting SACs or SPAs by 2004. All sites taken forward into Stage 2 of the joint EA/EN *'Guidance for the Review of Environmental Permissions'* should be included. This will provide an audit trail of the work carried out in Stage 2 to show why some sites and licences were carried forward to full investigation and why others were closed.
- English Nature: in the 1999 joint EA/EN publication *'Sites of Special Scientific Interest and Abstraction'*, the Agency made a commitment to investigate and, where necessary, implement solutions at all Category 1, 2 and 3 sites in this list.
- LEAPs: where Water Resources staff have accepted that there is a possibility that abstractions are having a detrimental effect on the environment.
- Agency Water Resources staff: where a resource assessment of a catchment, reach or groundwater unit has shown that the amount of licensed abstraction is unsustainable and is known to be, or could be, causing environmental damage. These may also be sites identified through CAMS or in the original Top 40 low flow sites identified by the NRA in 1992.
- Agency staff in other functions: where Water Resources staff accept that abstraction could be causing the specified problem. Where it is not known if the problem is caused by abstraction or by another factor, the site should be included for initial investigation.
- External organisations in publications that have been endorsed by Agency Regional Water Resources Managers: Any 'new' sites where there is a clearly documented environmental problem that Agency water resources staff agree could be caused by over-abstraction should be included.
- The public: Each complaint from a member of the public or interest group should be acknowledged and taken on its merits but it is up to Agency water resources staff to decide whether the complaint should be taken forward to a Step 1 investigation and included in the catalogue.
- Use the following guidelines for including sites in the catalogue when:
 - community groups have brought a site to the Agency's attention,
 - Agency Conservation, Fisheries or Water Quality staff agree that there is an environmental problem due to reduced flows or water levels, there is an agreed loss of amenity or recreational value (agreement between Agency and local parish or town councils, or recreational organisations),
 - **Agency Water Resources staff agree that the reduced flows or water levels are or could be caused by abstraction.**
- AMP 3: all of the sites identified under AMP 3 will fall into one of the categories above, and should already be included in the catalogue.

1.3 Updating the catalogue

The catalogue is an easily updateable Microsoft Access database. For it to be useful, it must be kept up to date both regionally and nationally. Each Region must hold a copy with a national master copy held at Head Office. It is up to each Region to decide how often their copy should be updated, but an up to date copy should be sent to Head Office twice a year by:

- 1st September, for the Corporate Planning round
- 1st March, for end-of-year reporting

Updates should include information on:

- New schemes accepted onto the catalogue
- Progress on existing schemes
- Financial progress on existing schemes
- Outcomes of investigations
- Details of the options chosen for implementation
- Details of successful implementation

Updates should be sent electronically to the Head Office catalogue controller for consolidation. The HO controller will create a new version of the catalogue at each update to provide an audit trail of the work done to date. A copy of this new version will then be returned to the regions.

2 PRIORITISATION

This chapter explains why we need the prioritisation process and gives an overview of the process and detailed guidance for RSA Scheme Leaders and Regional RSA Co-ordinators on their responsibilities.

2.1 Why we need a prioritisation process and what it must do

The 500 or so schemes in the Agency's RSA catalogue vary in type, scale and complexity. We need a way to prioritise their implementation within staff resources and funding that is consistent, flexible and auditable. The process must include other stakeholders. The aim must be to implement the most urgent RSA schemes as quickly as funds allow.

The availability of funds for the RSA programme is a critical issue. So the process must also enable senior managers to assess the implications of the draft RSA programme on existing funding and resources levels. If necessary, managers can use the process to bid for extra strategic funds to undertake the programme within agreed deadlines, or re-schedule the programme within agreed funding limits. This information can also be used to help set the charges we levy.

The prioritisation process should be repeated at each stage of the scheme to ensure the site is still a high priority within the available funds.

2.2 Factors affecting the prioritisation of RSA schemes

2.2.1 Urgency and Importance

How urgent is the need to implement a change and how important is the site? The prioritisation process should address both questions. Urgency is based on the environmental requirements and the time constraints imposed by set deadlines or funding. Importance is mainly based on whether the site has a national or international designation, or is part of an agreed programme of work.

2.2.2 Benefits and costs

As with most Agency schemes, we need to consider costs alongside possible benefits. This will only be possible in the later stages of the process when the benefits can be quantified.

2.2.3 Project Risks

Risk assessment and management is covered in the Project Management chapter.

2.2.4 Funding and Manpower planning.

The availability of money and the people to carry out the work will influence which schemes can be done. The prioritisation proforma asks for the likely costs and requirements for each individual scheme. There are no set rules on how long an investigation will take or how much it is likely to cost.

In most cases the resources available will not be known until the bids have been made through the Corporate Planning process and assessed against the requirements of other initiatives. A repeat of the prioritisation process is likely to be needed once the available resources are known. The Regional RSA Co-ordinator will be responsible for collating the individual scheme requirements, feeding these into the Corporate Planning process and co-ordinating the reprioritisation process once available resources are known.

Further guidance on this is provided in the Project Management chapter.

2.3 An overview of the process

2.3.1 What it does - key elements of the process

The prioritisation process has two main stages:

- identifying the site priority factors and the resources required for each site
- ranking the sites and bidding for the required resources

The key elements of the prioritisation process are the two proforma, P1 and P2, found in Appendices 1 & 2, along with detailed guidance on how to complete them.

Form P1 deals with the individual schemes and is the responsibility of the scheme leader. It consists of a table of priority based on urgency and importance and, to a lesser extent, cost/benefit and risk. The manpower and funding requirements is included. This ensures that the audit trail is complete and easy to follow. It details the funds made available for the scheme and provides a record for the monies spent over time; it will cover the scheme throughout its life.

This process does not negate the need for a Form A under the Agency SOD procedures to actually secure the funds from the budget, although it can be used as an addendum to Form A. Guidance on this is in the Project Management chapter. Form P1 also highlights funding from other sources such as water companies or other regional funds.

Form P2 compares the individual schemes in each region with one another to rank them in order of priority. It also provides an overview of the funding and manpower requirements of all the region's schemes. This is the responsibility of the Regional RSA Co-ordinator and should be used to decide which projects to progress in the coming year. This will then enable Corporate Planning to secure the funds. It will also inform the process of making representations to DETR for Standard Unit Charges to be set at a level that will cover this aspect of work. It is a similar approval process to that for WR CAPEX schemes and should be done in close co-operation with the Regional Water Resources Business Planner; guidance on this is provided in the Project Management chapter.

Once the available resources are known, Form P2 can be used to reprioritise the projects to maximise the benefit. It may also be necessary to review the priority factors in the individual schemes. The Regional Co-ordinators and the scheme leaders should carry out this process together.

2.3.2 Undertaking the process

When to do it?

- At scheme inception to assign an 'in principle' priority level for each scheme. For schemes with low priority and which are unlikely to be started within the next 3 years, resource requirements will not need to be assessed.
- During the Corporate Planning year before the start of each stage of the scheme, to reassess the relative priority of that stage, and to bid for resources. This will allow senior managers to assess the funding and staff requirements for the various elements of the RSA programme.
- When seeking 'in principle' approval to implement a specific RSA scheme or stage between Corporate Planning rounds, for example, when the environmental urgency for action is unexpectedly increased.

2.4 Detailed guidance for RSA scheme leaders completing form P1

2.4.1 Completing and submitting Form P1

The nominated *Scheme Leader* is responsible for completing Form P1 for relevant stages of their RSA scheme, getting it endorsed by the Area WR/FD Manager (or their delegee) and submitting it to the Regional Co-ordinator.

The accompanying guidance sets the scene and identifies key stages in the process and when they are relevant. The full process involves identifying and weighting the factors affecting the priority and identifying the funding and manpower resources of the schemes.

2.4.2 Step 1: Factors affecting the priority of the scheme:

- **Scheme Details Box:** Fill in scheme/stage summary details.
- **Table P1/1:** List relevant factors likely to affect the priority of the scheme or stage of current relevance.
 - Assign weightings for *Urgency*, *Importance* where relevant, following the guidance below.
 - Complete the summaries of highest factor levels, by counting the number of the highest weightings for each column, i.e., 3 As for Urgency and 2 Bs for Importance.

2.4.3 Table P1/1: The factors affecting prioritisation

The factors affecting the priority of a site are based primarily on the urgency of the need for action and the importance of the scheme. These factors are given weightings of A-D, based on guidelines set out below. The number of factors in the highest category is then counted to give the overall site priority weighting. The focus for factors likely to affect the priority of a particular RSA scheme or stage should be:

- key drivers, e.g. Habitats Directive, NEP
- environmental, such as the degree of impact on the habitat
- deadline, for example, the Agency's commitment to "complete investigation of site by 2003" in its NEP programme
- funding, such as the availability of money from the Water Companies through the AMP process
- others, e.g. local/political factors such as LEAPs and commitments to the local population

An initial scoping exercise should have been carried out to decide if the scheme should be included in the catalogue. This will help the prioritisation process. A reference table of likely factors affecting a site is included in Appendix 3, with suggested weightings. It's not exhaustive, nor are the weightings fixed, but is intended for guidance.

Separate weightings should be used for multiple designations (e.g. HD site with both RAMSAR and SAC designations – give two As) to help with prioritisation if necessary.

If appropriate, indicate impacts of *Benefits & Cost* or *Project Risk* factors.

Summary data on the highest weighting levels achieved in each category and the number of factors with this weighting are listed at the bottom of Table P1/1. The Regional RSA Co-ordinator uses these at the next stage to assess the priorities of different schemes/stages.

2.4.3.1 Assigning Levels of Urgency

Urgency factors relate to the severity of impacts on the environment, water resources or sustainability of development (see examples below). They should take into account whether action to meet agreed deadlines and obligations is on or close to the critical path.

Table 1: Levels of Urgency

| Urgency Category | Level of Urgency |
|-------------------------|--|
| A. | Action imperative now to minimise or avoid irreversible or long-term damage to water resources or the environment. Stage(s) being bid for is/are on the critical path. Includes cases where damage is actively occurring or imminent. |
| B. | Action urgent to avoid significant damage to water resources or the environment, and/or only limited slippage possible in scheme or stage. |
| C. | Action necessary to avoid likely damage but scheme or stage timing is not or not yet critical. |
| D. | Need for action contentious or as yet unjustified. |

2.4.3.2 Assigning Levels of Importance

Importance factors generally include key drivers affecting site selection and levels of commitment to action made by the Agency to date.

Table 2: Levels of Importance

| Importance Category | Level of Importance | Examples |
|----------------------------|--|--|
| A | Committed Must Do – Obligatory/Statutory commitment and timing already agreed. | Habitats Directive commitments once a specific remediation scheme is identified, NEP - AMP 3 commitments |
| B | Committed Must Do – timing yet to be decided | Other commitments agreed with third parties (Water Company, English Nature on SSSIs, etc.) |
| C | Need for action identified and agreed | LEAP or other in principle commitment with timing dependent on availability of funds after commitments for A and B level schemes have been discharged. |
| D | No action identified or agreed | No commitment to action and insufficient drivers for C level |

Where a number of factors apply at a site that have different levels of importance, those that have the highest relative level of importance are used to assign priority in Part P1/4.

Assigning Weightings for Benefit/Cost

It's not possible to quantify the benefits of an investigation, so this element won't be used to prioritise the early stages of a scheme. The likely benefits and costs of a scheme can only be assessed after the initial investigation and expert advice made is needed for this.

Weightings will generally relate to the scale of benefits to likely costs

The "Monetisable B/C data" may be the most relevant (Axford?)

It may be pertinent to take into account the stage that the scheme has already reached and % expenditure to date; the marginal B/C ratio increases for outstanding stages.

Table 3: Benefit/Cost Category Levels*

| Benefit/Cost Category | Partial Monetisable Benefit /Cost Ratio (where known) | Likely Non-monetisable Benefit/Cost Status (where known) |
|--|--|---|
| A | >> 1 "Strongly Positive" | Large |
| B | >1 "Clearly Positive" | Very Significant |
| C | c. 1 "Neutral" | Significant |
| D** | Not known | Not known |
| * This factor is not relevant for schemes to resolve impacts on critical habitats and species designated under the Habitats and Birds Directive Regulations 1994 | | |
| ** This level should precipitate scheme review and the exploration of cheaper alternatives. | | |



2.4.3.3 Assigning Levels of Risk

Risky can mean either that the project might not deliver its intended outcomes, or that it might overspend.

Risk factors can increase the priority of stages that will manage/reduce the risk (e.g. investigations); decrease priority of later stages (e.g. through the need to delay initiation until the implications of the risk issue have become clear)

Current criteria (High, Medium or Low) are simple but may need elaboration in the light of experience.

R4: Risk Weightings

| <i>Risk category</i> | <i>Risk Descriptor</i> | <i>Examples</i> |
|----------------------|---|---|
| High. | High risk significantly affecting likely feasibility or cost benefits of resolution | Benefits not known Solution not yet identifiable |
| Medium | Medium risk affecting likely feasibility or cost benefits of resolution | possible options for remediation identified but not yet costed. |
| Low | Lower risk affecting scale and cost benefit of scheme | Environmental Targets clear and achievable by the proposed solution |

2.4.4 Step 2: Tables P1/2 - P1/4 Funding and resources information

Few records have been kept on past projects that can inform this process, particularly for manpower requirements. Appendix 4 gives some assumptions on manpower requirements for each step of the investigation and implementation stages; these should only be used as a fallback in the absence of more detailed information.

Table P1/2: Listing *Planned Schedules and Non-Manpower Costs*: this gives an overview of likely costs in an ideal world where there are no funding constraints. This should also include any associated third party costs.

Table P1/2a: Listing *Planned Agency Manpower Commitments*: this gives an overview of likely manpower requirements in an ideal world where there are no constraints.

Table P1/3: Identifying any *Actual Scheme Schedule and Funding Commitments to Date*: this shows the money that has already been spent on, or committed to, schemes that are ongoing.

Table P1/4: Identifying the *Funding being sought for the relevant stage that is being bid for in the current bidding round*: this highlights the actual funds being sought from each fund in the current Corporate Planning round.

Outcome Box: This identifies the money allocated to the scheme once the Corporate Planning round is complete.

Where possible a Scheme Leader should ensure the data on the resources needed to implement a scheme or stage covers:

- non-manpower costs
- associated CAPEX funds for elements of the scheme
- any third party contributions
- manpower requirements (in full time equivalents)

2.5 Detailed guidance for regional RSA co-ordinators completing form P2

2.5.1 Responsibility

Form P2 should be completed by the Regional Co-ordinator using the Scheme/stage data from the relevant Form P1s and the prioritisation guidelines. This should be carried out in consultation with senior managers.

2.5.2 Actions

The aim of Form P2 is to rank the regional RSA schemes, define the funding need and assess the availability within the constraints set by senior managers. This uses summary data collated from all regional Form P1s, Tables P1/1, P1/2 and P1/3. This is then used to inform the Water Resources Business Planners in the Corporate Planning rounds and the annual charge setting bids. Further Guidance is available in the Project Management Chapter and from your Regional Water Resources Business Planner.

Table P2/1: summarises the priority and funding information from the P1 forms and assigns a rank. A column is also included to show the funding status allocated (using reference table P2/2). If there is more than one fund available for RSA schemes/stages to bid for (see below), scheme/stages can be entered in different sections of the table under the relevant fund heading (using references Fund F1 and Fund F2, etc.).

Table P2/2: summarises the funding availability and constraints for this bid period, with rows showing any relevant strategic funding streams for which RSA schemes/stages can bid. It identifies the constraints imposed by senior management on the types of scheme and/or stage that can be bid for from each fund in this bidding round. A number of funds, including third party fund streams, can be accommodated. Once strategic funding limits are known, senior managers will need to identify the funding available and the constraints. These can then be applied to the prioritised bids in P2/1. Funding Status is then assigned for each scheme stage bid as follows:

- Endorsed, funding bid allocated
- Placed on *Reserve List*
- Rejected as premature

Table P2/3: identifies the initial priority levels for scheme stages. There are 10 priority levels that may apply to different scheme/stage bids, depending on the relevant top weighting levels assigned to each one for Urgency and for Importance on Table P1/1 of each Form P1. The accompanying information about default drivers/site types is only relevant where other factors do not provide an overriding level of *Urgency* or *Importance*.

Any changes to the priority of the sites based on lack of funding should be made with Scheme Leaders and endorsed by senior management. The funding status must then be logged on the RSA catalogue.

Form P2 can also be used within a funding year if more funds become available. In these cases, Reserve List stages can be revived.

2.5.3 Assigning priorities to different schemes/stages

Priority Reference Table identifies priority levels 1 to 10 based on the *highest level* (A, B, or C) achieved for *Urgency & Importance* by any priority factor(s).

For schemes/stages at a similar priority level (e.g. ones with top weightings of A for *Urgency* and B for *Importance*), the number of factors at those levels are compared to rank schemes/stages within that priority level (e.g. 3.1; 3.2 etc. - see table below)

Where *Benefit/Cost* or *Project Risk* factors appear particularly significant, an appropriate *Urgency* and/or *Importance* weighting should be assigned to reflect this.

