Acknowledgements

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Foreword

The need for policy and practice that is based upon an objective and thorough review of the evidence base is being increasingly recognised. However, this presents a number of challenges. For example: how can large volumes of information be best searched for and synthesised and how can this be done in a transparent and unbiased way? Evidence Reviews (ER), in their various forms represent ways of searching for, reviewing and summarising evidence to help answer specific questions. There is a spectrum of ERs that range in detail and rigour from Literature Reviews to Systematic Reviews (SR). This document contains a brief overview of the different forms of ERs but is primarily written for those intending to commission and/or produce an ER in the form of Quick Scoping Reviews (QSR) or Rapid Evidence Assessments (REA), two forms of review that lie between literature reviews and SRs in terms of rigour of assessment. These types of ER have been found to be well suited to meet the evidence challenges most frequently faced by the authors.

Whilst being less resource and time intensive compared to full SRs, QSRs and REAs are designed to be transparent and to minimise bias. QSRs and REAs can most readily be used to understand the impact either of a ‘pressure’ or a policy intervention. Additionally, a QSR may also be applied to more open ended (non-impact) questions such as ‘what do we know about x or y?’ Both forms of ER also provide an understanding of the volume and characteristics of evidence available on a certain topic and make it more accessible for further scrutiny if required. Hence, QSRs and REAs allow us to answer questions by maximising our use of the existing evidence base, whilst also providing a clear picture of the adequacy of the existing evidence base.

This document expands on high level Civil Service Guidance (HM Treasury Magenta Book guidance and Civil Service web based guidance for conducting Rapid Evidence Assessments) and experience gained by members of the Joint Water Evidence Group (JWEG). JWEG works to bring together ‘land and water’ evidence teams from across Defra, the Environment Agency, Natural England and the Forestry Commission (England). This How to Guide provides a step by step approach to conducting QSRs and REAs, emphasising the value of close working
with commissioning clients, in order to meet research needs and so that findings are presented clearly and in context.

Whilst this document has been written for JWEG within the Defra network, we are confident it will be of use to other teams both within the Defra network and beyond. Finally, this version (produced April 2014) will be reviewed and updated as further ERs are undertaken and lessons are learned. If you would like to help improve this guide please forward your comments and suggestions to Alexandra Collins (alexandra.collins@imperial.ac.uk), Deborah Coughlin (d.coughlin@imperial.ac.uk) or Stuart Kirk (stuart.kirk@environment-agency.gov.uk, stuart.kirk@defra.gsi.gov.uk).
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## Glossary

