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River Restoration Internet Toolkit

Scoping Study

R&D Technical Report W5A-060/TR

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ENVIRONMENT AGENCY

River Restoration Internet Toolkit

(Phase 1: Scoping Study, Project Report)

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EXECUTIVE SUMMARY

A considerable amount of research on river restoration has been done in the UK and elsewhere in the world. Improving the availability of this information could reduce duplication of work and enhance current and future rehabilitation projects significantly. The overall project objective, given this background, is to develop an easy to use search tool / web directory that will 'guide and provide' those involved in River Restoration with useful and useable sites quickly and efficiently.

Phase 1 of the study, the scoping study, entailed identifying potential users and their anticipated profiles of needs, collection and appraisal of available resources, and providing time and cost estimates for Phases 2, 3 and 4. The latter phases comprise populating the database, developing the interface, and testing of the toolkit respectively.

Key findings from Phase 1 include:

- Google is the most suitable search engine for use in this project (including subsequent phases). The limit of 10 words per search has a significant impact on the accuracy of searches for this project, which should be addressed in phase 2.
- There are numerous sites on the internet that describe sound river restoration principles and refer to specific projects, but relatively few have significant amounts of information readily available on-line.
- The internet sites for the ECRR and RRC refer to guidelines and project specific information available on request. It is therefore likely that further collaboration with these organisations could be useful. Their databases could be used to help populate the River Restoration Internet Toolkit, (although further investigation of these resources would be required). The technology developed for the Internet Toolkit could possibly be shared with these organisations.

KEYWORDS
River Restoration, River Rehabilitation, Internet Toolkit, Resource Guidelines, Decision Support

1. INTRODUCTION

1.1 BACKGROUND

Rivers and their floodplains support life in many different ways. Many UK rivers and floodplains are seriously modified, which degrade their potential to perform their various functions. The Environment Agency (EA) is the public organisation responsible for protecting and improving the environment (including rivers) for England and Wales. Effective collaborative effort towards river restoration requires sharing of knowledge and experience between those involved, whether inside or outside of the EA. A considerable amount of research on river restoration has been done in the UK and elsewhere in the world and documented on the internet. Improving the availability of this information could reduce duplication of work and enhance current and future rehabilitation projects significantly. It is this need for collated and readily available information on river restoration that gave rise to this project.

1.2 TERMS OF REFERENCE

The overall project objective, given the background sketched above, is to develop an easy to use search tool / web directory that will 'guide and provide' those involved in River Restoration with useful and useable sites quickly and efficiently. The sites reference should include guidance on selection and implementation of techniques, evaluation of different methods, case studies, lessons learned, useful national and international contacts and references. The project will be split into 4 phases, namely:

- **Phase 1: Scoping Study**. (This study). Identify users, develop profile of needs regarding River Restoration and the internet, appraise available resource and give examples of relevant sites.
- **Phase 2: Populate the Internet Toolkit database**. Briefly review all sites identified in Phase 1 above (and any ones that have been posted since the completion of Phase 1). Assign a quality scoring system to sites based on the EA users needs (as identified in Phase 1).
- **Phase 3: Develop the Internet Toolkit interface**. A simple but graphically pleasing 'front end' that enables a user to search the Internet Toolkit of internet sites and resources using a variety of criteria, (examples may include, searches by river type, location, restoration technique, year of project, etc.)
- **Phase 4: Test Internet Toolkit as a planning tool**. Develop examples illustrating the use of the methods developed above, showing real-life applications to catchment management decision-making.

The Phase 1: Scoping Study (this study) instructions were as follows:

- **Identify users**: Draw up a list of potential users within the EA (after discussions with project manager, members of River Habitat Survey, and EA River Restoration Champion).
- **Develop profile of needs**: Develop a profile of the potential needs of those users for river restoration information from the web.
- **Appraise available resource**: Appraise the quantity of material available that fits these needs on the web, i.e. break the user profile (developed above) down into sections, and list the number of web-hits for each section. Produce a simple glossary of

all web-hits, (website address, section relevant to, number of pages). Select 10 sites at random from each section and appraise them using a simple scoring system as 'fit for purpose' against the user needs.

- **Examples of relevant sites**: Provide examples of the most relevant websites for each section, (total approx. 20 sites).
- **Compile Report**: Compile a report on the outcomes of Phase 1, and include estimates of the time and cost requirements (not included in this report) to undertake Phases 2, 3 and 4 of the project.