Ranking schemes/stages with similar priority levels* - an example

| Scheme/Stage/Key driver | Highest factor weightings | | Priority |
|--|---------------------------|------------|----------|
| | Urgency | Importance | |
| Avon Marshes (AMP3 HDStatus1) RSA Stage 1 - Investigation | A(3) | A(4) | 1.3 |
| River Avon (AMP3 HD Status 2) RSA Stage 2 - Option Appraisal | A(2) | A(4) | 1.4 |
| River Puddle - (AMP3 Status 1) RSA Stage 3 - Augmentation Scheme Implementation | A(5) | A(3) | 1.2 |
| Redcar Chalk Aquifer - RSA Stage 1a - GW Modelling Study (benefits 5 RSA schemes) | A(8) | A(6) | 1.1 |
| River Styx: (AMP3 SSSI Cat 3) RSA Stage 1 - Hell Reach Study | A(2) | B(2) | 3.2 |
| Kings Mead (AMP3 SSSI Cat 2) RSA Stage 1 - Investigation | A(1) | A(3) | 2(-) |
| Maxwell Bog RSA Stage 3 – Remediation Scheme (no driver status but high Urgency due to level of current damage) | A(1) | C(2) | 4(-) |
| River Amazon (Other SSSI) RSA Stage 1b - Investigation | A(3) | B(2) | 3.1 |

See Reference Table P2/3 on Form P2

Form P1: SCHEME PRIORITY SHEET

| SCHEME DETAILS | |
|--|---|
| Name: | RSA Catalogue ID |
| Description: | Location data: Site name: NGR(s): Catchment: Region & Area: |
| Key deadlines: | |
| Key drivers: | |
| Third Party commitments/contributions: | |
| RSA SCHEME STAGE BEING BID FOR | |
| RSA Scheme Stage No: | |
| Description: | |
| Form No: * | Completed/revised by: |
| Date:/.../20.... | |
| Notes: | |
| *Forms to be numbered and retained as a scheme record of bids made and their outcomes. | |

Table P1/1 PRIORITY FACTORS

| Ref No. | Factor* | Category & level assigned | | | | Comments |
|--|---------|---------------------------|---------|--------------|------|----------|
| | | Importance | Urgency | Benefit/Cost | Risk | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| Summary for highest weighted factor categories: | | | | | | |
| Highest weighting | | | | | | |
| No. of factors with this weighting | | | | | | |
| Notes: | | | | | | |
| * i) Put key drivers first (e.g. "HD site – SAC" and "NEP site – AMP3") followed by | | | | | | |
| ii) key deadline factors (e.g. "Investigate by 2003"), then | | | | | | |
| iii) funding factors (e.g. "Avon Water commitment to fund 90% of scheme solution stage", then other factors | | | | | | |

| OUTCOME OF THE CURRENT BID | | | | | | |
|--|----------|----------|--------------------------|----------|----------|-------|
| Priority allocated (for this round): | | | Date advised.../.../20.. | | | |
| Funding status allocated (delete as appropriate) | | | | | | |
| <ul style="list-style-type: none"> • Endorsed, funding bid allocated • Placed on Reserve List • Rejected as premature. | | | | | | |
| Year: | 200../.. | 200../.. | 200../.. | 200../.. | 200../.. | Total |
| Funds allocated~ (fromfund) | | | | | | |

SCHEME SCHEDULING & FUNDING DATA

Table P1/2: Planned schedules and costs* (in £k.)

| Scheme Year | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Post Year 5 | Total(s) |
|--|--------|--------|--------|--------|--------|-------------|----------|
| Stage 1 | | | | | | | |
| Stage 2 | | | | | | | |
| Stage 3 | | | | | | | |
| Stage 4 | | | | | | | |
| Stage 5 | | | | | | | |
| Total(s) | | | | | | | |
| Notes: * Agency costs. Also identify any planned third party costs in brackets, either after Agency costs – e.g. 21(35) or within further rows inserted under a particular stage (e.g. for funds from more than one third party source). | | | | | | | |

Table P1/3: Actual Scheme schedule and funding commitments* to date (in £k.)

| Scheme Year | 200../.. | 200../.. | 200../.. | 200../.. | 200../.. | 200../.. | Total(s) |
|---|----------|----------|----------|----------|----------|----------|----------|
| Stage 1 | | | | | | | |
| Stage 2 | | | | | | | |
| Stage 3 | | | | | | | |
| Stage 4 | | | | | | | |
| Stage 5 | | | | | | | |
| Totals | | | | | | | |
| % of scheme already completed** | | | | | | | |
| Notes: * Expenditure to date, plus forecast expenditure of funds that have already been committed to end of current funding period. Include third party expenditure – e.g. by a Water Company under AMP3 as for table P1/2. | | | | | | | |
| ** Total expenditure to end of current funding year as a percentage of Planned Total Scheme Expenditure – (include relevant third party costs). | | | | | | | |

**Table P1/4: Agency funding* being sought for Stage in current bidding round**

| Financial Year | 200../.. | 200../.. | 200../.. | 2000../.. | 200../.. | Total sought |
|----------------|----------|----------|----------|-----------|----------|--------------|
| Fund | | | | | | |
| Fund | | | | | | |
| Total sought | | | | | | |

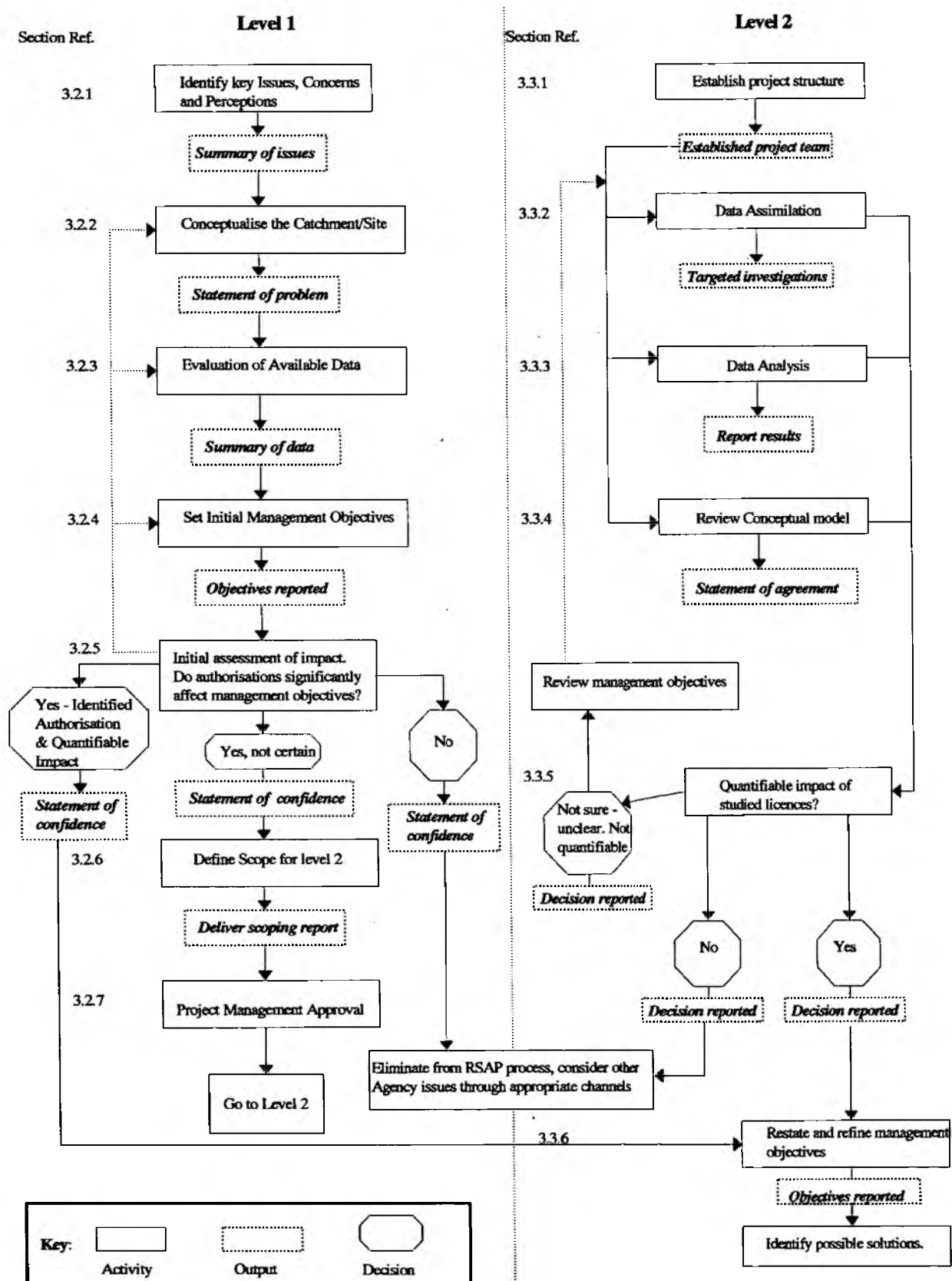
Notes: *Agency Non-manpower funds. Related Agency FTE resources, CAPEX bids and any third party funding for the stage should have been separately cleared subject to this bid being endorsed. If not, relevant aspects can be identified by adding additional rows to this table with an appropriate heading in the left-hand column.

ENDORSEMENT

| ENDORSEMENT STATEMENT | RESPONSIBLE OFFICER | SIGNATURE | DATE |
|--|---------------------------------|-----------|------|
| The information on this form is an accurate record of the current situation for the purpose of RSA scheme stage prioritisation in accordance with associated guidance. | RSA Scheme Leader: | | |
| | Area WR/FD Manager: | | |

ENDS /FormP1v2

Figure 1: RSA Investigations Logic Chart



3 INVESTIGATIONS

3.1 Objectives and Purpose

This chapter provides the guidance for investigating sites believed to be affected by abstraction. It has been drafted for RSAP and Stage 3 Water Resources assessment of the Habitats Directive review (Ref.7, Appendix 1a). You should also refer to the guidance for the Catchment Abstraction Management Strategies (CAMS), the Resource Assessment and Management technical framework and relevant R&D.

It provides:

- a two level approach to investigations
- a stepped approach through each level, identifying what each step is trying to achieve
- a means to identify sites or catchments for further investigation and those that can be removed from the RSAP process

Figure 1 outlines the step by step approach, which is described in more detail below. The logic behind the investigations framework is to reduce risks and make sure the perceived problem really is due to abstraction and not some other cause.

This guidance is targeted at the nominated project manager for the investigation who will need to draw on local knowledge and the expertise of specialists. Chapter 6 describes project management procedures.

Useful information from other studies is included in the appendices.

Level 1 builds a conceptual model of the site and should eliminate sites not affected by abstraction. But for sites where insufficient information is available to eliminate with certainty, they will proceed to level 2.

Level 1 investigations could only take a few days but would take much longer, with a much greater resource input, at more complex sites like the River Bourne and Nine Mile River Flow Investigation, Phase 1, Ref. 11, Appendix 1a).

Level 2 is a more detailed investigation stage, likely to involve collecting and interpreting a lot of data. This will require project management procedures and a scoping study before Level 2 investigations can start.

3.2 LEVEL ONE

Level 1 equates to stages 1 & 2 of the Habitats Directive – See HD and TRAG guidance for further information.

3.2.1 Identify Key Issues, Concerns and Perceptions

The objective of this step is for the project manager to identify the extent of the problem key issues in collaboration with relevant experts and stakeholders.

This step will normally involve a site visit (not field investigation), consultation with relevant experts internally – typically Water Resources, Fisheries, Ecology and

Conservation, and relevant external authorities including English Nature, Countryside Council for Wales and other stakeholders as appropriate.

Existing information will be used to identify the range of influences across the site (see P1 form information - Chapter 2, and Site Issue Briefings). Appendix 2 details the information required for Habitats Directive sites (Site Issue Briefings), which should be available from regional/area Habitats Directive Co-ordinators.

Output: Issues will be summarised by the project manager and signed off on the Summary Sheet (Appendix 3).

Risks: Need to ensure appropriate experts are involved otherwise the extent of the problem may not be realised.

3.2.2 Develop a conceptual model of the Catchment/Site

The purpose of this step is to understand how the catchment or site functions. This conceptual model is a crucial part of the investigation and will be reviewed as understanding develops. There will be a need to consult informed internal and external contacts.

It's very important to consider the boundaries of the catchment or site to make sure you include all relevant influences/factors. At this early stage, it's better to consider wider boundaries and to focus down later as understanding improves.

A schematic of surface and groundwater interactions, and how the catchment functions would help. This might include

- diagrams, maps and cross-sections
- information on the catchment boundary and the major tributaries
- the location of any gauging stations
- the location of any significant changes in geology and potentially naturally losing reaches

You should include any features that depend on water. At this stage, we should, with confidence, be able to remove from the RSAP process any sites where the problems are clearly not related to over-abstraction

Output: An agreed statement describing the catchment including site history etc including a catchment or site schematic. Signing off the Summary Sheet.

Risk: If the information at this stage is incorrect then all future work will be flawed. This can be mitigated by regularly reviewing the conceptual model as more information becomes available.

3.2.3 Evaluation of Available Data

The purpose of this step is to collect the available information and assess its usefulness.

Appendix 4 lists different types of data and information and how it may be useful depending on local circumstances. The quality assessment should include:

- the period of time and the area measured
- when the data was taken
- time steps of measurement
- any gaps in the records
- the temporal and spatial extent of data, its relevance and availability
- the length of record

The conceptual model should be reviewed following this step.

Output: The project manager will summarise the data and appraise its quality for the purpose of the investigation. The project manager, with others, will identify what is required to improve the data sets and the way forward. Signing off the Summary Sheet.

Risk: If evaluation is not adequate, progression to Level 2 may not occur when it should.

3.2.4 Set Initial Management Objectives

This stage aims to make an initial assessment of what features need protecting and how this can be achieved i.e. the management objectives. Developing management objectives will ensure the project focuses on delivering tangible outcomes for the catchment or site and its features.

The objectives will be revisited throughout the investigation as more detailed information is collated (see Figure 1); new data may require the original understanding of the problem to be revised.

The project manager will ensure that agreement is reached for objectives and criteria. The assessment will have to take account of environmental, ecological, amenity, social, hydrological and hydrogeological perspectives. These objectives must be agreed between all stakeholders: EA internal functions and external representatives.

Output: Initial objectives, the site criteria that need to be established, and the features that need to be protected will be agreed with relevant parties and reported. For Habitats Directive and Sites of Special Scientific Interest, English Nature and/or Countryside Council for Wales must agree to conservation and hydrological objectives. The Summary Sheet will be signed.

Risks: If initial objectives are unrealistic, incorrectly identified or unfocused, identifying the appropriate options is going to be difficult.

3.2.5 Initial Assessment of Impact

Stage 2 HD. See HD & TRAG guidance.

The purpose of this step is to determine if there is an abstraction issue, how significant it is and to identify the uncertainties attached to the assessment of impact.

The project manager will organise an assessment of the impact of abstractions against the agreed management objectives. This will be derived from the data or may be based on expert opinion. *Impact* is the deviation from the agreed management objectives for the site. Where possible, this assessment may include some quantification of the scale of deviation e.g. 'impact depletes natural Q95 flow by over 20%' etc.

The assessment must be supported by a judgement or quantification (where possible) of an acceptable level of confidence agreed by relevant parties. The default is 'yes there is an impact but there is uncertainty as to the level of impact'. This would be the likely result in the absence of relevant data. In the case of an impact being clearly identified, quantified and understood, option appraisal may be considered. In some cases, licence holders may be approached if an obvious cost-effective solution can be identified.

Output: A statement will be delivered describing the means of assessment and the degree of confidence in the decisions. The final decision will be signed off on the Summary Sheet, following internal consultation.

Risk: That the decision is not supported by an acceptable level of confidence, creating uncertainty in both the likely impact and the success of options or further investigation.

3.2.6 Define Scope for Level 2

The purpose here is to develop a scoping paper and ensure agreement between relevant parties. This will help reduce uncertainties about the scheme by detailing the requirements for better quality and more appropriate information and the means of obtaining it.

The project manager must be clear on the responsibilities of stakeholders and the Agency and ensure effective liaison. The project manager will lead the scoping study, which will identify the extent of the investigations and propose techniques for collecting and analysing the data. An example layout for scoping is referenced in Appendix 1 (EA, 2000?). Additional guidance is given in Chapter 6 with reference to the relevant Policy Implementation Note.

Output: The scoping report will detail what needs doing, by whom and by when. The report will attempt to establish the resources needed in the short and long term and identify potential sources of funding. It will identify the input required from, and roles of, internal and external parties. The feasibility of each site will be assessed, taking account of the likely costs and benefits as necessary. The scoping study will be explicit in its assessment of the likely outcome of proposed investigations with confidence limits set for probable conclusions (derived in 2.5). On completion of the report, the Summary Sheet will be signed.

Risk: Insufficient resources (FTE/£K) may be provided if insufficient scoping has taken place. Also, Level 2 investigations may not be appropriately targeted or defined.