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<th>Term</th>
<th>Definition</th>
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<tr>
<td>Boolean Operators</td>
<td>Used for applying search terms in order to define the relationships between words or groups of words</td>
</tr>
<tr>
<td>Commissioner or commissioner client</td>
<td>The individual or individuals who have identified the need for the work and are providing the funding</td>
</tr>
<tr>
<td>Conceptual Model</td>
<td>A description, ideally in the form of a systems diagram or schematic, of the interactions that the ER is testing or exploring</td>
</tr>
<tr>
<td>Evidence</td>
<td>Information that can be used to support decisions in developing, implementing and evaluating policy, operations and services</td>
</tr>
<tr>
<td>Evidence Review (ER)</td>
<td>An umbrella term that encompasses the types of review methodology available for reviewing evidence. In this document ER mostly relates to either a QSR or REA</td>
</tr>
<tr>
<td>Grey Literature</td>
<td>Informally or non-commercially published information that can be difficult to search for</td>
</tr>
<tr>
<td>First Phase Screening/First Pass</td>
<td>The first phase of screening of the evidence found by the ER using only the title or headline of the evidence found</td>
</tr>
<tr>
<td>Impact Question</td>
<td>A question that specifically aims to assess the impact either of a ‘pressure’ on a system (environmental or socio-economic) or the impact of a policy driven intervention – such as: ‘Does this intervention have the desired outcome?’</td>
</tr>
<tr>
<td>Inception Meeting</td>
<td>The initial meeting held between the steering group and review team to refine the conceptual model and primary question of the ER</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Lead Reviewer</td>
<td>The individual responsible for conducting the evidence search, screening, synthesising and where applicable the critical appraisal phases of the evidence review</td>
</tr>
<tr>
<td>Narrative Synthesis</td>
<td>An approach to the synthesis of findings from multiple studies that relies primarily on the use of words and text to summarise and explain the findings.</td>
</tr>
<tr>
<td>Non-Impact Question</td>
<td>A question that aims to address less quantifiable or defined effects – such as: ‘What is known about?’; ‘How does it work?’</td>
</tr>
<tr>
<td>Peer-Reviewed Evidence</td>
<td>Evidence that has been reviewed by others knowledgeable in the field of inquiry, to determine whether the studies they describe are of reasonable quality and the conclusions reported are supported by the evidence.</td>
</tr>
<tr>
<td>PICO Elements</td>
<td>The Population, Impact, Comparator and Outcome elements that are used to define a question</td>
</tr>
<tr>
<td>Primary Question</td>
<td>The question to be addressed by the review</td>
</tr>
<tr>
<td>Protocol</td>
<td>A written paper outlining the methodology the ER will follow</td>
</tr>
<tr>
<td>Qualitative Evidence</td>
<td>Information that does not contain numerical data and may be reflective in nature such as an anecdote or interview</td>
</tr>
<tr>
<td>Quantitative Evidence</td>
<td>Information expressed as numbers or statistics</td>
</tr>
<tr>
<td>Quick Scoping Review (QSR)</td>
<td>A type of evidence review that aims to provide an informed conclusion on the volume and characteristics of an evidence base and a synthesis of what that evidence indicates in relation to a question.</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
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<tr>
<td>------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Rapid Evidence Assessment</strong></td>
<td>REAs is a type of evidence review that aims to provide; an informed conclusion on the volume and characteristics of an evidence base, a synthesis of what that evidence indicates and a critical appraisal of that evidence.</td>
</tr>
<tr>
<td><strong>Review Team</strong></td>
<td>The group of people undertaking the evidence review</td>
</tr>
<tr>
<td><strong>Search Strings</strong></td>
<td>Groups of keywords used for systematically searching for evidence within selected databases</td>
</tr>
<tr>
<td><strong>Secondary Question(s)</strong></td>
<td>Questions that contribute to building up the evidence surrounding the primary question. They may be sub-components of a primary impact question or non-impact questions surrounding the topic under review</td>
</tr>
<tr>
<td><strong>Steering Group</strong></td>
<td>A group of individuals interested in the outputs of the evidence review who work to define the question to be addressed, identify who will carry out the review and guide the review process</td>
</tr>
<tr>
<td><strong>Second Phase</strong></td>
<td>Screening phase that involves reading the abstract or first paragraph of the evidence that has passed the first screening phase in order to identify evidence that will be used further in the evidence extraction and synthesis stages of the ER</td>
</tr>
<tr>
<td><strong>Systematic Map</strong></td>
<td>A searchable database of evidence meeting the screening criteria organised by criteria relating to the primary and secondary questions, keywords and other aspects of interest to the review</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Systematic Review (SR)</strong></td>
<td>A review of a clearly formulated question that uses systematic and explicit methods to identify, select and critically appraise relevant research, and analyse data from the studies that are included within the review. Statistical methods (meta-analysis) may be used to analyse and summarise the results of the included studies</td>
</tr>
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Introduction

There is an increasingly recognised need for evidence-based policies and practices informed through a systematic and objective review of evidence. This helps to ensure the creation of well-designed, effective and efficient policies and interventions. However, it is commonly acknowledged that despite significant research investment there is sometimes a lack of consideration of what the available evidence on a topic presents, when considered collectively and objectively. Such a lack of consideration may result in poor use of evidence in policy and equally in poorly informed pieces of research undertaken on topics that may already have been researched.

United Kingdom Civil Service Guidance has identified a number of methods for reviewing evidence. The varying levels of ERs are illustrated in Figure 1. The levels illustrated represent increasing effort, detail and ability to provide a thorough and systematic assessment of the evidence. Whilst these can be built upon, each level of review can also be carried out independently.

Figure 1: The position of Quick Scoping reviews and Rapid Evidence Assessments in the hierarchy of evidence reviews, adapted from the Civil Service Guidance on Rapid Evidence Assessments.
http://www.civilservice.gov.uk/networks/qsr/resources-and-guidance
Literature reviews have been the traditional response to providing an overview on a subject and are useful for simple fact finding tasks. However, by basing reviews on selected sources, literature reviews can be liable to bias, represent subjective views, and often lack transparency. This has led to increased interest in the use of more systematic approaches to assessing evidence such as SRs. Whilst SRs provide comprehensive searches of evidence and in depth critical appraisal of the evidence found, the time and costs of SRs often make them unsuitable for the needs of Government departments such as the Department for Environment, Food and Rural Affairs (Defra). This is because Defra and their delivery bodies are often required to provide a rapid, and less costly, assessment of evidence in order to answer a question. Additionally, a SR may also be disproportionate for a relatively ‘low risk’ topic or area of enquiry. Furthermore, the amount or types of evidence available may make a SR unsuitable. However, an approach which is as transparent and unbiased as possible is still required.