1.3 PURPOSE AND LAYOUT OF THIS DOCUMENT

The purpose of this report is to document the outcomes of Phase 1 of the above study.

Chapter 2 describes the profile of potential users and their anticipated needs. **Chapter 3** describes the collection and appraisal of available resources, including examples of useful resources. **Chapter 4** provides the proposed scope for subsequent phases. Conclusions and Recommendations are provided in **Chapter 5**.

2. PROFILE OF USERS AND USER NEEDS

Before an Internet Toolkit or directory can be designed, consideration must be given to the profile of potential users and their anticipated needs. These profiles were therefore drawn up in conjunction with the River Habitat Survey group in the Agency's North West region.

2.1 PROFILE OF POTENTIAL USERS

It is envisaged that potential users of the River Restoration Internet Toolkit will include those involved in river restoration design and assessment, as well as general information seekers. Organisations represented may include the following:

- Conservation and Fisheries officers;
- Development control officers;
- RHS team;
- Environment Agency (other functions and directorates);
- Local councils and riparian land owners / developers;
- Professional partners (such as Wildlife Trust, etc);
- Academic organisations (both local and international);
- Consultants acting on behalf of any of the above.

2.2 PROFILE OF ANTICIPATED USER NEEDS

It is necessary to profile the user needs in order to design a tool that meets that need as well as possible within given constraints. As indicated in **Chapter 1**, the concept of a River Restoration Internet Toolkit arose from the anticipation of a need for practical guidelines and resources for those directly involved or potentially involved with river restoration and rehabilitation in the United Kingdom. This role of 'guide and provide' will therefore form the core function of the Internet Toolkit.

A key requirement for any resource system is that the main content be readily accessible and up to date. It is anticipated that this function could be best served using the internet as primary medium. The internet offers a number of advantages over other mediums (such as a book or CD package), which include:

- Content can remain live, and be updated regularly;
- Use of Active Server Pages (ASP) allowing access to database content across any operating system without the need to install and configure additional software;
- Integration of existing text resources (such as EA guidelines converted to Html or PDF formats), resources from other internet sites, and internet search facilities for wider searches.

As indicated in **Chapter 2.1**, the users will represent a wide range of institutions. It is therefore also reasonable to assume that their requirements will differ to some extent. A basic introduction will therefore be essential to inform users of the facilities available, and how to make use of the resources presented. This level of introduction or overview should also be able to help new users, as well as members of other disciplines who require nothing more than a broad picture of the types of processes involved.

In considering the manner in which the proposed River Restoration Internet Toolkit could be used, it is recognised that user needs may arise out of either:

- Proactive requirements to motivate and design rehabilitation works (for example EA scientists and engineers, fisheries, etc);
- Reactive requirements to assess or approve river restoration works (for example Flood Defence, riparian land owners, funding organisations, etc).

Both types of user needs would require access to similar information of a technical nature. Other descriptors are therefore necessary to describe how the information could be associated with user requirements.

In order to guide the user to information suited to the particular situation, a decision tree or decision support tool would be helpful. This would allow the user to select various options describing the site or reach of river and floodplain under consideration, as well as its level of degradation and any particular management issues being faced. The system should then provide the user access to information relating to that type of situation. An initial categorisation for such a decision tree could be the type of restoration work under consideration, namely:

- Plan form changes, such as realignment, reprofiling, or provision of offstream storage;
- Channel form changes, such as the introduction of deflectors, weirs or flow features;
- Habitat enhancements (whether localised site or river reach), such as introducing riffles or shoals, changing revetment materials, land-use controls, etc;
- Catchment wide habitat evaluation and improvements.

The information relating to a particular situation may cover more than one of the above topics, for example both channel form changes and habitat enhancements. The information presented should be grouped into different types of information, such as:

- Statutory regulations, if applicable;
- Best practice guidelines or generic habitat improvement plans;

- Reference to specific case studies in similar situations;
- Where to find models or modelling resources;
- Tips on how to use the site and/or wider internet searches to obtain further information (in order to keep the initial volume of information presented to manageable proportions);
- When and how to contact the EA (or other institutions) for assistance.

The material for the above resources could come from EA documents (whether in html or PDF) or other internet sites.