3.2.7 Project Management Approval

The scoping report will be used to establish project management approval for the scheme. The project manager will determine at what stages project management needs to be applied and to what degree. Chapter 7 provides guidance this.

3.3 LEVEL TWO

Level 2 equates to stage 3 of the Habitats Directive. See Habitats Directive guidance for further information.

3.3.1 Establish Project Structure

The project structure and the resource commitments required will depend on the size or complexity of the catchment or site. Chapter 6 describes the process for implementing project management procedures in line with standard Agency procedures. The project structure will be developed from the scoping report. The project manager will establish a project framework to enable effective investigation through the processes described below.

Output: A project team and full project structure as required will be formally established and Summary Sheet completed as appropriate.

Risk: An inappropriate structure of project management may lead to a poorly audited and inadequately consulted authorised investigation.

3.3.2 Data Assimilation

The purpose of this step is to achieve a baseline of relevant data of good quality in line with the management objectives. Appropriate methods for analysing the data, to assess potential impacts, will need to be considered to identify data requirements at this stage. Section 3.3 should be referred to in parallel with this stage (Figure 1).

Data requirements will have been identified in the scoping exercise. To meet these requirements, monitoring programmes will need to be developed and implemented. The process of collecting data could be lengthy and may require establishing new baseline data sets e.g. it may take up to 5 years to arrange and construct a flow gauging station. Statutory deadlines must be considered if relevant (e.g. AMP3 etc.).

Whilst considering the development of an appropriate monitoring programme, quality assessment of existing data will be needed, as described in the 2-3 Evaluation of Available Data step.

The value of proposed data needs to be carefully considered and cost / benefit assessment should be employed (cost being time and resources). Appendix 4 provides an inventory of useful data types and their applicability.

Output: Targeted monitoring programmes established and justification given for all proposed data collection. Time-scales for data collection set and agreed. The project manager, with appropriate approval, will sign the Summary Sheet following establishment of data collection methods.

Risk: The data collection programmed needs to be targeted to provide information for the selected analytical techniques which will be used to identify the impact against the management objectives. Inappropriate data collection will prevent this.

3.3.3 Data Analysis

The purpose of this step is to analyse data using accepted techniques to enable an assessment against the agreed management objectives. Data analysis will enable the conceptual model of the catchment or site to be reviewed during this stage. This step should be carried out in parallel with Data Assimilation (Section 3.2).

Appropriate techniques are essential to ensure continuity, repeatability and consistency, and guarantee confidence in the decisions. Appendix 5 lists available techniques for data analysis. (Ref 13, Appendix 1a). Appendix 1 provides contacts and case studies.

The most appropriate methods should be selected, taking account of cost/benefit and likely degrees of confidence. Novel methods can be employed subject to appropriate peer review.

Output: The project team/manager will report the results and conclusions from this stage and sign the Summary Sheet on delivery.

Risk: The selection of inappropriate techniques will mean the project will not be able to assess management objectives or provide an acceptable solution and data collection programme may be limited in its use.

3.3.4 Review Site or Catchment Conceptual Understanding

The purpose of this step is to revisit the original understanding. Although formalised at this stage within this guidance, review should continue throughout the investigation as more information becomes available. This will help ensure the investigation remains focused. This step should be carried out in parallel with Data Assimilation (Section 3.2) and Data Analysis (Section 3.3).

The project team will consider if analysis has improved understanding of the issues and problems. Reviews will be made of the data gathering programme (allowing for any new requirements) and the reasoning behind the original conceptual model.

Output: Revised and agreed statement of the conceptual model.

Risk: If not undertaken, and if the original perception changes, the objectives for the site may not be met.

3.3.5 Quantification of Impact

The purpose of this step is to confirm whether or not particular abstractions are causing a significant impact and if the site/catchment is meeting its management objectives.

'Significance of impact' will vary from case to case depending on local factors and circumstances. The project team and experts/stakeholders will assess this.

If the Level 2 investigations have established a quantifiable and significant impact and the management objectives to be met are clearly identified, then a proposal can be made for option identification and appraisal, as described in Chapter 4.

If the conclusions state that abstraction is not the cause of problems at the site, then arrangements can be made to remove the scheme from the RSA catalogue.

If the conclusions are unclear, the project objectives will need to be re-established and further investigation undertaken. The risk of this should be small if the investigation has been properly scoped. (see Section 2.6). Repeating the steps should only be done if the conceptual understanding or the management objectives change significantly. And then only if the project team is confident that more investigations will determine the source and extent of abstraction impacts. In the absence of quantifiable abstraction impacts, the scheme should be eliminated from the RSAP process. The final agreement on the quantification of the impact will be taken by the project team and other relevant experts/stakeholders.

Output: The decision will be reported and signed off by the project manager and project team.

Risk: To fail to make an appropriate decision may result in extended time-scales and resources for completing the scheme or inappropriate solutions being identified.

3.3.6 Restate and Refine Management Objectives

The purpose of this step to refine the project objectives as defined in 2.4 and revise as appropriate, in the light of the investigations.

Solutions for the site will be considered during the next stage of option identification and appraisal (Chapter 4).

Output: This final stage in the investigations will be reported and signed off by the project manager before options appraisal. The report will include any environmental, flow or level criteria (i.e. management objectives), which should be met for those options to be acceptable.

Risk: If objectives are not clearly defined, the features to be protected may be damaged by inappropriate solutions.

3.3.7 Quality Assurance and Documentation

Quality assurance will ensure the outputs from the investigations meet their requirements. It is the overall process by which the quality of any output is assessed and maintained. It involves assessing all the components and steps in the investigation process and is a powerful method of establishing confidence in the results. Quality assurance is required because:

investigations can involve large amounts of data from a wide variety of sources that might require a considerable amount of processing
the extent and complexity of data processing may mean it is carried out over an extended period and by different people
catchments and sites are highly specific, so many aspects of the guidance will require the local experts
the results need to be auditable

The two main components of the quality assurance process are the data archive and the documentation.

Documentation lies at the heart of any effective investigation. The required documentation reflects the importance of the investigation. Setting up adequate documentation is vital at an early stage in the investigation process. Appendices 2 and 3 form control summary sheets for the investigation. But the investigation must be appropriately documented throughout including all decisions, catchment description, data sets and assumptions, management objectives. The documentation should be detailed enough to allow auditing.

Documentation and quality assurance is also covered in Chapter 6 'Managing a RSAP scheme'.

3.4 Summary

The framework guidance provided will either remove the site from the RSAP process or quantify the impact of abstraction. Once the investigation process has quantified the impact of abstraction compared to the management objectives, we can proceed to the next stage 'Options Identification and Appraisal' Chapter 4.

APPENDIX 1a Available References

| Ref No. | Report Title | Date | Authors, Project Manager or Contact Name | Purpose; Aims and Objectives of Project; Applicability |
|---------|--|------------|--|---|
| 1 | Environmental Evaluation Criteria for Water Resource Impact Assessment | April 1998 | Environment Agency North East Region Project Manager/Contact: Liz Chalk | Purpose: Specific Flow Requirements of Aquatic fauna and flora Aims and Objectives: To identify the flow needs of selected aquatic species. Applicability: Setting of Minimum Flows for Ecological need |
| 2 | Guidance on Preparation of (AMP 3) Business Cases | Nov. 1997 | Environment Agency Thames Region Project Manager/Contact: Tim Webb | Purpose: Justification for undertaking projects Aims and Objectives: Applicability: Cost /benefit application for WR schemes |
| 3 | Low Flows, Groundwater & Wetland Interactions | 1998 | EA/ BGS/ Inst. Hydrology/ UKWIR/ NERC Project Manager/Contact: Ref. EA R&D W112. | Purpose: User Guide for selected methodologies for GW/SW linked systems Aims and Objectives: Applicability: |
| 4 | Guidelines for Monitoring Methodologies for Water Resources Projects | Oct. 1996 | Environment Agency North East Region Project Manager/Contact: NE Regional Licensing Officer | Purpose: Drought Monitoring Guidance Aims and Objectives: To provide a framework for managing drought contingency Applicability: Regional drought management |

| Ref No. | Report Title | Date | Authors, Project Manager or Contact Name | Purpose; Aims and Objectives of Project; Applicability |
|---------|--|------------|---|--|
| 5 | Drought Orders / Permits – Best Practice Guidelines for Environmental Monitoring – R&D Technical Report W149 | April 1998 | Environment Agency Project Manager/Contact: Aileen Kirmond, local ALG rep. | Purpose: DO/DP Monitoring and Surveillance Aims and Objectives: To assist planning for drought management. Applicability: Regional drought management. |
| 6 | Determining the Freshwater Flow Needs of Estuaries – R&D Technical Report W113 | 1998 | Environment Agency Project Manager/Contact: Ref. EA R&D W113 | Purpose: Estuarine guidance Aims and Objectives: Establish best practice and future research needs in determining the flow needs of estuaries. Applicability: Habitat Directive studies and other estuary work. |
| 7 | Practical Advice for Agency Water Resources Staff (in Habitats Directive Stage 2 Review) | 1999 | Environment Agency Project Manager/Contact: WR HD Co-ordinator | Purpose: Habitat specific guidance or S2 assessment. Aims and Objectives: Applicability: Determination of minimum acceptable flows and identification of impacting licences |
| 8 | A Framework for Identifying In-stream Ecosystem Flow Requirements | 1999 | J Sherriff, Environment Agency Project Manager/Contact: WR HD Co-ordinator | Purpose: Summarises all available information and recommend appropriate methods. Aims and Objectives: To interrogate and appraise the range of available eco-hydrological methods. Applicability: Guidance for the application of methods and further reference for their usage. |
| 9 | Ecologically Acceptable Flows Phase 2. Guide to the Use of the Physical Habitat Simulation System: PHABSIM | | Environment Agency: TR W20 Project Manager/Contact: WR HD Co-ordinator | Purpose: To provide guidance on the use of PHABSIM. Aims and Objectives: To assist practitioners in the effective use of this tool. Applicability: see Appendix 5. |

| Ref No. | Report Title | Date | Authors, Project Manager or Contact Name | Purpose; Aims and Objectives of Project; Applicability |
|---------|---|------|---|--|
| 10 | River Flow Objectives Scoping Study | 1999 | Environment Agency Project Manager/Contact: NW Regional Water Resources | Purpose: To develop RFO's in North West region Aims and Objectives: Applicability: Identifying a Target Flow Regime |
| 11 | Bourne & Nile Mile Rivers Low Flow Investigation, Phase 1 Report. | 2000 | Environment Agency SW Region Project Manager: Bruce Jones | Purpose: Investigation of abstraction Aims and Objectives: Investigations and analysis to satisfy AMP3 requirements and to meet requirements to a time limited licence expiry. Applicability: To meet aims and objectives Agency needs a good conceptual understanding of hydrogeology, hydrology, and ecology to allow conclusions to be drawn re. impact of abstractions. Good example of conceptualisation in a groundwater catchment. |
| 12 | Good Practice in Flow Naturalisation by Decomposition | 2001 | National Hydrology Group, Environment Agency | Purpose: To provide framework guidance on preparing for and carrying out a naturalisation by decomposition. Aims and Objectives To guide experienced hydrologists through a four-stage process of considering, preparing for, carrying out and quality assuring a naturalisation. Applicability: For RSAP investigations naturalisation is highly likely to be required as a baseline. Early sections of guide are applicable to water resources investigations even if naturalisation is not being carried out. Similarly the sections on quality assurance. The main thrust of these sections is about considering the purpose of the work, what data is required and any inaccuracies or uncertainties. |

| Ref No. | Report Title | Date | Authors, Project Manager or Contact Name | Purpose; Aims and Objectives of Project; Applicability |
|---------|--|------|---|---|
| 13 | Applied Hydrology for Low Flow Investigations, R&D project | 2001 | On-going R&D project for Environment Agency. Consultant WS Atkins | <p>Purpose: To provide Agency hydrologists/water resources staff with a thorough, practical and accessible reference/guidance tool to assist in both the specification and implementation of hydrological investigations.</p> <p>Aims and Objectives To review methods that are or have been used for low flows investigations.</p> <p>To identify what types of issues and questions are low flow investigations addressing.</p> <p>To identify what management objectives are to be solved. To identify what sort of questions hydrologists (and to some extent hydrogeologists, ecologists) are asked.</p> <p>To identify how these questions can be answered.</p> <p>To catalogue, document and evaluate approaches, methods and techniques available to hydrologists, to identify gaps and make recommendations.</p> <p>To produce and disseminate practical and accessible guidance material.</p> <p>Applicability: Will directly support investigations work and RSAP chapter. Outputs will include an Access database summarising consultation process, fact sheets of individual techniques.</p> |
| 14 | East Devon Pebble Beds Study, | | Environment Agency | <p>Purpose:</p> <p>Aims and Objectives</p> <p>Applicability: Good example of benefits of early conceptualisation of the system</p> |

APPENDIX 1b Available Case Studies

| Scheme Purpose | Title | Year | Authors, Project Manager or Contact Name | Habitat Type | Applicability / Remarks |
|-----------------------------------|--|------|---|--|--|
| Alleviated Low Flow, AMP 2 scheme | River Wey at Alton – Proposal to Alleviate Low Flow by Mid Southern Water and the Environment Agency | 1994 | Environment Agency – Thames Region Project Manager/Contact: Tim Webb | River, associated flood meadows and wetlands | Cost/benefit Analysis, Options Appraisal. Socio-economic consideration. Reference to previous ecological studies |
| AMP 3 | EA: Anglian Region. Draft Business Cases proposed for AMP 3 | 1998 | Environment Agency – Anglian Region Project Manager/Contact: Mark Whiteman | 5 Wetland Sites and 1 River | Cost/benefit Analysis, Options Appraisal. Socio-economic consideration. |
| AMP 3 | AMP 3: River Piddle ALF Business Case – EA South West Region | 1998 | Environment Agency – South West Region Project Manager/Contact: Cliff Tubb | River | Highlighting general problems with the site. Considers Cost/benefits of a number of options. Recommends solutions. |
| AMP 3 | AMP 3: River Allen ALF Business Case – EA South West Region | 1998 | Environment Agency – South West Region Project Manager/Contact: Cliff Tubb | River | Highlighting general problems with the site. Considers Cost/benefits of a number of options. Recommends solutions. |

| Scheme Purpose | Title | Year | Authors, Project Manager or Contact Name | Habitat Type | Applicability / Remarks |
|----------------|--|------|---|--------------|--|
| AMP 3 | AMP 3: River Wylfe ALF Business Case – EA South West Region | 1998 | Environment Agency – South West Region Project Manager/Contact: Cliff Tubb | River | Highlighting general problems with the site. Considers Cost/benefits of a number of options. Recommends solutions. |
| AMP 3 | EA: Midland Region. Draft Business Cases proposed for AMP 3 | 1998 | Environment Agency – Midlands Region. Project Manager/Contact: GP Davies and J Ratcliffe | Various | Cost /benefit assessments for a number of schemes. |
| AMP 3 | AMP 3: Swanbourne Lake ALF Business Case – EA Southern Region | 1998 | Environment Agency – Southern Region Project Manager/Contact: Alison Rennie | River | Detailed study considering objectives, hydrogeological modelling, option appraisal, cost /benefit analysis. |
| AMP3 | Hydrogeological study of the catchment of the Croxden Brook by Environmental Simulations International (ESI) | | Environment Agency – Midlands Region Project Manager/Contact: Anne Dacey and Elizabeth Large | Upland Brook | |
| ALF Schemes | Low Flows and Water resources – Top 40 low flow river sites in England and Wales | 1993 | Project Manager/Contact: regionally available (out of print) | Various | Brief details on 40 top low flow sites. Identifying what information is available and possible options for alleviation |

| Scheme Purpose | Title | Year | Authors, Project Manager or Contact Name | Habitat Type | Applicability / Remarks |
|----------------------------|---|------|--|--------------------|---|
| AMP 3 / Habitats Directive | Lower Derwent Valley Project | 1999 | Environment Agency – NE Region Project Manager/Contact: Liz Chalk | River, Flood Plain | Detailed study identifying key indicator species impacted by authorisations. |
| Habitats Directive | Anglian Region / Entec Report - Guidance for HD schemes | 2000 | Project Manager/Contact: Anglian Region Ecohydrologist | Various | Useful for scoping of schemes as per 2.6. |
| Habitats Directive | Habitats Directive review of Licences on Hampshire Avon | 1999 | Environment Agency – SW Region Project Manager/Contact: Cliff Tubb | River | Used in the development of Stage 2 Assessment for Habitats Directive. Naturalising flows and assessment of individual licences. |

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APPENDIX 2 Habitats Directive Site Issues Briefing v2.4