QSR and REA have been identified in the Civil Service Guidance as a suitable level of ERs that sit between those more traditional review approaches and the more rigorous and resource intense SR approaches. The selection of QSRs and REAs were found by the authors of this guide to meet the majority of evidence needs of the Joint Water Evidence Group (JWEG); comprising of Defra, Environment Agency (EA), Natural England (NE) and the Forestry Commission (FC), whilst balancing the resource constraints and scope of topics. Examples of QSRs and REAs are available from the JWEG community site https://connect.innovateuk.org/web/jweg.

Both QSRs and REAs seek to provide a ‘balanced assessment’ of what is known about a topic related to a policy or practice issue, by using systematic searching methods developed for SRs, but limiting the rigour of their application to reduce the time and expense of production. A QSR aims to provide an informed conclusion of the size and type of evidence available and a summary of what that evidence indicates with respect to the question/s posed. A REA also aims to do this but will additionally provide a critical appraisal of the evidence returned prior to answering the question/s posed. Whilst QSRs and REAs should be as systematic and thorough as possible, the reduced scope and resource constraints mean that they may not be as robust as SRs The main attributes of different types of ERs are detailed in table 1.
Key Principle: Aims of QSRs and REAs

A QSR aims to provide an informed conclusion on the volume and characteristics of an evidence base and a synthesis of what that evidence indicates in relation to a question.

A REA aims to provide an informed conclusion on the volume and characteristics of an evidence base, a synthesis of what that evidence indicates following a critical appraisal of that evidence.

Table 1: Main attributes of different types of ER

<table>
<thead>
<tr>
<th>Attributes</th>
<th>Literature Review</th>
<th>QSR</th>
<th>REA</th>
<th>SR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time duration</td>
<td>1-2 weeks</td>
<td>2-4 months*</td>
<td>3-8 months*</td>
<td>10-18 months</td>
</tr>
<tr>
<td>Used to</td>
<td>Inform on a specific topic</td>
<td>Identify evidence available on a topic and summarise</td>
<td>Identify evidence available on a topic, summarise and provide a critical assessment of the evidence</td>
<td>Comprehensive review and assessment of evidence available on a topic</td>
</tr>
<tr>
<td>Search published data</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Search additional sources of information</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Systematic map of evidence</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Informed conclusion upon completion</td>
<td>Maybe</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Critical assessment of evidence</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Input from external experts</td>
<td>Maybe</td>
<td>Maybe</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Estimated cost</td>
<td>&lt;5,000</td>
<td>10-30,000</td>
<td>20-50,000</td>
<td>80-120,000</td>
</tr>
</tbody>
</table>

*after contract has been established and once project has commenced
Factors that determine the resource needs/cost of an ER include:

- the breadth of the question or issue
- the volume of relevant information
- how easy the information is to locate and obtain
- how quickly the review needs to be done time available for the review
- how much input from experienced researchers is needed
- how experienced the review team is and how well they understand the policy context
- The level of risk associated with the consequences of the ER i.e. acceptable degree of uncertainty

As the aims of a QSR and REA are similar, they share a number of initial and concluding steps. Furthermore, as a REA builds upon assessments of the size and type of evidence available in relation to a question, a QSR in practice could be carried out as a precursor to the more thorough search process and evidence assessment of a REA.

By providing a summary of the available evidence related to a question, the QSR or REA may highlight gaps (or gluts) in the evidence available or improvements that could be made to experimental/study design. In some cases, conducting an ER may indicate that sufficient evidence is available to fully inform an evidence-based policy/practice decision, indicating that no additional research in that particular area is required. Findings may also have implications for directing future research programmes, ensuring that new primary research is targeted to address needs, thereby delivering value for money.

The production of a summary of all evidence relating to the primary question is also a powerful resource that is delivered as part of the ER process. Users/readers of the review are able to access and review the articles, papers and other sources of evidence which may help answer other questions they are working on.

The benefits of having a clear summary of the knowledge available relating to a specific question may also bring benefits in terms of corporate memory. For example, new employees will be able to access a document that can bring them rapidly up-to-speed with respect to the evidence base that supports policy and practice for a particular issue or topic area. As time moves on and policy is updated and research moves forward, there is a working document that can be readily
updated to include new evidence, providing an efficient way of managing knowledge that does not require reinvention, rather renewal.

This document provides a how to guide to the production of QSRs and REAs, expanding upon the high-level descriptions available via the Civil Service web based guidance and builds on the authors’ experience of undertaking evidence reviews for policy and practice needs. Additionally, the approach developed here draws upon guidance produced by expert Systematic Review groups such as the Collaboration for Environmental Evidence (CEE), Evidence for Policy and Practice Information (EPPI), and the Campbell Collaboration. It is the authors’ intention that in time this version of the ‘How to Guide’ will be further refined as various groups test it on a range of topics/questions and to take into account work being done throughout the Defra network on aspects such as quality assurance and the communication of uncertainty.