As a separate function to the decision support tool, the user may also wish to search for information on case studies based on various criteria. This would require storing project information in an indexed database structure, which can be searched using the given criteria. The indexing required for this database would be carried out during Phase 2. There may be potential for collaborating with the River Restoration Centre, and using their database to populate the project database, provided that such collaboration can be agreed upon and would not infringe upon any information rights. Examples of criteria that could be used to describe the case studies are:

- Project scale (catchment-wide, river reach or localised site);
- Restoration category (plan form, channel form or habitat enhancements only);
- Restoration technique (pre-defined lists would be required for categorising, which could also be made available to the user as a drop-down list for searches);
- River type (braided, meandering, headwater tributary, etc, again requiring pre-defined lists);
- River name;
- Country (in which project took place);
- County/s (in which project took place, if in the UK);
- Year (of project);
- Additional keywords, if available (which could be used to find occurrences of key species, or specific management issues such as flood defence, access or recreation, etc).

Other features that may be helpful to the user include:

- Site search allowing users to search the html files on the site (including or excluding the database/s).
- Internet search to facilitate extended searches outside of the Internet Toolkit site, with tips on how to search effectively for information on river restoration and related topics.

3. COLLECTION AND APPRAISAL OF RESOURCES

3.1 COLLECTION OF AVAILABLE RESOURCES

Before starting to search for available resources on the Internet, a suitable search engine had to be selected. A number of search engines were evaluated briefly, indicating that Google is the most suitable search engine of those tried, for the following reasons:

- Yahoo and Go.com were each powered by other search engines (Google and Overture respectively), and the main engine sites were therefore evaluated in preference to these sites.
- Overture does not report on the total number of hits in the search, so the user cannot establish how wide the search field is, and whether or not a narrower search would be required. This search engine was therefore regarded as unsuitable for the purposes of this project.
- MSN Search produced inconsistent results when searching for combined Boolean phrases (ie using both AND and OR), even when selecting the Boolean phrase option on the advanced search page. Also, MSN Search does not appear to allow the use of search syntax (even single or double quotation marks to enclose a phrase) in their normal search window, which necessitated visiting their advanced search page to carry out every desired search. These factors make MSN search unsuitable for use in this project. A search for River Rehabilitation yielded ±152 000 hits for all words, or 954 hits for the phrase. A phrase search for "Habitat Restoration" yielded 35 000 hits (stats as at 28 February 2002).
- Google offers a user-friendly advanced search page, which is very useful for new or infrequent users. Google also allows the use of search syntax (such as "", OR, +, -, etc) from their normal search location, which allows rapid access for regular users. Help is available on the advanced syntax and operators available. Google offers various options for free inclusion of their search engine on any web site, including some customising the appearance of the results window. A search for River Rehabilitation yielded ±319 000 hits for all words, or 2 110 hits for the phrase. A phrase search for "Habitat Restoration" yielded 64 800 hits (stats as at 28 February 2002). These hit statistics are approximately double those of MSN Search. Google has a limit of 10 words per search (including nested searches using "search within results"). In the context of this project, searching for more than 10 words would be very useful in trying to create more definitive searches. Initial queries to Google regarding this issue did not receive a response, and this issue should be further pursued in Phase 2.

The searches originally intended had to be shortened to accommodate the Google limitation of 10 words per search. This resulted in fields (number of hits) that were either too large or too small. For example, using word searches rather than phrase searches (e.g. river restoration) produced a very large field (575 000 hits in this case), that included sites that coincidentally use both the words but have no relevance to river restoration. Phrase searches (e.g. "river restoration") produced a small field (15 200 hits), thereby excluding relevant sites which did not use the exact phrase. (The final statistics for these and subsequent searches were generated on 5 March 2002, which is recorded due to the rapid rate of increase in search engine coverage). Due to the large number of hits found on river restoration in general, it was decided to use the smaller field (namely "river restoration"), even though it will exclude some sites with potential relevance. Similarly, the phrase "river restoration" is far more common than "river rehabilitation" (2 120 hits), and was therefore used as the pre-filter on all subsequent searches, even though it excludes some sites on river restoration or rehabilitation which do not use the exact phrase. Ways to extend and improve the search fields will be given further considered during Phase 2.