1. **Site name and designation:**
2. **Features (*list*)**
3. **Site condition** **Degree of confidence**
[favourable/unfavourable] (high/medium/low)
- 3a. **If unfavourable, list features contributing to this judgement:**
4. **Level of complexity**
 - i. **Number of Agency consents:** <100; 100-1,000; 1,000-10,000; >10,000)
 - ii **Number of SSSIs:**
 - iii **Total area of site:**
 - iv **Estimated level of site knowledge: (High/Medium/Low)**
5. **Current Status of Review of Consents Process**
6. **Date of entry:**
7. **Site priority**
8. **Issues matrix (best judgement at present)**

| Issue/factor | | Impact/Risk* | | | | Responsibility | | Features at risk | Information source and comments |
|--|------------------------|--------------|---|---|---|----------------|--------|------------------|---------------------------------|
| | | 3 | 2 | 1 | 0 | Agency | Others | | |
| Contamination (From air pathway) | | | | | | | | | |
| Contamination (From water & land) | Toxic | | | | | | | | |
| | Non-toxic | | | | | | | | |
| Problematic hydrology | Flow | | | | | | | | |
| | Lowered water table | | | | | | | | |
| | Water level management | | | | | | | | |
| Land drainage | | | | | | | | | |
| Land use (catchment/off-site land use) | | | | | | | | | |
| Site management | | | | | | | | | |
| Fisheries management | | | | | | | | | |
| Flood & Coastal defence | | | | | | | | | |
| Non-physical disturbance (eg. noise / recreation) | | | | | | | | | |
| Physical damage (e.g. dredging/tramplng) | | | | | | | | | |
| Biological Disturbance (eg. non-natives, extraction) | | | | | | | | | |
| Habitat fragmentation/barriers to migration | | | | | | | | | |



Risk: 3, Impact on feature; 2, High risk; 1, likely low risk/uncertain risk; 0, No exposure/irrelevant

Other initiatives addressing issues (tick)

Planning mechanisms/strategies¹

- Local Environment Agency Plans (LEAPs)
- Air quality plans/strategies
- Waste Management strategies
- Catchment Abstraction Management Strategies (CAMS)
- Salmon Action Plans
- River SSSI Conservation Strategies
- Coastal Habitat Management Plan
- Shoreline and Estuary Management Plan
- Other Restoring Sustainable Abstractions Programme (RSAP) Initiatives

Management

- Water Level Management Plan
- Nitrate Vulnerable Zones
- Agri-environment initiatives (Countryside Stewardship)
- River quality objectives

Eutrophication Control Action Plan

Wildlife enhancement scheme

Regulation/licensing/consenting

- Abstraction licensing review
- Urban Wastewater Treatment

Periodic Review Programmes

- Water industry
- IPC/IPPC / Waste licence four yearly reviews

Specific Projects

- EU-LIFE demonstration projects
- Alleviation of low flow projects

10. Key contact

Key contact for site:

11. Signatories

| | | |
|---------|-----------------------------------|-------|
| Signed: | (on behalf of Environment Agency) | Date: |
| Signed: | (on behalf of English Nature) | Date: |

¹ The Site should be directly affected by the implementation of these plans. i.e. although all catchments in the UK will have a CAMS developed, the box should only be ticked if the Natura 2000 site is likely to be affected by its implementation

APPENDIX 3 - Investigation Summary Sheet

Site Name:

RSAP Code:

Brief Site Description:

Project manager:

LEVEL ONE

1. Identify Key Issues, Concerns and Perceptions

Key issues to be summarised for all sites

Completed: (signed by project manager)

2. Conceptualise the Catchment/Site

Complete a site statement with appropriate evidence

Completed: (signed by project manager)

3. Evaluation of Available Data

Attach summary of available relevant data and judgement of quality/adequacy

Completed: (signed by project manager)

4. Set Initial Management Objectives

Develop a statement of objectives for the site (no more than 1 side of A4) with appropriate agreement and consultation

Completed:
(signed by project manager and statutory consultee)

5. Initial Assessment of Impact

Attach a statement describing means of assessment undertaken to determine impact of authorisation(s). Answer question below. Describe degree of confidence attached to determination.

Do Authorisations significantly affect management objectives? (Circle as appropriate)

Yes (identified solution) Yes (solution not identified) Don't Know No

Completed: (signed by project manager)

6. Define Scope for Level 2

Produce a scoping paper to be agreed by all parties. Level of detail and content will depend on site size and priority.

Completed: (signed by project manager)

LEVEL TWO

7. Establish Project Structure

Utilising recognised project management procedures

Completed: (signed by project manager)

8. Data Assimilation

Establish monitoring programmes, targeted investigations & means for assimilating data

Completed: (signed by project manager)

9. Data Analysis

Undertake analysis, report results and draw conclusions

Completed: (signed by project manager)

10. Review Conceptual Model

Check that original problem still exists

Completed: (signed by project manager)

11. Quantification of Impact

Deliver project conclusions and decision on scale and severity of authorisation impact

Completed: (signed by project manager)

12. Restate and Refine Management Objectives

Deliver statement of project objectives following revision

Completed: (signed by project manager)

APPENDIX 4 Data Inventory and Appropriate Methods

| Data | Source | What it's used for |
|--------------------------------|---|--|
| Background Information | | |
| Geology | BGS maps | |
| Catchment Boundaries | EA – probably available on GIS | |
| Conservation Designations | EA (FER) English Nature, CCW County Council Wildlife Trusts | Identifies sensitive sites and may give some clues about how the site operates. |
| LEAPS/CAMS | EA(CS) | LEAPS give good background information and identify pertinent issues in the area. |
| WLMP | EA (FD), IDBS, English Nature or Local Government office (depending on site) | WLMPs contain information about structures and in some cases link this to management objectives of sites. |
| Site plans and maps | EA - GIS | Remember to print all maps with OS copyright. OS maps can help identify features such as wells, stream, springs and wetlands. |
| Hydrometric Information | | |
| River Flow | EA (WR) Hydrolog Centre for Ecology & Hydrology (CEH) | River flow information can be subject to various analysis techniques throughout the investigation such as time series plots and flow accretion. It is often used for calibrating more detailed models. |
| River Level | EA (WR) Hydrolog | River level information can be useful for comparative purposes – particularly comparing river level and groundwater levels. Time series plots can be useful. |
| Groundwater Level | EA (WR) Hydrolog Water Company | Groundwater level information is often displayed as a time series plot. It is also used to calibrate groundwater models. |
| Rainfall | EA (WR) Rainark Met Office | Rainfall information is often analysed using time series plots and double mass analysis. It is a crucial input for determining groundwater recharge. |
| Records of flooding | EA (FD) | Flooding records can give useful information. This is often kept as photos, anecdotal information, and flood plain extents. |
| Test Pump Data | EA (WR) BGS | Test pumping data gives useful information about the impact of abstractions. Analysis using tools such as Aquifer Win 32 may give estimates of aquifer parameters. |

| Data | Source | What it's used for |
|---|---|--|
| Ecological Information | | |
| Fish counter data | EA(FER) | This information is often used in the initial scoping and subsequent investigations. It can be analysed in relation to flow. |
| Fish tracking data | EA(FER) | This information is often used in the initial scoping and subsequent investigations. It can be analysed in relation to flow. |
| Fish population survey data | EA (FER) | This data can be used for determining baseline conditions, scoping and investigation. This can be used as an input to SWALP |
| Fish habitat survey data | EA (FER) | This data can be used for determining baseline conditions, scoping and investigation. This can be used as an input to HABSCORE analysis |
| Fish habitat suitability index | EA (FER) literature | The index is derived from PHABSIM and can be useful in other PHABSIM studies |
| Invertebrate and Macrophyte data | EA (FER) Site owner English Nature Wildlife Trusts | Survey data can be used for determining baseline conditions. Further surveys may be necessary in the investigation phase. Invertebrate information can be analysed using LIFE. |
| Bird counts | RSPB Wildlife Trust | Survey data can be used for determining baseline conditions. Further surveys may be necessary in the investigation phase. |
| River Corridor Survey | EA (FER) | Survey data can be used for determining baseline conditions. |
| River Habitats Survey | EA (FER) | Survey data can be used for determining baseline conditions. |
| Conservation status and Conservation Objectives | English Nature | This information is often vital in setting management objectives. |
| SSSI/SPA/SAC citation | English Nature | Citations for designated sites give vital information about which species are important. Clues about how the site operates can also be obtained. |

| Data | Source | What it's used for |
|------------------------------------|---|---|
| Artificial Influences | | |
| Abstraction returns | EA (WR) - NALD | Abstraction returns are another vital piece of information. The data are used throughout the investigation and can be used in techniques such as SWALP, Lowflows 2000, flow naturalisation and can be displayed as time series data. Abstraction data is also used as an input to more detailed models. |
| Non licensed or exempt abstractors | EA (WR) Local Authority | Exempt or non licensed activities may have an impact on water resources. As much information as possible should be gathered about these sources. |
| Abstraction licence details | EA (WR) - NALD | The detail of abstraction licences is important to determine the point of abstraction, source, uptake and consumption factors and any restrictive conditions. |
| Discharges | EA (EP) - WIMS | Discharge data is particularly important when carrying out investigations. Techniques such as SWALP, Lowflows 2000 and flow naturalisation require this data. It can be displayed as a time series plot and is often used in detailed modelling. |
| Intakes & Feeders | EA (WR), Water Companies, British Waterways, abstractors, Reservoir Inspecting Engineer | This information may be vital in forming a conceptual understanding of the area. It can be obtained from maps, local knowledge, site visits or from abstraction licence details. |
| River Management (FD) | EA (FD) | Flood defence operations may impact on water resources and should be considered in investigations. |
| EN site management agreements | English Nature | Site management is an extremely important issue when considering problems at specific sites. |
| ESA agreements | | Environmentally Sensitive Area agreements could take the form of countryside stewardship grants where land use is altered to enhance the environment. Changes in land use may be an important issue. |

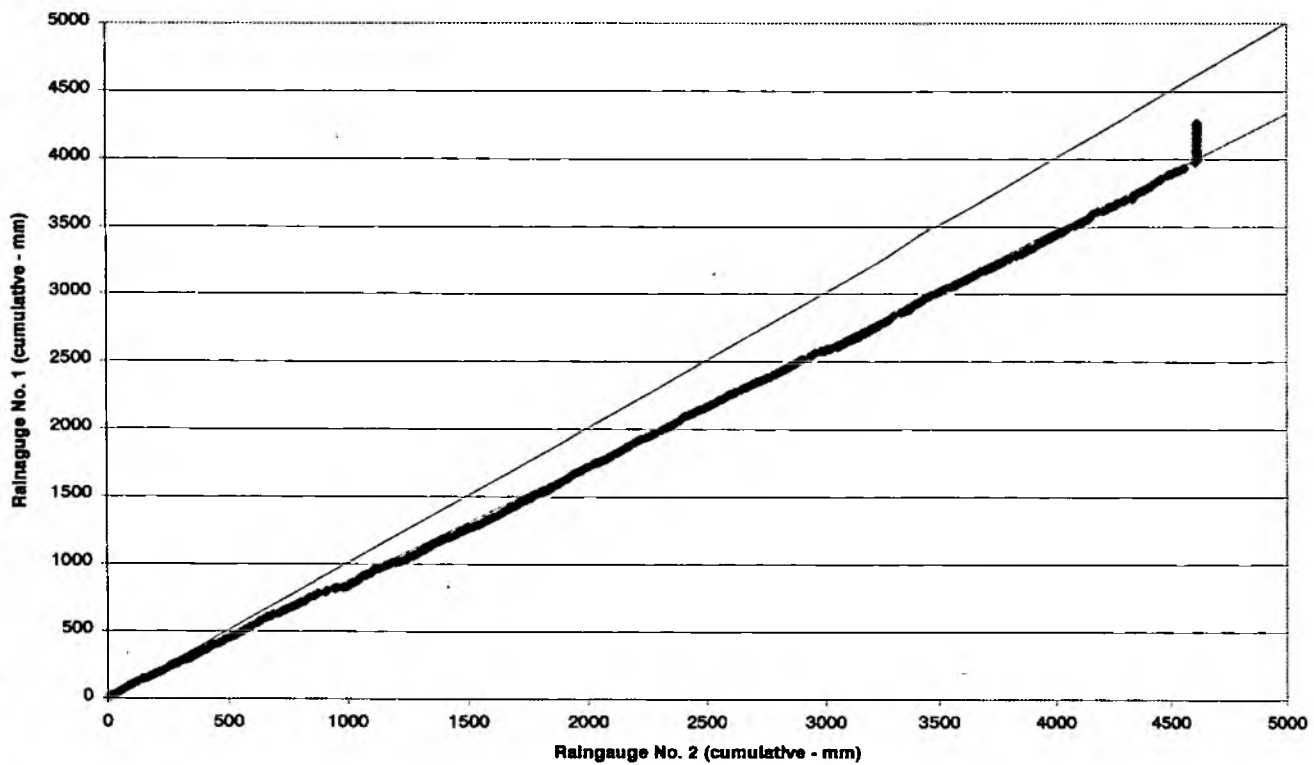
| Data | Source | What it's used for |
|----------------------------------|---|---|
| Additional Information | | |
| Modelling results | Previous investigations EA, site owner | May assist in scoping the current project and in gathering data and forming a conceptual model of the area |
| Public perception | Surveys | |
| Geomorphology | Previous work | |
| Topographic survey | Surveys | This information may be a very simple survey to determine relative levels or could cover river levels over a wide area to incorporate into a model. |
| Anecdotal/Historical | Local papers Records office | Where reliable, this type of data could give an indication of changes to the site or area. |
| Water Quality | EA (EP) - WIMS | Water quality changes with time may indicate problems in the catchment. Spatial variations in water quality can highlight pollution problems. |
| Navigation Data | EA (Navigation), British Waterways for lockage movement, levels and flow data. | |
| Consultation | Stakeholder Group | Consultation is vital throughout any RSAP scheme. Involvement of the right people can provide valuable information. |
| Complaints | EA (CS) | Complaints may highlight perceived problems in the area. |
| Data collected by third party | Site Owners Wildlife Trusts BTCV | Groups who have been collecting relevant data are likely to be involved in consultation. Data collected by third parties could be very useful. |
| Published papers and reports | various | Papers can give an indication of mechanisms operating in an area and of similar studies which may provide relevant data |
| Environmental Impact Assessments | various | Previous EIAs may provide useful data |
| Expert opinion | Various | It is important to involve relevant experts in the project so that any decisions made are robust |

| Data | Source | What it's used for |
|-------------------------------|--|---|
| Recreation Information | | |
| Visitor data | Site owner Local Authority | This type of information may assist in future cost benefit work and could help determine if amenity is an important aspect to be considered in an investigation. |
| Population data | Local Authority National Statistics Office | This type of information may assist in future cost benefit work |
| Recreation | GIS (I:drive) | This type of information may assist in future cost benefit work and could help determine if recreation is an important aspect to be considered in an investigation. |

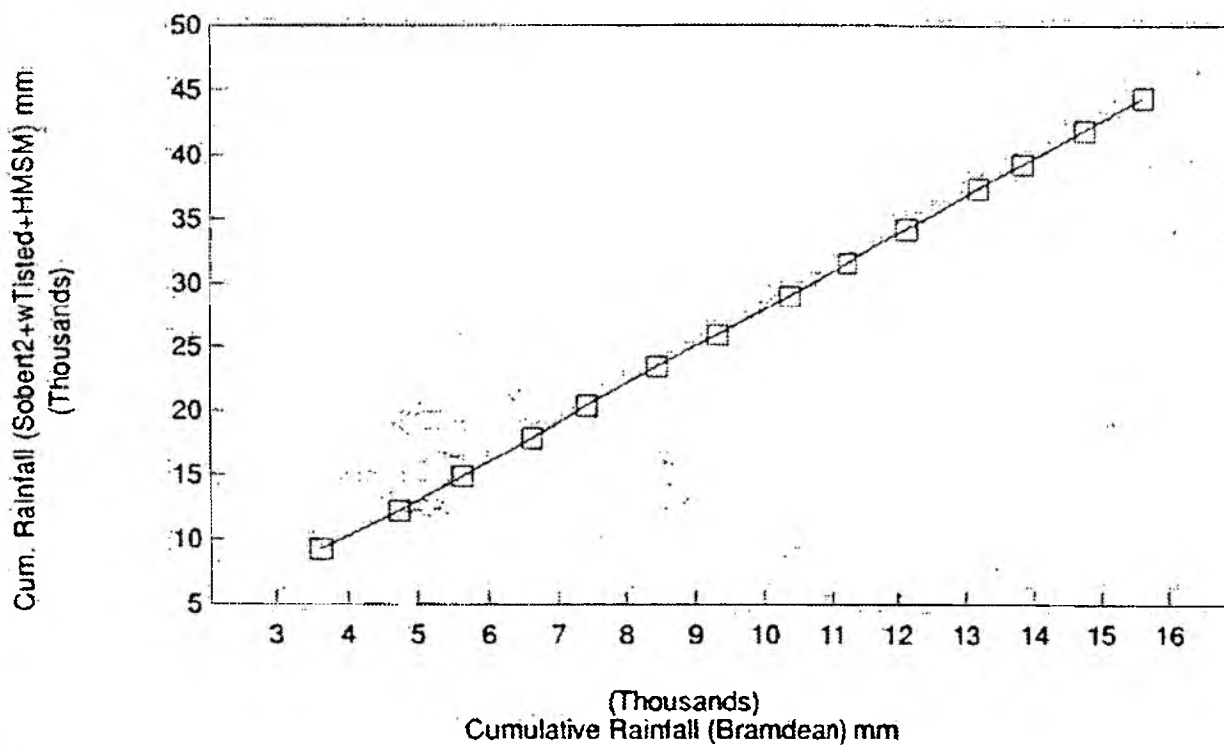
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Appendix 5a: Example Output from R&D Project ‘Applied Hydrology for Low Flows Investigations’, (Ref. 13)