The document follows the process outlined in figure 2, with each section heading corresponding to a key step in the approach. As the document is primarily designed for practitioners, checklists have been provided to assist with following the steps in the process. A glossary of the terms in bold has also been provided at the beginning of the document.
Figure 2: Flow chart of the steps for conducting a QSR and REA
1 Initial Steps

The planning phase of both a QSR and REA (hereafter an ER) is an important step that distinguishes them from less structured reviews of evidence. The planning phase provides the opportunity to refine the question and approach to ensure that the process that follows delivers outputs that adequately address the evidence needs.

Prior to commissioning the work, the individual who has identified the need for the work should consult with others who have experience of conducting ERs. This is to help ensure that the question to be posed will not lead the review in one particular direction and to minimise bias from the onset.

1.1 Establishing a Steering Group

The individual(s) who have identified that an ER is required will need to set up a steering group (which need not be large) to carefully design the question(s) to be addressed by the ER. This group will mostly consist of those who require the evidence, the commissioning client and those who will benefit from the outputs produced. Additionally the steering group will benefit from an individual with experience of conducting ERs who will be able to challenge the direction of the review and its process in order to encourage the highest possible standards of quality.

The steering group’s role is to critically consider the need for the ER, identify the question to be asked, arrange for a review team to undertake the ER and guide them throughout the process to ensure the outputs meet the needs the steering group has identified. Once a review team has been established (after section 1.3) the lead reviewer will join the steering group in order to provide a point of contact between the two groups.

1.2 Critically Consider the Question and the Most Appropriate Type of ER

The steering group should first collectively explore and address the following:

- Why there is a need for the ER?
- What is the context for the assessment?
What are the physical, economic or social interactions that the review will investigate?

What types of evidence are likely to be available?

What resources are available for undertaking the assessment?

Who could undertake the assessment?

What is the timeframe for delivery?

Is the proposed question the best one to address the commissioner's evidence needs?

What type of ER is most appropriate for the question posed?

Establishing the policy context for the work is essential to understand and later communicate the background to the work, to fully understand the aims of the review and to ensure the ER will provide relevant outputs.

Additionally, developing a **conceptual model** of the interactions that are the focus of the ER will be crucial. The conceptual model describes what interactions are to be explored by the review and where appropriate, makes explicit the assumptions and assumed mechanisms associated with our understanding of those interactions. If possible this should be provided as a systems diagram or a schematic (an example is provided in Figure 3).
This should then be explored at the inception meeting (see section 1.4) which may lead to its revision (in the example provided above this could mean that sheep dip would be added as a potential source). Review of the conceptual model and the policy context will also significantly help to identify whether the question is best addressed via a QSR, REA or an SR.

Understanding the conceptual model and the policy context of the work will also be essential in assuring that the frame of review is not overly narrow, which could lead the results of the review in a particular direction, e.g. only investigating one effect out of a number of potential effects on a population so that the importance of that effect is overly emphasised.
Once clear answers are available to the questions explored by the steering group (above), it will become possible to identify what type of review will be most suitable. Both a QSR and a REA will provide an assessment of the size and type of the evidence available on a topic, enabling judgements on whether the evidence base is sufficient to answer policy needs and questions. Both a QSR and REA will also provide a synthesis of the evidence identified by review to answer the questions/s posed. Additionally, a **REA will also include a systematic critical appraisal of the evidence found** before presenting findings and drawing conclusions.

Once the appropriate type of review has been selected by the steering group, the next step is to assemble an appropriate **review team**.

### 1.3 Form a Review Team

Once the steering group has decided upon the type of review and identified the resources available, they will need to identify and obtain the services of a review team, who will undertake the bulk of the ER and produce the final report. (In the case of the Defra network, the appropriate Evidence Programme Manager will assist with tendering and commissioning of the Review Team).

The review team should consist of individuals who have proven experience in systematically searching evidence along with those who have good technical knowledge of the topic to be addressed by the ER. It is particularly important that the review team is familiar with the context and practical issues surrounding the subject. This will be important to facilitate dialogue with the steering group during the inception meeting (section 1.4) and later during the searching, interpretation and communication of the evidence. The review team must have access to the relevant electronic databases, as only certain organisations will have particular subscriptions and access to journal articles; outside of these organisations access to the evidence
needed will become expensive. The review team should appoint a lead reviewer who will lead the process and also take a position on the steering group.