The searches performed were grouped into categories and types of restoration works, as discussed in **Chapter 2.2**. The table below indicates the searches that were performed and the number of hits obtained from the Google search engine (www.google.com). The Google

engine assumes “AND” searching by default, i.e. a space before a word reads the same as the AND operator. Due to the large numbers of hits, it was not practical to produce a full listing of all hits. The search results are as follows:

Search Description	Category	Number of Hits
“river restoration”	Pre-filter for all searches	15 200
guidelines generic OR "best practice"	Guidelines	317
realign OR realigned OR alignment OR planform OR "plan form"	Planform	450
regrading OR reprofiling OR "bed check weir"	Planform	96
storage OR pond offstream OR "off channel" OR "off-channel"	Planform	188
storage OR pond "on-stream" OR "on-channel"	Planform	365
section OR channel resectioning OR "channel form" OR "multi-stage"	Channel	202
berm OR berms OR levees OR terrace OR terraces OR terraced	Channel	1 360
gabions OR blockstone OR stone OR brick OR bricks OR "rip rap"	Habitat	1 270
hurdles OR faggots OR faggoting OR spiling	Habitat	112
geotextile OR "fabric pockets" OR "coir rolls"	Habitat	79
groynes OR vanes OR deflectors	Habitat	2414
fence OR fences OR fencing poaching OR pollarding OR stock OR livestock	Habitat	730
riffle OR shoal OR bar create OR creation OR introduce OR introduction	Habitat	957
wetland OR wetlands OR swale OR swales	Habitat	5 820
grass OR reed OR tree OR vegetation planting OR revegetation OR seeding	Habitat	1 950

3.2 SAMPLE RESOURCE APPRAISAL

From each searches listed above, a selection of 10 sites was sampled per category for appraisal. The sites were selected at random, provided that they appeared at least at face value (based on text extracts presented by Google) to be relevant and potentially applicable to the UK river restoration context. Sites included potential best-practice information from other countries, although at least some of the sites were selected with UK domains.

The sites selected were then appraised and given two scores, based on closeness to intended search subject and usefulness of content in UK context. It is reasonable to expect that a certain amount of subjectivity may be involved in a scoring scheme of this nature. The definitions used in the scoring are illustrated in the table below:

Score	Closeness to search subject	Usefulness in UK context
1	Well suited to subject of search	Useful material, easily adapted for use in UK
2	Partially suited to subject of search	Partly useful, some adaptation may be required
3	Marginally suited to subject of search	Marginally useful or significant adaptation required
4	Poorly suited to subject of search	Not useful without major adaptation
5	Not suited to subject of search	Not useful in UK river restoration context

The results of the appraisal are presented in the table below. Useful sites (with usefulness scores of 1 or 2) have been highlighted with an asterisk.

Description (Category / Search / Address)	Scores	Comments
Guidelines		
"river restoration" guidelines generic OR "best practice"		