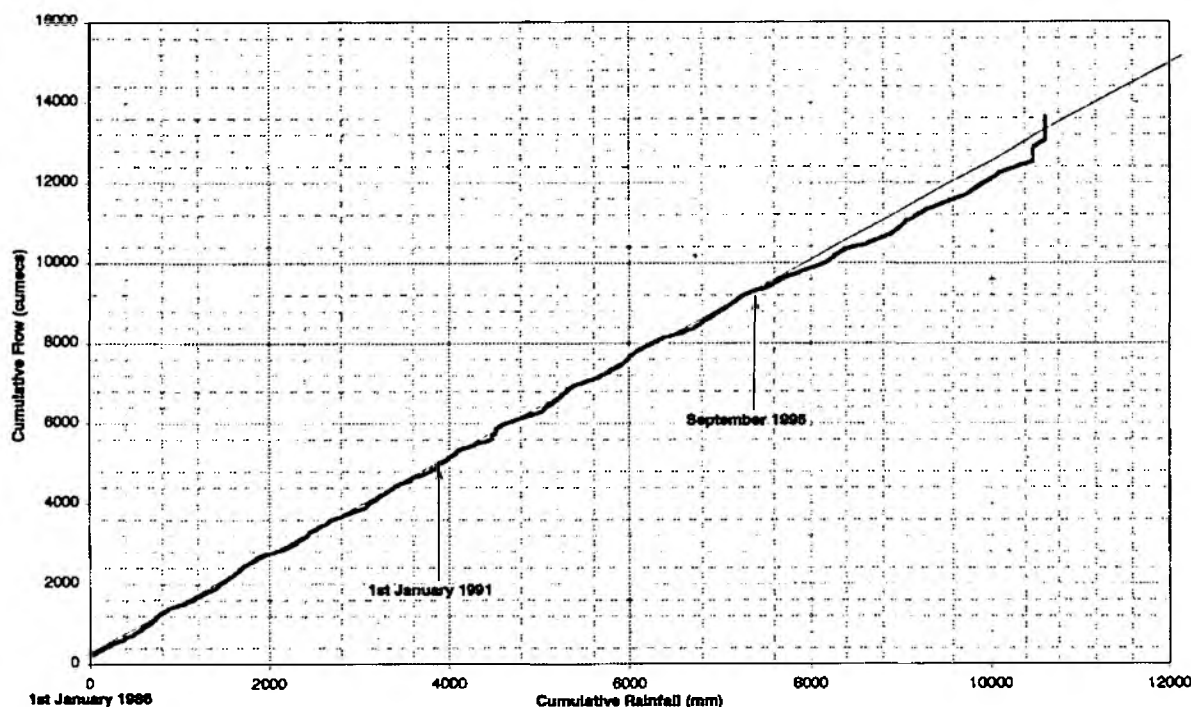
| |
|--|
| Technique Name: DOUBLE MASS PLOTS |
| Description of technique |
| Production of a graph of one cumulative variable plotted against another. This technique allows the simple and useful identification of any alterations in gauge accuracy over the period of measurement. It also allows the illustration of long term trends in the data series and whether these trends are re-produced by other regional gauges or other climatic variables. |
| Context for use under different circumstances (cost / data available / new technique / industry standard etc) |
| Simple and cheap analysis tool to enable trends in data to be easily identified. Used to determine factors such as has a gauge record altered over time and if so is this change seen in other gauges (i.e. is it a local or regional affect and is it a climatically driven phenomenon?). The technique can also be used to identify differences in spatial pattern of influences such as rainfall and the regional patterns of flow response. It is recommended that double mass analysis is used as the first step in any hydrological analysis to increase catchment understanding and to define the cause of the problem identified. |
| Where and how was it used - Example (include graphs and figures where applicable) |
| Double mass analysis is a graphical analysis of cumulative time-series data. This can be undertaken in several ways: By comparing one gauge against another of the same type (e.g. rainfall vs. rainfall); |



By comparing one gauge against the sum of several other regional ones;



By comparing one gauge of one type with another of a different type (e.g. flow vs. rainfall)



The break in slope of the double mass plot should be tested for statistical significance before any conclusions are drawn from it. The best test for a double mass plot is to use an analysis of covariance (Searcy and Hardison, 1966), which is calculated from the deviations between each X and Y values and the associated mean value. The reader is referred to reference 2 below and also to any standard statistical textbook for a full explanation of this technique.

This test uses the F statistic, the ratio of the among-periods variance to the within-periods variance. The test consists of computing F, the variance ratio, from the data being tested and comparing the computed value with the tabulated value of the F distribution for the level of significance selected (commonly 5%). Tables of the F statistic exist in most standard collections of statistical tables. If the computed value of F exceeds the tabulated value then the result is deemed to be significant at that level. For the 5% significance level, there would be a 95% chance that the break in slope was due to change in the relationship between the two patterns and not due to the vagaries of sampling.

Every double mass plot that will be used to prove altered flow regime should be tested in this way. This proves that a break in slope identified is (probably) due to a changed relationship between the two variables rather than a sampling error.

| Example Project(s) | Region | Project Manager | Brief Summary |
|------------------------|------------|-----------------|--|
| River Bourne | South West | Bryony Howlett | Use of double mass analysis to check gauge validity, identify trends in long term records, and compare regional variables to identify local vs. regional trends, compare different climatic variables to identify changes. |
| Devil's Brook | South West | Bryony Howlett | Use of double mass analysis to check gauge validity, identify trends in long term records, and compare regional variables to identify local vs. regional trends, compare different climatic variables to identify changes. |
| Rivers Hamble and Meon | Southern | Rod Murchie | Comparison of data from a rain gauge outside of the study catchment with other regional rain gauges to determine if record could be used as a substitute for missing data |

Useful References

Wilson, E.M. (1990), Engineering Hydrology, p 25, Macmillan Press.

Searcy, J.K. and Hardison, C.H. (1966) Manual of Hydrology: Part 1. General Surface-Water Techniques, Geological Survey Water-Supply Paper 1541-B, US Department of the Interior.

Data required (for successful use)

Analysis can be undertaken using any time-series data (flow, rainfall, evaporation, temperature etc.) Level data can also be used, but user needs to be aware of gauge datum.

Data needs to be long term (preferably >20 years) to identify useful trends and alterations in graph slope.

Breaks in the slope of the graph suggest non-stationarity in gauge record. Once a break in slope is identified the cause needs to be determined via further double mass analysis with other variables. For example, if a flow gauge shows an alteration in cumulative slope, does the local rainfall also show this trend or is it due to some other factor (e.g. drift in the observed record, alterations to runoff regime etc.)

Analysis can be done on any data resolution. Longer time steps (monthly or annual averages) create less data scatter and smoother trends, but daily data allows an exact date for data problems (break in slope) to be identified.

Pitfalls to avoid

Missing data within either record will manifest itself as either a horizontal line (missing data for y-axis category) or a vertical line (missing data on x-axis category). The data used to construct a double mass plot needs to be reliable. If the gauged data is incorrect (e.g. rain gauge under a tree or a weir with a poor rating) then the double mass analysis produced from it will be inaccurate.

No conclusions for the cause of non-stationarity of a data-set should be derived before all possible causes have been investigated;

Non-stationarity in a data set should not be derived from a short term record, just because no long term conclusions can confidently be drawn;

It should not be assumed that an identified change in the data trend will continue into the future. It may just be a factor such as altered runoff for a short period of time, but a longer term data-set is needed to identify this;

If the ratio between the two variables is not fairly consistent through time (e.g. rainfall and flow) then a double mass analysis will not be successful and breaks from a trend will be untraceable. All identified changes in the slope of the graph should be statistically tested to determine if they are significant compared to the long-term data trend.

Statistical tests, and conclusions drawn, from short periods of high variability data are more prone to error than those based on less variable data for the same length of period or those based upon longer periods of data (Searcy and Hardison, 1966). The more variable the data used then the longer must be the sampling period to obtain a valid statistical test.

Conclusions drawn and recommendations on use

Very powerful and simple data analysis tool;

Use as one of first steps in any data analysis programme to identify trends in regional and local data;

Technique most successfully undertaken with any standard spreadsheet program (e.g. MS Excel or Lotus 123);

Use to identify if important data sets are reliable and stationary over time;

Do not draw conclusions of cause from a single double mass analysis - effect does not identify cause.

Higher confidence limits can be gained with double mass analyses done for time series over about 15 years in length. Trends in shorter records may be identified, but cannot be put into correct historical context. Small fluctuations may be seen as trends in a short data set when they really represent noise in the data record.

Appendix 5b: List of Available Techniques from R&D Project 'Applied Hydrology for Low Flows Investigations' (Ref. 13)



Technique Sheets

Site Visits and Anecdotal Data Collection
Hydrological Data Quality Assessment
Rainfall and Evaporation Analysis
Time series analysis
Duration Curve Analysis
Flow Frequency Analysis
Flow Accretion Curves
Double Mass Plots
Water Balance
Base flow Separation
Flow Naturalisation and Artificial Influence Analysis
Spell Analysis
Conceptual Model Development
Rainfall-Runoff Modelling

The following will not have technique sheets produced for them, but will have detailed reference lists and a summary only.

Related assessment methodologies or frameworks:

Groundwater Modelling
Hydraulic Modelling
PHABSIM
SWALP
River habitat Survey
LIFE
RIVPACS, BMWP and ASPT
HABSCORE
SWK

TECHNICAL GUIDANCE

Appendix 5c: Analysis Techniques for Investigations

| Techniques | Purpose | Data Requirements | Advantages & Disadvantages | Reference |
|-----------------------|--|---|---|--|
| Test Pumping Analysis | Aquifer parameters can be derived from test pumping analysis. | Draw down and abstraction data collected during test pumping. | <p>Test pumping can be expensive and the results obtained are often specific to the individual test.</p> <p>Test pumping can provide valuable information about the impacts of abstraction on surrounding water features and water users.</p> | <p>Analysis and Evaluation of Pumping Test Data, GP Kruseman and NA de Ridder, ISBN 90 70754 207</p> <p>Environmental Simulations Ltd, Practical Well Test Interpretation with Aquifer win32, 2000</p> |
| IGARF | This method uses simple assumptions and analysis techniques to predict the impact on surface water from a groundwater abstraction. | Aquifer and river parameters | These are simple estimates and cannot account for the complexity and variation in aquifer characteristics. | <p>Impact of Groundwater Abstractions on River Flows, NGWCLC – Project WR1 Research Contractor – Environmental Simulations Ltd</p> <p>Currently being updated by RAM group</p> |



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FINAL DRAFT

4 OPTIONS IDENTIFICATION AND APPRAISAL

4.1 Introduction

This chapter provides guidance on the processes for identifying solutions and appraising options for restoring acceptable flows and/or levels at sites damaged by the effects of abstraction. The guidelines apply to Habitats Directive Stage 4 assessments, the assessment of SSSIs and non-designated sites, and Catchment Abstraction Management Strategies (CAMS). It is a tool to help achieve a consistent and robust approach to identifying and appraising options across Regions and Areas.

4.1.1 Habitats Directive Sites

Solutions for SACs and SPAs designated under the European Habitats and Birds Directives should be considered in the same way as any other site, but with some extra considerations. These are defined in the Conservation (Natural Habitats, &c.) Regulations 1994, which implement the Directives in the United Kingdom.

Changes to the abstraction and discharge regimes should be the foremost options for solutions at these sites. However, there is a provision in Regulation 51 (3) that

“ the decision, or the consent, permission or other authorisation may be affirmed if it appears to the authority reviewing it that other action taken or to be taken by them, or by another authority, will secure that the plan or project does not adversely affect the integrity of the site.”

Where there is no alternative solution and the authorisation must be granted for imperative reasons of overriding public interest, the Agency can grant the authorisation despite the negative implications on the site. In these circumstances, the Agency must apply to the Secretary of State (Regulation 49). It will be good practice to include a cost benefit analysis of either option when applying to the Secretary of State to help the decision-making process.

A cost-benefit analysis should be carried out on solutions relating to Habitat Directive sites; the Agency has a duty to the abstractor to do so, as defined in the Environment Act 1995.

Regulation 51 (3) requires the Agency to ensure that, where there are a number of possible options delivering equal environmental benefit, the least onerous should be chosen. Agreement to the recommended option should be obtained from English Nature or the Countryside Council for Wales.

FINAL DRAFT

4.2 Objectives

The main objectives of identifying and appraising options are to:

- identify all potential options for restoring an ecologically acceptable flow/level regime and/or aesthetic and amenity value. (Targets will have been determined during the Site Investigation stage)
- appraise all identified options in a rigorous and consistent manner and identify a single preferred option
- ensure that major stakeholders, in particular abstractor(s) and the local population, are consulted during the process and are aware of the voluntary and statutory routes for variation/revocation of licences and compensation
- ensure the Agency treats all abstractors fairly

Options should initially be appraised in terms of their ability to meet the target flows/levels. If it becomes clear that an option is not capable of meeting the target flows/levels, then it should be ditched unless it can be used in combination with other option(s) as described in paragraph 3.7.

4.3 Identification of Options

The number of potential options for solving problems caused by abstraction will vary from site to site. Key stakeholders should be consulted to ensure all options are identified. Here are some categories to help assess the merits of potential options:

- Demand management measures (which may include a water audit of key abstractors)
- Changes to abstraction regime
- Changes to discharge regime
- Re-circulation of groundwater or surface water
- Augmentation from bankside boreholes
- River bed sealing
- Changes to river and wetland management/maintenance procedures
- Combinations of the above
- Do nothing

This list is not exhaustive.

4.3.1 Demand Management Measures

Consideration of what measures could be implemented by a licence holder to manage demand should always be the place to start when considering possible options. This 'prevention rather than cure' approach can involve a number of options depending on the nature of abstractions shown to be adversely affecting a site.

For public water supply abstractions, options can include:

- Pressure control
- Increased meter penetration
- Reduction in leakage
- Water efficiency initiatives/education (recycling and waste minimisation)

FINAL DRAFT

These options could have a significant effect on demand for water; but we must be realistic about what a water company can achieve in the 3-5 years given the constraints imposed by OFWAT.

For smaller direct abstractions these alternatives should be investigated:

- Water audits² to ensure water is used efficiently (including rainwater harvesting, grey water reuse).
- Other sources such as canals and public water supply.

The advantages of Demand Management solutions are:

- Reducing actual abstraction with benefits to the abstractor and the environment.
- Advantages to the abstractor by saving energy and water charges. Can contribute to attaining environmental accreditation (e.g. ISO 14001).
- Reducing waste leaving abstraction premises; lower effluent charges.
- The payback period on modifications to plant is normally less than 3 years so this is a cost-effective approach for the water user.
- The measures may be introduced with any of the options discussed in this chapter to help optimise the benefits of any option.

The disadvantages of this type of solution may include:

- Uncertainty and debate over the economics and social costs of some options (e.g. leakage and metering).
- Reductions in returned effluent flow downstream may cause problems by reducing river flows below acceptable levels.

If the scheme leader decides on one of the options below to resolve an environmental problem associated with a local abstraction for public water supply, reference should still be made to the Water Company's water resource plan. This will set out any projected reductions in local demand that can lead to reducing local surface/groundwater abstraction.

2

* For information on how to undertake a Water Audit, start with the publication produced by "Envirowise" (formerly known as the "Environmental Technical Best Practice Programme") sponsored by the DETR. The results of this audit can then be compared with the 'best practice' information set out in "Optimum Use of Water for Industry and Agriculture on Direct Abstraction – Best Practices Manual".

4.3.2 Changes to Abstraction Regime

By definition, this should always be considered. The Government expects environmental problems to be solved by reducing abstraction. But, in areas of high stress on water resources, alternative sources of water may not be available and other options will be appropriate.

Types of solution to consider include:

- Reduce or revoke surface water/groundwater abstraction licences.
- Redistribute abstraction among existing sources within the catchment.
- Change flow/level constraints.
- Combinations of the above.
- Introduce or amend Operating Agreements to secure specified operating arrangements.
- Introduce Water Level Management Plans, English Nature Site Management Plans or Environmentally Sensitive Area prescriptions.

The main advantages of this form of solution are:

- Solutions that rely solely on reducing or stopping abstraction will improve the hydrological and ecological qualities of the site through entirely natural processes.
- With appropriate licence changes, such solutions will be sustainable in the long term.
- Solutions of this type are likely to be supported by stakeholders and the public.