<table>
<thead>
<tr>
<th>Key Principle: Review Team</th>
</tr>
</thead>
<tbody>
<tr>
<td>The review team will undertake the bulk of the ER and should consist of individuals with experience of undertaking systematic searches and reviews of evidence, along with those that are familiar with the policy and practice context and have technical expertise relevant to the question in order to allow more in-depth interpretation of the ER findings.</td>
</tr>
</tbody>
</table>

1.4 Refine the Question

Once the review team has been established an **inception meeting** should be arranged and attended by all members of the steering group and the review team. Through a discussion of the policy context, and the conceptual model, the topic of the ER should be explored and the specific, primary question of the ER and any related **secondary questions** agreed. By the end of the inception meeting the review team should have all the information they require to develop a draft **protocol** (a written structured methodology paper, see section 2.1) for the ER.

Specific outputs of the inception meeting should include:

- Summary of the policy context and background
- An agreed conceptual model of the physical or social or economic interactions under consideration
- An agreed primary (and if appropriate, secondary question(s))
- An agreed clear and achievable scope for the QSR or REA (e.g. geographical scale)
- Clarification of the various roles of the steering group and review team
- Details required for the submission of the ER’s protocol

A form to assist in achieving the desired outcomes of an inception meeting is provided in the Appendix to this document.

A primary question of the ER may be an **impact question**, i.e. a question assessing positive and negative impacts of a particular intervention or environmental pressure, or a **non-impact question**, e.g. ‘What is the evidence surrounding x?’ or ‘What do
we know about x?’ Questions of a non-impact nature are typical of a QSR, while the primary question for a REA is more commonly an impact question e.g. ‘What is the scale of the impact from x activity on the environment?’ or ‘how effective is intervention x at improving the condition of the environment?’ This is because due to the critical appraisal element REAs are particularly well suited to assessing the impact of a pressure or policy intervention. However, an REA can also take the form of a non-impact question if required.

Answering the primary question set in the inception meeting will be the fundamental aim for both a QSR and REA. The primary question should ideally be a closed question containing the relevant Population, Intervention, Control, Outcome (PICO) elements. Identifying the PICO elements will help to ensure that the question is clear and focused. However, for non-impact questions not all elements such as intervention and comparator will be applicable to the ER. An example question and its identified PICO elements is provided in table 2.

Table 2: Example QSR and REA questions with associated PICO elements (adapted from Civil Service Guidance for REAs http://www.civilservice.gov.uk/networks/gsr/resources-and-guidance/rapid-evidence-assessment/).

<table>
<thead>
<tr>
<th>Question</th>
<th>Do Teen Courts reduce rates of juvenile re-offending?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Population</strong></td>
<td></td>
</tr>
<tr>
<td>The subject or unit of study</td>
<td>Juveniles (10-18 years old)</td>
</tr>
<tr>
<td><strong>Intervention/Exposure</strong></td>
<td></td>
</tr>
<tr>
<td>The proposed management regime, policy or related intervention/ exposure applied or investigated</td>
<td>Teen Courts</td>
</tr>
<tr>
<td><strong>Comparator</strong></td>
<td></td>
</tr>
<tr>
<td>The control with no intervention or an alternative to the intervention</td>
<td>Standard juvenile courts</td>
</tr>
<tr>
<td><strong>Outcome</strong></td>
<td></td>
</tr>
<tr>
<td>The effects of the intervention</td>
<td>Juvenile re-offending rates</td>
</tr>
</tbody>
</table>

Secondary questions can also be investigated by the ER, these are typically more ‘open’, non-impact questions. Secondary questions can help inform how the intervention is applied and perceived. They may also reflect the diverse issues
surrounding the primary question, for example concerns and aspirations of stakeholders related to the assessment of the effectiveness of a policy driven intervention. The potential list of questions should be carefully considered so that the analysis is realistic for the scope of the review and addresses the most relevant issues surrounding the primary question. Where secondary questions are investigated it should be noted that the main focus of the ER will be the primary question, secondary questions will only be addressed once the initial search for the primary question has been conducted. If any information relevant to the secondary question is found during the evidence search and screening process it should be recorded when data extraction takes place (see section 2.4).

Setting the primary question and secondary questions to be addressed by the ER may require significant time and discussion but is essential to ensure the ER is fit-for-purpose.

At the end of the inception meeting both the steering group and review team should feel confident that a draft protocol for the evidence search will be submitted by the review team to the steering group by an agreed date.

These initial stages of the ER will be led by the steering group in order to set up the review team and ensure that they able to develop the protocol for the evidence search. Once this has been done, the review team will then produce the ER protocol which will be submitted at a date agreed at the inception meeting and then search and synthesise the related evidence. These stages led by the review team, will be covered in the subsequent sections of this document.

**Key Principle: Establishing the primary question**

The primary question to be addressed by either a QSR or a REA should, where possible, be a well-defined closed question identifying the relevant Population, Impact, Control, Outcome (PICO) elements. Where this is not possible, the review is likely to be a QSR rather than an REA and should incorporate as many as the PICO elements as possible.
2 Defining and Conducting the Evidence Search

It is the task of the review team to conduct the searching and synthesis stages of the ER. However, there should be frequent contact between the review team and the steering group to ensure progress is reported and that the steering group are consulted on each stage. This contact can take the form of quick ‘catch up’ conference calls or meetings as required.