www.sepa.org.uk/guidance/hei/pdf/hei_newsletter2.pdf	3,4	Guidelines on request
www.rivers.gov.au/publicat.htm	3,3	Guidelines on request, some via web
www.gsd.harvard.edu/professional/exec_ed/open_enrollment/restoration_toolbox/course_reader/RR_Schofield.pdf	1,**2***	Principles & framework, USA
www.ecoscope.co.uk/expert.html	3,4	Commercial profile
www.catchment.crc.org.au/products/pubs.pdf	3,4	Guidelines on request
www.pcl.org/bonds/hrubes_rep.html	4,5	Forested watersheds
www.ukbap.org.uk/Plans/Habitats/NBNSYS0000004553.htm	1,**1***	See rest of site
www.geog.nottingham.ac.uk/rivermorph/minutes1.doc	3,4	About research activities
www.ncrfs.civil.gla.ac.uk/4-april.pdf	3,4	About research activities
www.naturebureau.co.uk/pages/floraloc/about_us/action_plan.html	3,4	About research activities (flora)
Planform		
"river restoration" realign OR realigned OR alignment OR planform OR "plan form"		
www.geog.nottingham.ac.uk/harrp/NERC1.htm	3,4	About research activities (sediment)
www.aecw.demon.co.uk/rrc/projects/coleproj.htm	1,**2***	Project overview (old address?)
www.wrc.wa.gov.au/public/RiverRestoration/publications/rr10/	2,**2***	Guidelines, Australian
"river restoration" regrading OR reprofiling OR "bed check weir"		
www.dakotaswcd.org/stabilize/bauer.htm	2,4	Project overview, USA
www.scarab.newport.ac.uk/scarabconf/middlex.html	2,3	Project abstract
www.nero.nmfs.gov/ro/doc/0401.pdf	3,5	About research activities
"river restoration" storage OR pond offstream OR "off channel" OR "off-channel"		
www.ecy.wa.gov/programs/wr/wstf/wstfhome.html	4,5	Not directly river restoration
www.boise.uidaho.edu/hosted/redriver/news/RRBiennial96-97.PDF	3,**2***	Detailed project report, USA
"river restoration" storage OR pond "on-stream" OR "on-channel"		
www.sedlab.olemiss.edu/wqe_unit/topashaw/effectsLWDS.pdf	4,4	Revetment hydraulics
www.powerstationeffects.co.uk/reports/WessexRiverRestoration.pdf	2,**1***	Detailed project report
Channel		
"river restoration" section OR channel resectioning OR "channel form" OR "multi-stage"		
www.geog.qmw.ac.uk/staff/wharton.html	4,4	Personal CV (potential resource?)
www.wa.gov/wdfw/hab/ahg/execcd	4,4	Executive Summary of guideline
www.geog.nottingham.ac.uk/newgeog/research/projects/fluvialgroup/compound.htm	2,4	About research activities
www.utahonthefly.com/articles/prrp/pilot.htm	2,4	Project overview, USA
www.wileyeurope.com/cda/product/0,,0471968560,00.html	3,4	Handbook for sale
"river restoration" berm OR berms OR levees OR terrace OR terraces OR terraced		
www.epa.gov/fedrgstr/EPA-IMPACT/1998/December/Day-30/i34501.htm	3,4	Planned project notice, USA
www.aecw.demon.co.uk/rrc/newsletter/news-1/news-1.htm	1,**1***	Extensive newsletter (old address?)
www.scarab.newport.ac.uk/scarabconf/nene.html	2,3	Project abstract
www.geog.soton.ac.uk/research/nfrc/desc.asp	2,3	Project overview
www.sli.unimelb.edu.au/fig7/Brighton98/Comm7Papers/SS45-Boddington.html	2,3	Project overview
Habitat		
"river restoration" gabions OR blockstone OR stone OR brick OR bricks OR "rip rap"		
www.igb-berlin.de/abt2/poster/images/silke.pdf	2,4	Project poster
www.earth.leeds.ac.uk/research/dynamics/summary.htm	2,4	About research activities
"river restoration" hurdles OR faggots OR faggoting OR spiling		
www.land-own.demon.co.uk/waterfish.htm	3,4	Reference to commercial

		spiling site
www.wildtrout.freeserve.co.uk/projects/consAward/99.htm	4,4	Award description
"river restoration" geotextile OR "fabric pockets" OR "coir rolls"		
www.scotland.gov.uk/library2/doc11/tbap-14.asp	2,3	Integrated approach with roads
"river restoration" groynes OR vanes OR deflectors		
www.udal.org.uk/Liquid%20Assets.PDF	2,**1***	Principles and examples
"river restoration" fence OR fences OR fencing poaching OR pollarding OR stock OR livestock		
www.fishing-in-wales.com/wildlife/nga/results1.htm	1,**1***	Sample results (see project)
"river restoration" riffle OR shoal OR bar create OR creation OR introduce OR introduction		
www.sws.uiuc.edu/pubs/search.asp?lp=asearch&SID=144	3,**2***	Library search listing
"river restoration" wetland OR wetlands OR swale OR swales		
www.qmw.ac.uk/~fa9128/photogallery.html	3,**2***	Photos (see parent site?)
"river restoration" grass OR reed OR tree OR vegetation planting OR revegetation OR seeding		
www.rbgkew.org.uk/conservation/habitat.html	2,**2***	Reference listing

Based on the density of useful sites among the above samples, and given that the narrow search filter ("river restoration") may have excluded some useful material, it is estimated that the numbers of useful sites available on the internet will be in the order of 30% to 50% of the number of hits listed in **Chapter 3.1**, (i.e. approximately 4500-7500 sites). This estimate is extremely coarse and subjective, given the 10 word limitation on the search engine and the wide variation in search envelope size using different filters.

Additional sample resources collected by the Environment Agency River Habitat Survey team and the River Restoration Champion (while looking for background information for this project) are also listed below. These provide additional examples of potentially useful sites (though they were collected in an ad-hoc, non-standardised fashion).