Potential difficulties in securing such a solution include:

- Where problems are caused by large abstractions, such as those for public water supply, a limiting factor to such solutions is likely to be the difficulty in locating alternative sources of supply that will not themselves have unacceptable environmental impacts. In such cases, a higher level of demand management may need to be considered. For smaller abstractions, alternative supplies through the public supply network may be possible.
- Capital and operating costs may be high in relation to other options.
- In some cases a potential solution may be to vary a licence to winter operation only, and introduce water storage facilities.
- Changes to the abstraction regime are likely to involve licensing changes. These could include the variation or revocation of an existing licence as well as an application for a new licence to abstract from a replacement source.

There are two approaches available to the Agency and licence holders to change existing licences. These are change by agreement with the licence holder, or enforced change where there is no agreement and the Agency must use its powers to implement the changes proposed. In both cases the licence holder may be eligible for compensation.

Wherever possible, the aim should be to secure the licensing changes by agreement with the licence holder. The Agency would not normally be involved in implementing mitigation measures, but might consider making a contribution towards the costs incurred by the licence holder in implementing changes. Once the changes have been agreed, the licence holder would apply to the Agency for the necessary licensing changes under the normal statutory procedures for licence applications.

FINAL DRAFT

Where it is not possible to agree a solution with the licence holder, the Agency has powers to propose changes to licences without the licence holder's consent. The procedure for doing this is contained under Sections 52, 53 and 54 of the Water Resources Act 1991.

Full details of the Agency's approach to determining compensation payments are set out in "Securing Changes to Water Abstraction Licences and the Determination of Compensation". The detailed assessment of compensation and securing the licensing changes will need to involve input from Abstraction Licensing and Estates so they should be involved early on.

4.3.3 Changes to Discharge Regime

Under this category of solution, the existing abstraction regime may continue unaltered with enhanced flows/levels being achieved through changes in the location of discharges to the watercourse. Potential solutions in this category will include:

- Redirect effluent, typically to locations higher up the catchment.
- Effluent recharge to ground (subject to groundwater protection policy).
- Include water quality and/or discharge conditions within abstraction licences.

One advantage of this type of solution is that alternative sources of water supply do not need to be developed; such a solution may be appropriate in regions of very high stress on water resources where developing other sources may not be possible without unacceptable impacts on the environment.

Potential difficulties with redirecting effluents further up a catchment include the risks of pollution to a greater length of watercourse, potential failure of the augmentation system, loss of augmentation flow through the bed of the watercourse, and, possibly, a negative perception from the public.

4.3.4 Augmentation Schemes

Under this category, the existing abstraction regime may remain unaltered with the river or wetland being augmented by supplies from surface water or groundwater sources through single or multiple injection points. This type of solution may be appropriate in areas of high stress on water resources where other sources cannot be developed without unacceptable impacts on the environment. Augmentation schemes may, be one of these:

4.3.4.1 Re-circulate Surface Water or Groundwater

Surface water or groundwater may be re-circulated upstream from abstraction points further down the catchment and used to augment the watercourse or wetland.

FINAL DRAFT

Likely disadvantages include:

- Water quality problems associated with deteriorating quality from the continued recycling of water. This is more likely to be a problem where surface water is being re-circulated as there may be an element of self-purification where water abstracted from a groundwater source is re-cycled. Possible remedies include having treatment processes within the re-circulation system and limiting the percentage of flow recycled.
- Loss of re-circulated water through the bed and banks of the watercourse. The watercourse may need to be lined to resolve this.
- Reductions in flow downstream of the point from which re-circulated water is taken.
- Risks of operational failure of the re-circulation system, resulting in sudden catastrophic changes in flow and/or level.
- Risks of spreading pollution and unacceptable biota through the re-circulation system.
- Introduction of inappropriate ecology due to different water quality and temperature characteristics of the augmentation supply.
- Damage to existing flora and fauna due to different water quality and temperature characteristics of the augmentation supply.
- Damage to the watercourse through construction of out-falls and subsequent scouring by discharge of augmentation releases.
- Creating unnaturally high flows through the inappropriate siting of out-falls (in particular within the upper reaches of watercourses).
- The need for operating rules together with a monitoring and control mechanism, possibly in real time.

4.3.4.2 Augmentation from Bankside Boreholes

Under this category, the existing abstraction regime would remain in place with augmentation of the watercourse or wetland by abstracting groundwater from boreholes close to the site.

The advantages of this type of solution may include:

- Low capital cost due to relatively shallow boreholes and short pipeline lengths.
- Low operating costs.
- Reduced environmental damage due to construction/implementation, as pipeline lengths will be relatively short.

Potential disadvantages of augmentation from bankside boreholes include:

- Draw down of groundwater levels close to the site resulting in increased losses of flow through the bed and banks of the watercourse/wetland.
- For spring fed watercourses, abstraction from bankside boreholes may reduce groundwater levels and delay recharge and onset of spring flow.
- Damage to the watercourse through the construction of outfalls and scouring by discharge of augmentation releases.
- The need to install lining materials to prevent loss of augmented water through the bed/banks of the watercourse/wetland.
- Creating unnaturally high flows through the inappropriate siting of outfalls (in particular in the upper reaches of watercourses).
- The need for operating rules together with a monitoring and control mechanism, possibly in real time.

FINAL DRAFT

4.3.4.3 Augmentation from Other Sources

It's possible to consider other variants of augmentation scheme:
augmentation from groundwater sources in the upper catchment
augmentation with groundwater or surface water from adjacent catchments
changes to compensation releases from storage reservoirs and transfer by canals

The advantages and limitations discussed in 3.3.1 and 3.3.2 will need to be taken into account in appraising such options.

4.3.5 River Bed Sealing

As well as the possible need for river bed sealing associated with solutions which rely on augmentation identified in 3.3 and 3.4 river bed sealing may present a solution in its own right where:

- local changes in geology cause loss of river flow through the bed and/or banks of a watercourse
- a river channel is artificially perched (e.g. mill streams where earlier bed sealing has failed)
- local losses to a watercourse or wetland are caused by nearby abstractions from groundwater

Advantages of such solutions include:

- The existing abstraction regime will remain unaltered
- No alternative sources of supply will need to be developed
- In extreme cases, lining the river bed may be the only way to restore flow
- No operating costs

Disadvantages of such solutions include:

- Disturbing the bed and banks of the watercourse/wetland through installing the sealing material
- Creating artificial flow/level conditions and habitats and limiting the ability for natural recovery during times of seasonally high groundwater levels
- Deterioration of the sealing material due to ageing and/or mechanical damage and the associated costs of maintenance
- Needing the agreement of riparian owners; where sealing significant lengths of watercourse is being considered, the agreement of many riparian owners may be required
- Unacceptable impacts at other locations; where abstractions are from a groundwater source close to the river, a larger area of draw down may be created by sealing the bed of the watercourse or wetland
- Difficulty in design to prevent lifting or blow-out of the lining material at times of high groundwater level

For information on lining materials, installation techniques and likely cost associated with riverbed lining, refer to R&D Note 184 "River Bed Lining – State of the Art Review."

FINAL DRAFT

4.3.6 Changes to River and Wetland Management/Maintenance Procedures

At some locations it may be possible to remedy the effects of abstraction and re-create appropriate habitats by changing the management and/or maintenance regimes of the watercourse or wetland.

Items to consider when examining such an approach will include:

- The feeders and tributaries serving the watercourse or wetland and any potential environmental benefits of changing their modes of operation.
- The potential for creating environmental improvements by changing the geomorphology of the river channel by narrowing, creating riffles and pools, inserting groynes, etc.
- Changing the maintenance regime, in particular for weed cutting and dredging.
- Enhancing flows/levels through adapting or revising existing control structures, or the design and construction of additional control structures, to achieve agreed water level management plans.

The advantages of this type of solution include:

- Capital and operating costs are likely to be significantly lower than for re-circulation schemes and schemes based on reducing or stopping abstraction.
- Careful design of in-channel and other works will result in the optimum benefits from the available water.

The disadvantages of this type of solution include:

- The existing abstraction regime will remain unaltered so no extra water will be available to the watercourse/wetland. The principal benefits will be to water levels and/or velocity with no increase in flow, although significant ecological benefit may still be achieved.
- The co-operation of riparian owners may be required before changing river management or maintenance procedures. Collaboration with English Nature, Internal Drainage Boards and Conservation Trusts may be required.

4.3.7 Combining the Options

At some sites - in particular the larger more complex ones - the best solution may be to combine the options. Possible examples of this include:

- Bed sealing with an augmentation scheme.
- Bed sealing with reductions in abstraction.
- Introduction of demand management measures with any of the options described above.

Changes to river management and maintenance procedures may be required to reap the maximum benefits from any of the options described.

For some sites, an interim solution may be possible while investigating and designing a permanent solution.

For Habitats Directive sites, holistic solutions that take into account 'in combination' effects will need to be considered. (Refer to Habitats Directive Guidance).

FINAL DRAFT

4.3.8 Do Nothing

For any site, the do nothing option must be examined to provide a baseline against which to measure other options. In examining the do nothing option, the environmental impacts of prolonging the existing abstraction regime, together with the potential impacts of increasing abstraction within existing licence limits, should be assessed. Within the economic analysis, the do nothing option should be treated as having zero cost and zero benefit as described in "Periodic Review (AMP3) Sustainability Issues. Guidance on Preparation of Business Cases", November 1997. (Appendix 1).

If none of the options examined are capable of delivering the required target flows/levels within acceptable benefit/cost limits, then the do nothing option (possibly in combination with Options 3.5 and/or 3.6) may be the only practical way to achieve some improvement in flow or level.

4.4 Appraisal of Options

Each potential option should be appraised in terms of its ability to meet the target flows/levels set by the Investigation process. If, at any stage within the appraisal process, it becomes clear that an option will not provide the benefits to meet these targets, it may be discarded.

Options should be appraised in terms of environmental benefit, cost, socio-economic benefit, engineering feasibility, risk, sustainability and intangible benefits. The identification of a recommended option should be undertaken according to the methodology described in Appendix 1. For options dependant on changes to the existing abstraction regime, take into account legal and compensation issues where voluntary agreement for variation or revocation of licences cannot be secured. Any changes to water company licences should be sought through the Periodic Review process.

4.4.1 Environmental Benefit

When considering the environmental benefits of an option, include flows, levels, ecology, biology, fisheries, conservation, recreation, amenity, water quality (surface water and groundwater), navigation and risk.

Tools for assessing the impacts of abstraction will have been identified and used during the Site Investigation process; the same tools can be used to assess the environment benefits of options for restoring acceptable flows/levels at the site.

4.4.2 Cost

The capital and operating costs of each option should include costs to the Agency, the Water Company or private abstractor, and to any other third party. Costs to the Agency should include compensation payments arising from any enforced revocation or variation of abstraction licences. For information on compensation payments refer to "Securing Changes to Water Abstraction Licences and the Determination of Compensation".

FINAL DRAFT

To assist in comparing options, the total cost of an option should be determined to a common time base over a period of 20 years at the agreed Treasury discount rate of 6 percent. Replacement costs and residual values should be included in the analysis where appropriate. If the relevant expertise for undertaking such an appraisal of costs is not available within Water Resources, help will be needed from outside the Function.

4.4.3 Socio-economic Benefits

Socio-economic benefits of an option will depend on the predicted levels of environmental benefit resulting from this option. The benefits should be assessed according to guidance provided in “Low Flow Benefit Assessment Guidelines”, Version 3, November 1997. Current research into the assessment of socio-economic benefits may modify the guidelines but this is unlikely to occur before 2002.

Particular attention should be given, for each site, to these points:

- The availability of similar (healthy) sites within the surrounding area may reduce the economic benefits from restoring the site under appraisal.
- The geographic area over which per capita values of benefit are aggregated will significantly affect the final determination of economic benefit.
- The environmental benefits resulting from implementing a scheme may not be realised until some years later; the lag in time between cost and benefit should be taken into account within the discounting process.
- The frequency of environmental benefit is likely to vary between options and this will affect the level of economic benefit. (e.g. one option may meet or exceed target flows/levels 90 percent of the time whereas an alternative option may meet target flows/levels for 70 percent of the time). The benefit assessment guidelines describe how the frequency factor should be accounted for in determining economic benefits.

External expertise may be needed in some Regions/Areas to help undertake an socio-economic appraisal according to the Low Flow Benefit Assessment Guidelines.

4.4.4 Risk

The appraisal of options should include a qualitative assessment of the risks associated with each option. Where more than one option has been identified, an appraisal of the risks of each option should be undertaken through a scoring and weighting matrix as described in Appendix 1.

Typical risks that may be examined include:

- The option may not provide the predicted benefits.
- The long-term sustainability of the option may be uncertain.
- Where the agreement of landowners is required, this may not be forthcoming.
- Operational failure of the scheme through pipeline bursts or power failures.
- Danger of polluting surface waters or groundwaters.
- Lack of robustness in determining costs and/or benefits.
- Legal challenge.

FINAL DRAFT

Where risks are high, a risk management strategy must be incorporated within the project. An example of this would be involving landowners/abstractors in assessing options where their co-operation is vital.

4.4.5 Sustainability Appraisal

One of the Agency's key duties is to ensure sustainable development. The Government has set out 4 core themes:

- Effective Protection of the Environment
- Prudent Use of Natural Resources
- Social Progress
- Economic Growth and Employment

Consideration of these core themes has been included in the Agency's national and regional water resources strategies under the key effects/issues listed below.

- Effective Protection of the Environment
 - Air/Noise/Soil Pollution
 - Waste Generation
 - Bio-diversity
 - Water Quality/Pollution
 - Landscape and Tree Cover
- Prudent Use of Natural Resources
 - Energy Consumption
 - Water Resources
 - Fisheries/Fish Stock
 - Aggregates and Minerals
 - Infrastructure Use
 - Greenfield/Brownfield
- Social Progress
 - Good Quality and Affordable Water
 - Availability, Protection and Quality of Amenity Value
 - Human Health and Safety
 - Equal Opportunities Available to Individuals
 - Public Perception of Quality of Life
- Economic Growth and Employment
 - Investment (Capital) Costs
 - Income, Employment and Attractiveness of Area

It is beyond the scope of these guidelines to refer to specific techniques for appraising each of the effects/issues listed above but the appraisal of options should take account of them.

4.4.6 Intangible Benefits/Disbenefits

An assessment of any intangible benefits/disbenefits associated with each option should be done through a scoring and weighting matrix as described in Appendix 1. As well as the typical intangible benefits of a positive impact on public relations, maintaining the Agency's credibility and complying with Agency statutory duties, there may be other intangible benefits that are unique to each case.

4.5 Identification of Preferred Option

The identification of a preferred option should take into account environmental benefit, economic benefit, cost, risk, sustainability and intangible benefit and be undertaken in accordance with the guidance given in Appendix 1. The views of key stakeholders and the local population will be important in selecting the preferred option.

4.6 Consultation

Consultation within the Agency and with all key external stakeholders will have been initiated during the Site Investigation phase. This level of consultation should be maintained, or increased, throughout the identification and appraisal of options. Guidance on approaches to stakeholder consultation may be obtained from the National Centre for Risk Analysis and Options Appraisal (NCRAOA).

4.7 Public Relations

A public relations plan for the scheme (should be developed. This is likely to include public meetings, stakeholder group meetings, releases to the media, newsletters and any other actions appropriate to the scheme. This may be expensive in time and money, must be developed in collaboration with, and agreed with, the Agency's Public Relations Department.

4.8 Tasks and Dependencies

The main activities involved in designing, implementing, operating and monitoring the recommended scheme should be clearly stated, setting out what will be done and by whom including third parties, and the programme for completion. Formal project management procedures, as described in PIN 14, should be applied throughout the Options Identification and Appraisal process.

4.9 Use of Consultants/Contractors

The services of consultants/contractors may be needed to undertake some or all of the appraisal. In such circumstances, Agency procedures for procuring such services must be followed.



FINAL DRAFT

4.10 Cost of Preferred Option

A detailed appraisal of the actual costs of implementing, operating and monitoring the preferred option will need to be undertaken. Costs to the Agency, the abstractor(s) and any third parties should be identified and shown separately. Costs should be presented in the years in which they will occur, with allowances made for inflation. The costs presented here will not be the same as the costs determined for the option in Paragraph 4.2 (above) as those costs will not have allowed for inflation and will have been discounted (20 years at 6 percent) to facilitate comparison with the costs of other options.

Such costs should be entered into the P1 tables described in the Prioritisation Chapter.

All proposed expenditure by the Agency will be required to comply with the rules on the authorisation of expenditure under the Scheme of Delegation.

APPENDIX 1: PERIODIC REVIEW (AMP3) SUSTAINABILITY ISSUES GUIDANCE ON PREPARATION OF BUSINESS CASES

BACKGROUND

Through the Periodic Review process (AMP3) the Environment Agency will be seeking to secure reductions in abstraction (or the implementation of other remedial measures) by water companies at agreed priority sites. The priority sites designated under the European Union Habitats Directive have been agreed between the Agency and English Nature whilst other sites to be addressed in AMP3 have been put to the water companies by the Agency.

Estimates of the cost of implementing solutions will be received from the water companies in February 1998; it is anticipated that there will be substantial dialogue, at Regional/Area level, between the Agency and the water companies in this process.