Both a QSR and a REA use a systematic approach to searching for evidence. The main difference between a QSR and an REA is that an REA includes a systematic, critical appraisal of the evidence (covered in section 3). However, additionally the evidence search of a REA will generally be more in depth and comprehensive than a QSR.

2.1 Develop a Protocol

Once the steering group and review team have refined the question, a working protocol should be developed that will act as an *a priori* guide for the ER. Developing such a protocol will assist with increasing the rigour of the ER, will ensure transparency and provide a clear methodology to be followed. The protocol will be subject to consultation with the steering group to ensure the design of the ER is suitable and achievable. The protocol will act as a ‘working’ reference document throughout the life of the ER as the protocol may need to be reviewed and updated during the review process.

<table>
<thead>
<tr>
<th>Key Principle: The ER Protocol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developing a search strategy and formally detailing this in the protocol document will help to ensure that the ER process is rigorous and transparent</td>
</tr>
</tbody>
</table>

2.1.1 Protocol Template

The protocol will outline the background to the ER and provide a transparent guide to how the ER will be carried out.
The protocol should explicitly state the following elements:

- Authors – Team members and report authors
- Background – Outlining the rationale behind the ER including the policy context
- Objective – Clarify the primary question and secondary questions if used, detailing the PICO (Population, Intervention, Comparator, and Outcome) elements
- Scope – Provide clear limits to the question elements such as geographic range, topic, language, and time period
- Conceptual model – A conceptual model of the interactions that are the focus of the ER.
- Methods - Outline of how the following search, extraction and synthesis steps are to be carried out, including:
  - Search keywords
  - A strategy for where evidence will be searched for, covering peer-reviewed, grey literature and unpublished evidence
  - Outline inclusion and exclusion criteria
  - Strategy for extracting information
  - Strategy for critical appraisal, detailing how will evidence be weighted, if a REA is being carried out
  - Indication of how information will be synthesised
  - Outline of conflicts of interest and sources of support to ensure transparency
  - References and sources of information used in the protocol

Using this structure as a template will ensure that the required elements are included within the protocol.

2.1.2 Developing the Search Strategy Included in the Protocol

In order to search for evidence in a systematic and transparent manner, keywords related to the question should be used. These keywords should be identified in consultation with the steering group and can be identified from the primary question and the PICO elements of the question. The use of synonyms and antonyms of these words should also be explored. The development of keywords used by the ER will be an iterative process with keywords and different search locations being trialled...
and refined as necessary during the development of the protocol. This is to ensure that the amount of evidence returned by the search is optimised for the scope of the ER.

### Key Principle: Keywords

| Searching for evidence must be done in a systematic manner using clearly recorded keywords. This should be done to reduce bias within the searching phase |

A strategy for where evidence will be searched for must also be established. This should consider databases of scientific literature for peer-reviewed evidence, relevant websites for grey literature and also any sources that can be used to gather unpublished evidence. It is important that the search strategy covers these three types of evidence in order to minimise the problem of publication bias.

The types of evidence used in the review and thus where to search will be determined by the ER question. For well-established and well researched areas, peer reviewed evidence will be available. However, for contemporary subjects that may not have been academically assessed to a high degree, or where the subject is relatively new, other sources of information will be necessary. Grey literature and published non-peer reviewed sources of literature will be particularly useful in these cases. Unpublished information that is not openly available, for example evidence in the form of internal documents and expert opinion, may also be required. If the ER is based on an intervention question, grey literature and unpublished evidence may be particularly important. This is because it has been demonstrated that often there is a publication bias which results in studies that do not find effects or impacts being less likely to be published (Gough et al., 2013).

Members of both the steering group and review team may be well placed to suggest the types of evidence most likely to be used by the ER and the places where it can be searched for. This information will be captured in the protocol. The protocol should list the places to be searched, giving the rationale in order to ensure transparency. Any types of evidence that will not be considered by the ER, such as other secondary research and reviews or theoretical and conceptual studies, should also be stated in the protocol with justification of the reasons why.
The level of detail of the protocol and the time spent developing a search strategy \textit{a priori} will be dependent on the scope and limits of the ER and should be discussed at the inception meeting.

2.1.3 Protocol Consultation

Once the review team have put together a draft protocol considering all aspects in the checklist above, it should be reviewed and agreed by the steering group, setting a common agreement and starting point for the scope and delivery of the ER. As stated in Section 2.1, the protocol is a working document that may need to be refined through an iterative process as the ER progresses. Any changes should be made via consultation between the steering group and review team. Good communication is essential to ensuring the review process is flexible, transparent and objective.