A list of other web sites found by the RHS team:

http://www.gwpforum.org/servlet/PSP?chStartupName=toolbox_about :Global Water Resources "Tool Box" on integrated water resource management.

http://www.epa.gov/OWOW/watershed/tools/: USA EPA's watershed tool directory

http://www.ncl.ac.uk/~nwrgi/wrsrl/projects/waterware/waterware.html : A decision support system for integrated river basin management planning

http://www.rivernet.org/ : European Rivers Network home page

http://www.rivernet.org/links.htm : Extensive list of hyperlinks to relevant organisations in this field

http://www.catchment.crc.org.au/programs/projects/p1_1.htm : Development of a catchment modelling toolkit (Australia).

http://www.ramsar.org/strp_rest_links_tools.htm : Ramsar organisation link to web based restoration tools.

http://www.clw.csiro.au/research/catchment/modelling : CSIRO (Australia) integrated catchment modelling home page.

http://www.epa.gov/owow : USA EPA's home page of the Office of Water Management. This site includes the on-line training course on integrated watershed management "Watershed Academy".

http://www.es.mq.edu.au/courses/RiverStyles/main.htm : Introductory course on geomorphology (Australia).

http://www.lwrrdc.gov.au/other/rd_rivers.asp : Land and Water (Australia) R&D pages.

http://www.epa.gov/owow/wetlands/restore : River and stream restoration home page of USA EPA

http://www.usda.gov/stream_restoration/newgra.html : Stream corridor restoration home page with links (USA).

http://www.ecrr.org : European Centre for River Restoration home page.

http://www.rivers.gov.au River Landscapes home page (Australia). This site has a good list of publications.

4. PROPOSED SCOPE FOR SUBSEQUENT PHASES

Phase 2: Populate the Internet Toolkit database

It is envisaged that Phase 2 would include the following:

- Inception meeting to confirm the intended scope with the client.
- Conceptual database design, in order to select suitable information fields for subsequent use in the Internet Toolkit. The conceptual design will be carried out in consultation with the EA, taking the profile of anticipated user needs (**Chapter 2.2**) into account. Consideration will also be given to potential methods of updating the toolkit's content in the future, as more material becomes available on the internet. The possibility of a customised Google search facility will be investigated.
- Collating of EA overview and guideline documents (electronic format) into the appropriate structure (decision tree) for use in the toolkit.
- Improvement of the search terms to create more definitive result sets.
- Reporting on the outcomes.

Phase 3: Develop the Internet Toolkit interface

It is envisaged that Phase 3 would include the following:

- Software selection.
- Detailed program design.
- Programming of the interface, which may also require some formatting of information fields within the database. Initial testing of the program functionality will be carried

out, although evaluation of the effectiveness of the structure and content will only be done in Phase 4.

- Lay out supplementary information for web site, which may include conversion (into pdf or html) of documents collected during Phase 2.
- Prepare online help information, including basic guidelines and advanced tips for searches.
- Automation of certain administrator tasks to reduce the amount of time required by the administrator in updating the toolkit content in the future.
- Prepare administrator documentation, containing guidelines for managing future updates.
- A training workshop for users and administrators on the use and maintenance of the system.
- Reporting on the outcomes.

Phase 4: Test Internet Toolkit as a planning tool

It is envisaged that Phase 4 would include the following:

- Selection of test cases.
- Follow decision process for test cases, assessing the toolkit in terms of structure (does the interface lead to suitable information) and content (is the information adequate in terms of quantity and quality or level of detail).
- Prepare presentation material (e.g. for online use and/or a brochure) demonstrating the usefulness of the toolkit.
- Reporting on the outcomes.

5. CONCLUSIONS AND RECOMMENDATIONS

Based on the information contained in this report, the following conclusions can be drawn:

- Google is the most suitable search engine for use in this project (including subsequent phases). The limit of 10 words per search has a significant impact on the accuracy of searches for this project, which should be addressed in Phase 2.
- There are numerous sites on the internet that describe sound river restoration principles and refer to specific projects, but few have significant amounts of information readily available on the internet.
- The internet sites for the ECRR and RRC refer to guidelines and project specific information available on request. It is therefore likely that further collaboration with these organisations would be useful. Their databases could be used to help populate the EA River Restoration Internet Toolkit, although a fuller assessment of these resources would first be necessary. The technology developed for the Internet Toolkit could possibly be shared with these organisations.

Based on the above conclusions, and the information contained in the report, the following recommendations are made:

- Carry out Phases 2, 3 and 4, as described in **Chapter 4** of this report.