The Agency is required to prepare draft business cases for the non-Habitats Directive sites by April 1998 and final business cases by November 1998. The preparation of business cases for the Habitats Directive sites will not be required as the status afforded them by the legislation overrides the requirement.

This document gives guidance on the preparation of business cases and draws together information and comments from the business case workshop held in April 1997, the Project Management Manual, and developments since April 1997.

The Business Case should be kept as brief as possible. All detailed calculations should be contained in appendices at the back of the Business Case leaving the main text to summarise the results. Any studies undertaken to assist in the appraisal of options, and the development of the recommended option, should only be referred to briefly in the text and referenced at the back of the Business Case.

FINAL DRAFT

SUGGESTED FORMAT

Introduction

The introduction to the Business Case should set the scene by clearly setting out the background to the problem and should include:

- A description of the location and physical description of the watercourse
- Brief details or levels of abstraction, recharge, environmental damage etc
- The scale and severity of the problem should be described with reference to the application of the Revised SWK Methodology
- Relevant political and local pressures/expectations should be described

Objectives

The objectives of the scheme must be clearly stated and should include:

- The length of watercourse that will benefit
- Target flows/levels
- The expected environmental benefits
- The frequency of the benefits
- Links with Corporate/Functional Strategy

Available Options

All possible options for meeting the objectives should be considered. Reasons for rejecting the more impractical or costly options should be given before focusing attention on the more likely options. The 'do nothing' option should be included in the options taken forward for more detailed discussion and will provide the base case against which all other options are assessed.

Economic Appraisal

The economic appraisal of each option will include:

- The assessment of tangibles.
- The assessment of intangibles.

The Assessment of Tangibles

The assessment of tangibles requires monetary values to be placed on all quantifiable costs and benefits – including socio-economic costs/benefits. The appraisal will consider, and identify separately, the tangible costs/benefits to the Agency, the Water Company and the environment/wider public.

The assessment of the tangible costs to the Environment Agency will need to include Capital and Operating (Revenue) costs of implementing and running the scheme. In determining the Net Present Costs (NPC) of each scheme the timing of costs will need careful consideration.

The NPC of Environment Agency costs should be determined:

- Over a discounting period of 50 years using a discount rate of 6 percent (Treasury Guidelines)
- Using the same discount period and rate as the water company implementing the scheme (likely to be 20 years at 5 percent by may vary)

FINAL DRAFT

The Water Company will provide an assessment of its tangible costs in February 1998. Discount periods and rates will be as in 4.1.1 (a) and (b) above.

The socio-economic costs will be determined by the Environment Agency according to the Low Flow Alleviation: Benefit Assessment Guidelines, Version 3, November 1997 using discount periods and rates as in 4.1.1 (a) and (b) above.

In determining the tangible costs/benefits the following points should be noted:

- Data on the assessment of tangibles will be entered into Table 1.
- Inflation should be ignored in the assessment of the costs of the options.
- All costs/values should be rounded to the nearest £1000.
- The 'do nothing' option should be treated as zero costs and zero benefit.
- If 'do nothing' has a cost, then the cost should be treated as a benefit in 'doing something'.

The Net Present Value (NPV) results for the assessment of tangibles need to be presented in a structured way, as shown in Table 1, to allow reviewers to make a decision over which is the preferred option. Detailed calculations should be contained in an appendix to the Business Case.

Assessment of Intangibles

Any costs and benefits that are not readily quantifiable in monetary terms should be included in the business case. These include:

Improved public relations/education of the public.

Facilitation of Agency compliance with statutory duties.

Improvements in Agency effectiveness.

Maintenance of Agency's credibility.

Assessment of the intangibles is likely to be best achieved by simply identifying them, and then discussing them in relation to each option. It should be made clear in the text how the various intangible effects influence the ranking of the options. Where there are a significant number of intangibles which may differ between options, an effective way of presenting the assessment is by the process of weighting and scoring as shown in Table 2 where the option with the highest total weighted points represents the preferred option (in terms of intangibles only).

The advantage of using the weighting and scoring method is that it clearly sets out the thought processes that have been gone through. The result of the assessment of intangibles will not, in itself, be a decisive factor in the choice of the preferred option; however it will be a contributory factor, in conjunction with the other assessments, in selecting the preferred option.

Risk Assessment

Risks are the probabilities of specified adverse events occurring. In the context of a Business Case, 'events' can be taken as meaning variations in the assumptions on which the appraisal and planning are based.

FINAL DRAFT

Where risks are relevant to the assessment of the different options, they should be included in the Business Case. The role of risk assessment is to identify the risks within a project and assess their probability and likely effects on each of the options. The end result is a ranking of the options in terms of risk.

When the potentially important risks have been identified, each risk should be assessed in terms of:

- How likely is it that it will happen?
- If it does happen, how great will be the effect on the project?

It is unlikely that the probability of an event happening, and the consequent impact on the project, can be accurately stated. In such circumstances, it is helpful to identify the risks and impacts as being “high”, “medium”, or “low”. The classification will be based on available data and the judgement of the assessor. The risk register given in Table 3 indicates some of the likely risks and provides a useful method for identifying and analysing the risks associated with a proposed scheme.

The do nothing option is always the least risky option as it implements nothing and so has no risk associated with it.

From the Risk Register it will be possible to identify which option represents the preferred option in terms of risk. The results of this, together with the results of the assessments of tangibles and intangibles, will enable an overall preferred option to be selected.

Selection of Preferred Option

The selection of the preferred option should be based on an overall review of the assessment of tangibles, intangibles and risk. The relative importance of each of the appraisals should be discussed and conclusions drawn.

The benefits of the preferred option should be clearly stated with a description of how the option will meet the project objectives.

Where the preferred option is not clear, sensitivity checks may assist in the decision-making process. An examination of the sensitivity of each option to changes in the following parameters may help:

- Timing/phasing of work
- Discount rate and cost of capital assumptions
- Changes in frequency of benefits

Additional decision-making criteria could include:

- Benefit/ cost ratio
- Incremental benefit/cost ratio where environmental benefits vary
- Ratio of use to non-use benefits

State clearly which is the preferred option and why it is the preferred option.



FINAL DRAFT

Tasks and Dependencies

The main activities involved in designing, implementing, operating and monitoring the scheme should be clearly stated setting out what tasks are involved and who will be responsible for them.

Cost of Preferred Option

The total cost of implementing and operating the preferred option should be made explicit. Costs should be broken down between the Agency, the Water Company, and any other parties. Capital and operating costs should be identified separately. The costs should be presented in the years in which they occur with allowances made for inflation.

All proposed Agency expenditure will be required to comply with the rules on the authorisation of expenditure under the Scheme of Delegation.



FINAL DRAFT

Table 1.
Assessment of Tangibles

| ASSESSMENT OF TANGIBLES | | | | | | | | |
|-------------------------|---------------------|------------------|-----------------|--------------|-------------------------|------------------|-----------------|--------------|
| OPTIONS | 6 percent, 50 years | | | | 5 percent, 20 years (*) | | | |
| | Agency NPC | Water Co. NPC | Economic NPV | TOTAL NPV | Agency NPC | Water Co. NPC | Economic NPV | TOTAL NPV |
| DO NOTHING | x | Y | z | $z-(x+y)$ | a | b | c | $c-(a+b)$ |
| OPTION A | | | | | | | | |
| OPTION B | | | | | | | | |
| OPTION C | | | | | | | | |
| OPTION D | | | | | | | | |

(*) Indicative only. Discount period and discount rate may vary between water companies.

FINAL DRAFT**Table 2 (Assessment of Intangibles)**

| Intangible Benefit | Weighting Factor | OPTION A | | OPTION B | | OPTION C | | OPTION D | |
|-----------------------|------------------|----------|-----|----------|-----|----------|-----|----------|-----|
| | | pts | wtd | pts | wtd | pts | wtd | pts | wtd |
| 1 | | | | | | | | | |
| 2 | | | | | | | | | |
| 3 | | | | | | | | | |
| 4 | | | | | | | | | |
| 5 | | | | | | | | | |
| 6 | | | | | | | | | |
| Total weighted points | | | | | | | | | |

Table 3 (Risk Register)

| Identified Risk | OPTION A | | OPTION B | | OPTION C | | OPTION D | |
|-----------------|----------|--------|----------|--------|----------|--------|----------|--------|
| | l'hood | effect | l'hood | Effect | l'hood | effect | l'hood | effect |
| Risk 1 | - | - | L | M | M | L | H | M |
| Risk 2 | - | - | M | L | L | M | H | H |
| Risk 3 | - | - | H | M | H | L | M | H |
| Risk 4 | - | - | H | H | M | H | L | H |
| Risk 5 | - | - | L | M | H | M | L | M |

Key: H = High
M = Medium
L = Low

FINAL DRAFT

5 OPTIONS AGREEMENT AND IMPLEMENTATION.

5.1 Introduction

This chapter sets out what is involved in agreeing a preferred option and gives basic guidance on planning and implementing the solutions. It doesn't give detailed guidance on the Agency's formal Project Management procedures and you should seek expert help from experienced Project Managers within the Agency.

There are three elements to resolving problems at RSA sites: licence alterations, engineering solutions and operating agreements. The latter should cover post- operation, post-implementation monitoring, mitigation and reporting obligations, as well as arrangements for their funding. A separate document deals with licence alterations: '*Securing changes to water abstraction licences and the determination of compensation*'¹. This chapter looks at securing the necessary agreements, implementing the engineering aspects of the solution and how to progress authorisation changes in parallel.

5.2 Options Agreement

Options agreement and setting up the implementation project are often inter-linked activities and should be discussed together.

5.2.1 Roles and Responsibilities

The roles and responsibilities of each stakeholder need to be made clear early on. The main activities involved in selecting an option, funding, designing, implementing, operating and monitoring the recommended scheme should be clearly stated and agreed with the key stakeholders. This should set out the activities, who will be responsible for them, including third parties, and the programme for completion. Agreement will also need to be reached on funding. Further information can be found in Chapter 6.

Many of the roles and responsibilities will already have been agreed in previous stages of the project.

At this stage, agreements is needed on who implements and funds the solution, including:

- key stakeholders involved in the decision making process
- who designs and who agrees the scope of the project and the design specifications
- who funds each aspect of the project
- who draws up and who awards the contracts
- who manages the contract
- operating agreements and post scheme monitoring

FINAL DRAFT**5.2.2 Identification of Preferred Option**

As described in Chapter 4, the views of key stakeholders and the local population will have been taken on board during the Site Investigation and Options Appraisal and Selection process. So there should be no surprises when stakeholders are approached to help implement the selected scheme.

The solution chosen should be the one that gives most cost-effective benefit to the environment, while taking account of the licence holders' needs. It must also be consistent with other Agency obligations and strategies such as the Water Resources strategies, CAMS, Water Framework Directive, LEAPs, Water Level Management Plans, Coastal Management Plans and flood defence proposals. Good communication within Water Resources and with other Agency functions will be vital.

5.2.3 Barriers to Option Agreement.

There are a number of reasons why it may be difficult to reach agreement on the best option. A degree of flexibility should be maintained to overcome this by reviewing new options or exploring ways of overcoming the stakeholders' objections. Ultimately there are statutory routes that can be followed to revoke damaging licences and pay compensation.

Examples of barriers to agreement and ways to overcome these are given in the table below:

| Barrier to agreement | Options |
|---|---|
| Cost to abstractor. Short term: no funds to pay for implementation Long term: This may have an unacceptable impact on their business. | Explore compensation (or AMP) options. Agency may consider paying some of the costs. Review the options - is there an alternative with an acceptable level of risk? |
| A more detailed cost analysis supplied by the abstractor shows the scheme is not cost-effective. | Review the cost-benefit analysis Review the options - is there an alternative with an acceptable level of risk? |
| Stakeholder does not agree that the option being promoted is the best one on environmental, cost or technical grounds. | Review the options - is there an alternative with an acceptable level of risk? Assess the stakeholder's preferred option for environmental benefit, cost effectiveness and risk. Use the statutory route. |
| Options lead to reduced reliability of supplies. | Explore alternative options such as demand management, boreholes or winter storage reservoirs or mains water, re-use or return of water. |

FINAL DRAFT

| Barrier to agreement | Options |
|--|--|
| The options lead to unacceptable social implications such as loss of public water supply, risk to the integrity of a business in an area of high unemployment. | Review the options - is there an alternative with an acceptable level of risk? Explore alternative supplies such as demand management, boreholes or winter storage reservoirs or mains water. Habitats Directive Sites: apply to the Secretary of State to override on the grounds of public interest. |
| Recent or imminent changes in legislation | Review options in light of new legislation, taking account of the timeliness for resolution. |
| Absence of full agreement on the extent of damage - i.e. true impact, and what the target levels should be for remediation | Review results of investigations and resulting environmental target flow criteria with stakeholders. |
| Level of improvement that a particular option will deliver | Review predictions and implications with stakeholders and ensure arrangements for appraisal monitoring and reporting are in place. |
| Impractical to implement | Revisit site and review options. |

5.3 Agreeing the Project Structure

5.3.1 Agreeing licence change elements of a solution

Guidance on Agency policy for altering licences is in '*Securing changes to water abstraction licences and the determination of compensation*'. There are two main routes for varying licences: voluntary or statutory. Wherever possible, the Agency aims to work with abstractors through the voluntary route. This may involve extra planning for water company licences if the costs of the solution are to be met through the Periodic Review process.

In many cases, licence alterations will be carried out in conjunction with mitigation works and engineering solutions. Many licence changes will require the applicant to find alternative supplies such as a new borehole or a winter storage reservoir. The construction and associated distribution network is a matter for the licence holder but these will require new licences and operating agreements. The licence holder may need these to be agreed in principle, or even be in place, before the original licence is altered to maintain their supply, and implementation dates need to be agreed in the Project Plan.

Where a licence is being altered without the agreement of the licence holder, the licence holder will need to Appeal against our decision to be able to claim compensation. This should be included in the project plan to allow for the necessary costs and workload.

FINAL DRAFT

5.3.2 Designing and agreeing engineering and works elements of the solution.

The outline of the engineering works will have been agreed in the options appraisal and agreement sections but detailed designs and specifications, including work plans, will be required. The roles and responsibilities for these will have been agreed and in many cases it will be the responsibility of the abstractor to draw up the designs although the plans will have to be agreed by the Agency. In all cases, expert advice should be sought from water resources staff, ecologists, Capital Works managers etc. Examples of specifications and plans for many engineering options can be found in the Business Cases listed in Appendix B of Chapter 3: Investigations.

5.3.3 Procurement and CDM Regulations

There are legal regulations and Agency procedures that need to be taken into account. All projects must comply with the Agency SOD and non-financial SOD procedures. Some projects will need to comply with the Construction (Design and Management) Regulations (CDM) regulations and will require the appointment of a planning supervisor. Large contracts may need to be advertised in Europe as well as the UK. Regional procurement and Capital Works departments will be able to give more advice on these regulations. The Regional Health and Safety Officer may also need to be consulted.

5.3.4 Permissions

Permissions take time and you should consider these questions:

- Must you find suitable land and get landowners' permission, arrange payment or compensation, or draw up leasing agreements?
- Does the activity need planning permission, or any Agency consents such as land drainage consents, abstraction or impoundment licences, discharge consents, waste licences or conservation notices, or any external consents?
- Will an Environmental Impact Assessment or an Environmental Statement be required?
- Is the site within Habitats Directive designated area, and therefore require appropriate assessment? Are there any habitats or species or archaeological interests on the site that may be sensitive to heavy equipment and long term disturbance? If so, what mitigating measures can be taken?
- Utility searches - are there any electricity or telephone cables, gas mains or water pipes in the vicinity?
- Environmental monitoring during construction and works

Monitoring of the site may be necessary to ensure the engineering works are not causing significant or lasting environmental damage. This is particularly important in Habitats Directive sites and other environmentally sensitive sites. Risk assessment should be carried out and mitigating measures planned. Examples of monitoring include work on the River Worfe in Midlands region and the Lowther and Gelt in North West region.

FINAL DRAFT

Typical monitoring would include:

- Baseline survey of flora and fauna repeated at agreed intervals at site and in the water course or pool
- Spot gauging at regular intervals at identified sites
- New gauging stations
- Tubewells with loggers
- Monitoring of pool levels or outflows
- Water quality survey repeated at agreed intervals

5.3.5 Key Deliverables

There should be formal sign-off of the agreed option, the costs and the roles and responsibilities. Key deliverables at this stage should include:

- A Project Implementation Plan, which may become a Capital Works Project in its own right. This should include:
- An in-principle agreement with relevant parties setting out the agreed roles and responsibilities
- Detailed design specifications for any engineering works
- Method statements for the works involved
- Mitigation plans for minimising disturbance during engineering works
- Draft agreements and supportive information to make any relevant licence applications

5.4 Implementation

All Agency led projects must be managed according to Agency project management procedures, outlined in Chapter 6, and projects led by other stakeholders should also follow these procedures as far as possible. Regular progress reports should be made to the Project Board on work in progress to ensure that key milestones and targets are met and to keep track of expenditure. Stakeholders must also be kept informed of progress. All key stakeholders must approve any changes or exceptions to the project or increases to its cost, as set out in the options agreement stage.