2.2 Search for Evidence

After agreeing the protocol with the steering group the review team should then use the identified search keywords to search for the evidence in the agreed locations.

In conducting any search it is important to strike a balance between sensitivity and specificity, and between a comprehensive or insufficient search. Therefore, despite the search terms and locations being decided on at the protocol stage, these may need to be adjusted in order to balance the specificity of the search with the number of results returned.

For each search conducted, a record of the date of the search, the database and search terms used, along with the number of hits and any date limits of the search should be recorded. The details of the individual pieces of evidence should then be recorded in a clear format that could be made available for others in order to ensure a transparent process. The use of reference software such as Endnote, ReFworks, Reference Manager and Mendeley are recommended for this. Where this is not possible, a spreadsheet should be used that clearly records the publication name, date, and source location – including a hyperlink where possible, or saving of the article. Once the records of each search have been completed these should then be combined to give a full list of the evidence found, removing any duplicates. Records of these search results should be considered a valuable part of the ER process as
they provide transparency and a reference list of potentially relevant articles for anyone wishing to investigate the topic in the future.

There are different considerations for searching for different types of evidence, which are outlined in the sub-sections below. Due to these differences, experts in information searching, such as librarians, could be consulted or included as members of the review team.

2.2.1 Peer Reviewed Evidence

Bibliographic databases of published journal articles are a common place to search for peer reviewed evidence. Some such as Web of Science additionally allow the searching of conference proceedings. However, these databases usually cover a particular academic discipline and/or topic area. As ER questions do not always match academic disciplines exactly it is recommended to use several of these databases. Access to most of these databases depends on library subscriptions, and so will vary between institutions and organisations.

The internet can also be used to search more broadly for peer reviewed evidence. For such searches it may be better to use a comprehensive search engine (e.g. Google, Bing), a search of Google Scholar. The disadvantage of using such internet searches is that it is often more difficult to record the search method in a way that others can reproduce. Furthermore, consideration should be paid to the fact that internet searches will often order the results returned from searches in specific ways, for example as a result of a citation index, or a popularity measure.

When searching databases or the internet Boolean operators e.g. AND, OR, NOT, can be used to create relevant search strings out of the identified keywords. Databases often have the facility to search for different versions of words, known as stemming and synonym searching. For example often words that potentially have multiple endings should be given the truncation or wildcard symbol *, i.e. chang* can be used to search for all of the following; change, changes, changed, changing etc. In order to be transparent all the combinations used to search for evidence should be clearly recorded. The keywords can also be used to develop some exclusion criteria (using the NOT operator) that will be used to identify studies that are not relevant but may be returned in the search result, for example, to maximise the return of studies related to the population identified through the PICO elements. Databases will vary

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in the manner keywords are used (e.g. different symbols for wildcards) and therefore the help pages of each database might have to be viewed to identify how search strings need to be modified for different searches.

2.2.2 Grey Literature

Grey literature, may not be readily identified by searches of online databases or the internet. Specific searches of organisations’ websites may need to be undertaken using a sub-set of the search strings developed for searching online databases in order to reflect the differences in the search engines of organisations websites. In many cases a manual search through the listed reports might be necessary. A list of relevant organisations should have been developed in the protocol but may need to be refined or added to at the searching stage.

Certain documents identified by online searches or by stakeholders, or the steering group may not be available in an electronic format and will require contacting the organisation to make a copy or view the resource. It may also be necessary to physically search organisations’ libraries especially if the evidence of interest is historical or highly specific in nature.

Theses and dissertations may be of relevance to a subject, especially if they report primary findings from experimental studies. These can be searched for using platforms such as CAB abstracts (http://www.cabi.org/publishing-products/online-information-resources/cab-abstracts/) which relates specifically to the applied life sciences.

2.2.3 Unpublished Evidence

The sources of unpublished evidence can be diverse but typically would come from unpublished reports or presentations, internal documents of organisations and personal opinion from specialists and experts. Such evidence is particularly needed in the case of contemporary topics that do not have much published information available.

Unpublished evidence in the form of reports and presentations can be found by using the existing networks between individuals and groups within government departments and organisations. The existing networks of the review team may also
be useful for this. Additionally key stakeholders could be contacted to request any relevant evidence.

Key experts in relevant fields should also be identified and contacted to request guidance on extra sources of evidence that would not be found by traditional searches. Evidence in the form of the opinions of experts regarding the ER’s questions may also be used. Where this is done structured methods such as questionnaires or interviews and workshops are recommended. At all times full details of the evidence provided by experts should be recorded so that there is a clear audit trail for the evidence produced.