Any licence changes should be implemented according to the Guidance, *'Securing changes to water abstraction licences and the determination of compensation'* and as agreed in the Project Plan. Licence applications for alternative sources of supply should be submitted and determined to coincide with the alteration of the original licence.

5.4.1 Environmental Monitoring

Environmental monitoring should be carried out throughout the implementation stage as set out in the project plan to ensure that the construction works themselves are not causing environmental damage. Where this is shown to be occurring, work should cease until mitigating measures can be implemented. This is particularly crucial in Habitats Directive sites if the designated species are affected.

**FINAL DRAFT****5.5 Project closure**

The implementation project should be closed formally, again according to Agency project management procedures, once all the key elements have been completed to the satisfaction of all key stakeholders. The project should only be considered closed once all compensation has been paid, or mitigating measures implemented. Arrangements must also be made for post-project environmental monitoring to ascertain the effectiveness of the solution. All elements of the project should have been completed and agreed before the project can be closed.

Licence Changes

Licence conditions and, where necessary, an associated Operating Agreement under Section 20 or 158 or WRA 1991 should have been signed off. The latter will need to include details of any ongoing operational arrangements, rules for their use, responsibilities and funding arrangements, and any monitoring, reporting or mitigation obligations. Arrangements for mediation in the case of dispute should also be agreed. Any compensation should have been paid, or alternative supplies agreed, although engineering works associated with alternative supplies are normally the responsibility of the abstractor and outside the scope of most RSA projects.

5.5.1 Mitigation measures

These elements of the project can be signed off once the work has been accepted and all invoices paid. Roles and responsibilities for ongoing maintenance of any assets should also have been agreed.

5.6 Post Project Monitoring

Agreement needs to be made on the extent of monitoring and who should carry it out. Examples of post project monitoring include work on the River Kennet and the Misbourne. Monitoring should reflect the data analysis carried out in the investigation stage, and concentrate on the effect of the improved hydrology on the ecology. English Nature and the Countryside Council for Wales will monitor the ecology at Habitats Directive sites and SSSIs.

The post project monitoring should not normally be included as part of the project; it should be either a separate project, or a continuation of the main project. This will allow the main project to be closed formally in a timely manner, rather than drifting on indefinitely. A post project appraisal should be conducted to review the success of the scheme at the end of the monitoring period. Provision for this should be made in Regional Business Plans.



FINAL DRAFT

5.7 Sign-off

Sign-off must be carried out according to normal project management and SOD procedures, and must be agreed. Every effort should be made to secure agreement of all the key stakeholders identified at the beginning of the project. Where full agreement is not achieved, the project closure report should clarify why and justify the Agency's decision. This might draw attention to the ability of the post project appraisal monitoring to confirm anticipated success (and, if not, to enable any outstanding issue to be re-addressed).

Once a licence has been reviewed under the HD Review of Consents, it cannot be reviewed again using this mechanism. If post-project monitoring shows there is still an impact on the site from abstraction, the licences can be reviewed again through the CAMS process.

5.8 Bibliography

Environmental Assessment of Projects
Environmental Effects of Demand Management
CDM Regulations: The safety management of Flood Defence maintenance work Programme (CDM). Available on Solutions in the Intranet
ICE standard contracts
Consultant standard contracts.
Abstraction Licensing Manual
Hydropower Handbook.

¹ 'Securing changes to water abstraction licences and the determination of compensation' Environment Agency Nov 2000.

Chapter 1



IDENTIFICATION OF SITES

- Author: Abigail Simpson
- Main Contributors: RSAP Group

Which sites should be included?



- Identified by a number of different organisations and groups.
- Must be abstraction related: known or suspected.
- Water Resources decision to include sites in catalogue

Types of Sites



- Habitats Directive: Top priority
- NEP
- SSSIs
- Old Top 40 sites
- LEAPS or CAMS
- Water Resources staff
- Other Agency functions
- Other environmental bodies.
- General public and local interest groups.

RSA Catalogue



- Is the definitive list of sites for investigation and possible compensation
- Must be completed for each site
- Must be updated every March and September for active sites

Chapter 2:



PRIORITISATION

- Author: Cliff Tubb
- Main Contributors:
 - Andy Barron
 - Abigail Simpson

Reasons for prioritisation



- Over 500 sites- we cannot do them all at once
- Habitats Directive sites have been identified as the most environmentally sensitive and important sites in the UK
- NEP sites have specific funding constraints, and many have already cost considerable amounts
- SSSIs are also identified as environmentally important sites that need protection
- BUT we need to ensure small local sites are sorted out as quickly as possible.

FORM P1



Prioritisation Factors:

- Factors based on urgency and importance.
- Cost-benefit and risk may also be taken into account
- Alphabetic weighting given to each factor using guidance provided
- list of likely factors included (not exhaustive)
- Summary weighting based on number of highest scoring factors (eg 3 'A' and 5 'B' scores for Urgency and Importance)

Urgency factors



- Environmental sensitivity
- Impact from abstractions
- Timescale
- A. Action imperative now to minimise or avoid irreversible or long term damage to water resources or the environment. Stage(s) being bid for is/are on the critical path. Includes cases where damage is actively occurring or imminent
- B. Action urgent to avoid significant damage to water resources or the environment, and/or only limited slippage possible in scheme or stage
- C. Action necessary to avoid likely damage but scheme or stage timing is not or not yet critical
- D. Need for action contentious or as yet unjustified.

Importance Factors



- Designation -international or national?
- Local importance
- Timescale
- A. Committed Must Do - Obligatory/Statutory commitment and timing already agreed. Habitats Directive commitments once a specific remediation scheme is identified, NEP - AMP 3 commitments
- B. Committed Must Do - timing yet to be decided. Other commitments agreed with third parties (Water Company, English Nature on SSSI, etc.)
- C. Need for action identified and agreed LEAP or other in principle commitment with timing dependent on availability of funds after commitments for A and B level schemes have been discharged.
- D. No action identified or agreed. No commitment to action and insufficient drivers for C level



Funding and Manpower

- Need to identify resource requirements to help bidding process
- Four tables:
 - Manpower and funding requirements, including 3rd party costs
 - Identify any money spent on or committed to the project to date, including 3rd party costs
 - Actual funding being sought THIS YEAR
 - Outcomes - how much was actually allocated



FORM P2 Regional Prioritisation

- Ranks all regional projects according to their summary weighting.
- Informs regional Finance and Corporate Planning Round
- Gives clear picture of the overall resource requirements for the region.
- Feedback to Form P1 for reiteration of funding is not available.



Chapter 3.

INVESTIGATION

Author: Mark Walters

Main Contributors:

Jennifer Taylor

Alison Rennie

Functional Working Group

BACKGROUND



ENVIRONMENT
AGENCY

- Need to have a consistent procedure for examining sites - despite designation or size
- Need to link with other ongoing processes
- Need to be able to utilise readily available tools for analysis
- Need to process sites efficiently and with confidence

OBJECTIVE



ENVIRONMENT
AGENCY

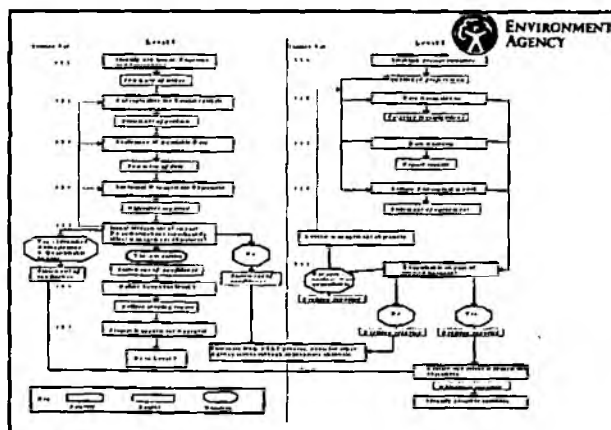
- Provides a 2 level approach to investigations
- With a stepped approach through each level
- Enables identification of sites for further investigation and those which can be removed from the process

TWO LEVEL APPROACH



ENVIRONMENT
AGENCY

- Level One
Builds a 'Conceptual Model' of the site.
Should allow for early elimination of sites not adversely affected by abstraction
- Level Two
More detailed investigation. Requires project management procedures



LEVEL ONE

- Identify Key Issues, Concerns, Perceptions
 - In collaboration with partners, utilising existing information e.g. HD 'Site Issue Briefings'
- Develop a 'Conceptual Model' of the Site
 - To understand how the system functions
 - Early assessment stage could enable removal of non-impact sites

LEVEL ONE cont.

- Evaluation of Available Data
 - Collate and assess availability and usefulness of information
- Set Initial Management Objectives
 - Determine what needs protecting and how
 - Determine extent of abstraction issue
 - Decision on further progression through RSAP
 - Assessment supported by agreed level of confidence

LEVEL ONE cont.



- Define Scope for Level Two
 - To ensure agreement over the scheme
 - To agree the extent of investigations necessary with adequate resources
 - To detail requirements for data collection and analysis
- Seek Project Management Approval

LEVEL TWO



- Establish Project Structure
 - Depending on the size or complexity of the site
- Data Assimilation
 - Ensure an adequate baseline data set through establishment of monitoring programmes
 - Need to consider data needs of selected methods (ref. Next stage)
 - Value of data needs to be carefully considered

LEVEL TWO cont.



- Data Analysis
 - Utilising accepted methods
 - Regularly reviewing conceptual model
 - Selection of methods taking account of cost-benefit and confidence in outcomes
- Review Conceptual Understanding
 - To ensure investigation remains focussed
 - Enable reviews in data collection / analysis

LEVEL TWO cont.



- Quantification of Impact
 - To confirm if a particular abstraction is causing a problem
 - To ascertain if the site is achieving its management objectives
- Restate and Refine Management Objectives
 - To ensure agreement over site objectives based on investigation outcome

LEVEL TWO cont.



- Quality Assurance
 - To ensure outputs meet their objectives
 - Establishing confidence in results
 - Assuring quality documentation throughout process
- Conclusion
 - The investigation will either remove the site from the RSAP process or quantify the impact of abstraction

CHAPTER 4



OPTIONS IDENTIFICATION AND APPRAISAL

Author: Tim Webb

Main Contributors:

- Andy Barron
- Allison Rennie
- Jennifer Taylor
- Amanda Turner
- Mark Walters

Introduction



- Sites already Prioritised and Investigated as discussed in Chapters 2 and 3.
- Habitats Directive Stage 4
- Benefit/Cost and Habitats Directive

Objectives



- Identification of Options
- Appraisal of Options
 - Environmental Benefit
 - Cost
 - Socio-economic Benefit
 - Risk
 - Sustainability Appraisal
 - Intangible Benefits
- Appraisal is consistent with CAMS Sustainability Appraisal.

Cost



- To:
 - Abstractor
 - Agency
 - Others
- Capital and Operating Costs
- Expressed as Net Present Value over 20 years at 6 percent discount rate.
- Involvement of Stakeholders



Environmental Benefit

- Meet Target Flows/Levels
- Consider:
 - Ecology
 - Biology
 - Fisheries
 - Conservation
 - Recreation
 - Amenity
 - Water Quality (SW and GW)
 - Navigation



Chapter 5

IMPLEMENTATION

- Author: Abigail Simpson
- Main Contributors
 - Alison Rennie
 - Bridget Thorn
 - Cliff Tubb



Options Agreement

- Roles and responsibilities
- Agreeing the project structure
- Licence change elements of a solution
- Compensation Guidelines
- Engineering elements of a solution
- Regulations
- Permissions

Key Deliverables

- Project implementation plan
 - Agreement on roles and responsibilities
 - Design specifications
 - Method statements for works involved
 - Mitigation plans for minimising disturbance to the environment
 - Draft agreements and supportive information for Licence alterations

Implementation



- Project management procedures
- Environmental monitoring
- Implementing mitigation measures

Post Project Monitoring



- Agreement to long term monitoring before sign-off.
- Agreement on spatial, temporal and ecological scope of monitoring.
- Agree roles and responsibilities
- Agree costs and funding
- Monitoring Plan

Sign-off



- Agency SOD and nfSOD procedures
- Agreement of all stakeholders.
- Project Report
- Provision for funding for post-project monitoring report

What next?



- Formalising what we already do in order to have a consistent and fair approach.
- On-going process, owned by RSA Co-ordinator in Bristol
- Authors responsible for individual chapters
- Further R&D will be incorporated, eg:
 - Site Characterisation work
 - Wetlands Projects
 - Monitoring Requirements
- Mechanism for disseminating information on new techniques
- Publication of Agency's prioritised list in October 2001

Habitats Directive



- WR Habitats Directive Co-ordinator being appointed
- WR Joint Technical Advisory Group set up to resolve problems.
- Current areas being discussed include:
 - estuaries
 - Conservation Objectives for riverine sites
 - screening criteria
 - S 32 consents
 - wetland characterisation and Conservation Objectives
 - interim measures for new licences

Fourth Periodic Review



- Need to start planning for this now
- Costed proposals by summer 2003
- Guidance on qualifying sites and cost-benefit may need to be revised
- Technical Guidance should be used as a framework for projects

Summary



- A Framework for Action
- Provides a framework to formalise what we already do
- More efficient and effective allocation of resources in the time available
- Consistent methodology for implementing the Habitats Directive and other over-abstraction problems
- Pulls together the tools and methods available
- Provides a planning tool and an Audit trail



What is this chapter about and who it is for?

- Managing an RSA project during the different phases in its lifecycle
- Nominated RSA project or stage managers
- Others who need to know how arrangements may affect them
- As a reference tool when planning particular aspects of work

Why it is important?

- RSA programme is high profile and resource intensive
- Each RSA project must be managed to Agency standards
- Nature of RSA projects merits this:
 - Complex and require a multi-stage approach
 - Critical uncertainties have to be resolved
 - Third parties must be properly involved

The Agency's project philosophy

- 'Product based planning'
 - "what are we delivering?" not "what shall we do?"
- Project Plan is primarily centred on deliverables/products
- Deliverables are set out in Product Descriptions
- Activities & tasks are the means of creating the products



ENVIRONMENT AGENCY

*A better environment in England and
Wales for present and future generations*

**GUARDIANS OF THE
ENVIRONMENT**

**CHAPTER 6:
MANAGING AN RSA PROJECT**

- Author: Cliff Tubb

- Main Contributors:
 - Jennifer Taylor
 - Abigail Simpson



The Project Lifecycle Framework

Pre-Project Work

Initiating the Project

Managing the Ongoing Project

Completing the Project

Organisation of Chapter 6: Sections

- Introduction
- Pre - project work
- Initiating the RSA Project
- Managing the Project
- Closure and Post Implementation Matters
- Appendices
- Discusses issues, documents and links

PRE-PROJECT WORK (1)

- The work to develop the case for a project (to put to management)
- Involves:
 - Clarifying the requirement
 - Level 1 Investigation
 - Preparing a Project Brief for the full project (the Level 2 Investigation etc.)
- Likely outcome = request to carry out the Project Initiation phase
- Includes key messages for those planning RSA work

Pre - Project Work - Stages

- Clarifying The Requirement
 - The work plan and authorisation
- Investigating And Analysing The Requirement
- Preparing For The Full Project
 - Business Case
 - Project approach
 - Project Brief
- Preparing for a follow on RSA Project

INITIATING THE RSA PROJECT

- Developing set-up documentation
- Initiating the organisational arrangements
 - Including arrangements for involving stakeholders
- Arrangements for Managing Uncertainty
- Gaining support, approvals and funding.

MANAGING THE PROJECT (1)

- Planning and controlling work on technical stages
- Holding Team and Project (Board) Meetings
- Monitoring, recording and reporting progress
- Signing off products and outcomes
- Change control



MANAGING THE PROJECT (2)

- Management issues during the Investigation stage
- Management issues during Option Identification and Appraisal
- Management issues during Option Agreement and Implementation

CLOSURE AND POST-IMPLEMENTATION MATTERS

- Seek closure at stage ends as well as at the end of the project
- Arrangements for 'No case to answer'
- Post project implementation arrangements
 - Monitoring arrangements
 - Operational arrangements

Appendices

- Appendix 1 covers Components of Good Project Management
- Appendix 2 covers Approving and Financing an RSA Project
- Appendix 3 covers Project Records and Reporting
 - Includes excerpt from National RSA Catalogue and reporting spreadsheet template



Key messages

- Time spent setting up proper arrangements to initiate and manage it will help secure success.
- Clear set-up helps gain ownership, authorisation and with managing the work effectively.
- Have a clear formal framework and deliverables tied to key decision milestones.
- Involve key stakeholders from the outset if the outcome is to be a success.
- Plan 5 to 15% of project resources for management activities.

Key Messages (2)

- The Project Manager needs to be vigilant about
 - Maintaining the focus, ownership and motivation of those involved
 - Not letting detail or process documentation obligations cloud the primary aim of resolving the RSA issue effectively.
- Consider a Regional RSA Project Board or Steering Group