<table>
<thead>
<tr>
<th>Key Principle: Types of evidence found</th>
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<tbody>
<tr>
<td>The question asked by an ER will partly determine the amount of evidence found from the different types of evidence searched. Grey literature and unpublished evidence may be needed for contemporary questions that have not received much academic attention; this type of evidence can also help to overcome publication bias.</td>
</tr>
</tbody>
</table>

2.3 Screen the Search Results

Once a search for evidence is complete it is necessary to screen the results in order to provide a more relevant evidence base for the evidence synthesis stage. In order for this to be done in a systematic manner a predefined set of inclusion/exclusion criteria should be established at the protocol stage. However, these can be subjected to some revision and refinement at the screening stage if necessary.

Inclusion/exclusion criteria can be taken from the keywords in the topic or question or the question’s PICO elements. The establishment of the inclusion/exclusion criteria should be done in consultation with the steering group. Example considerations for inclusion/exclusion criteria could include:

- Geographical references, e.g. UK/ European only
- Climatic conditions, e.g. temperate climatic conditions only
- Language restrictions, e.g. only evidence published in English
- Date restrictions, e.g. only evidence from after 2000
- Population restrictions e.g. rivers but not lakes
Outcome restrictions e.g. water quality measured as a reduction in nitrogen and phosphorus

Screening the evidence found by the search should be done by scanning the titles of the evidence sources returned for the keywords identified by the inclusion/exclusion criteria. Often a two phased approach will be needed. The first phase screening, also known as one stage screening or the first pass, includes reading only the title or headline of the evidence found. The evidence sources are then marked as, clearly relevant, clearly not relevant or uncertain. This ensures efficient use of time so that not all of the results returned have to be read in full. This may also be necessary for evidence found by internet searches as often only the title and abstract are available, with full access restricted unless the review team have the relevant subscriptions. If the evidence is found to be clearly relevant or uncertain at this first stage it should then be obtained in full. This evidence should then be used to complete second phase screening or the second pass. This involves reading the abstract or first paragraph of the clearly relevant or uncertain evidence to identify those that are found to meet the inclusion/exclusion criteria and will be used further in the evidence extraction and synthesis phases. Databases containing the details of the outcomes of the first phase and second phases screening should be created and retained in order to provide an audit trail for the ER process.

Good practice for the screening phase involves one person screening all the evidence found with an additional person independently screening a sub-section and comparing. This will ensure that bias has been reduced and the inclusion/exclusion criteria are being applied consistently.

<table>
<thead>
<tr>
<th>Key Principle: Screening</th>
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<tbody>
<tr>
<td>The screening of search results ensures that only the most relevant findings are taken to the evidence synthesis stage. Using inclusion and exclusion criteria to do this reduces bias but must be clearly recorded in order to ensure transparency in reviewer decisions during screening process.</td>
</tr>
</tbody>
</table>

The evidence that has met the inclusion/exclusion criteria should then be stored in a systematic manner. This could be done for example under headings that reflect the type of evidence found e.g. peer reviewed, grey literature etc., or under headings detailing the question’s PICO elements e.g. subject/population, comparator,
intervention together with any other relevant information. A combination of both these approaches could be used so that for each PICO element the type of evidence found can be clearly identified. The format chosen will depend upon the topic and question being assessed. Useful tools for this process include Microsoft Excel and Access.

The refined list of search results will go forward for use in the evidence extraction, critical appraisal (if a REA is being conducted) and synthesis stage. All the other items that have not met the inclusion/exclusion criteria at both the first and second screening stage should be recorded and made available as supplementary information alongside the final ER report. Not only will this aid transparency but such a reference list could be useful for someone wanting to develop the ER or with an interest aligned to the ER topic.

2.4 Extract the Evidence

Once the evidence has been screened the next stage is to build on the database of included evidence to extract information relevant to the ER's question in a systematic manner. The method to collate extracted evidence will be dependent on the type of evidence found and on the aim of the ER. However, the information to be extracted from the articles will need to be defined a priori in the protocol and used to create a database template. Examples of the information to be extracted include:

- The type of evidence
- The research design used
- The population studied
- The geographical context
- Details of the intervention applied
- Outcomes measured
- Evidence relating to the primary question (e.g. evidence of impact/response measured or observed)
- Evidence relating to secondary questions

Developing a template for information extraction will help to ensure that the extraction is done in a way that is consistent for each piece of evidence and can be readily understood without the original source being re-read. If during the process of extraction it is found that the existing method is not capturing all relevant information
then the template will require updating. Any changes will be recorded in an amended protocol document. The resulting database of extracted information from evidence passing the screening criteria is often referred to as a systematic map of the evidence and is an essential output of the ER process. An example of a systematic map, produced by Randall and James (2012) can be found at: http://www.environmentalevidence.org/SR35.html.

There is currently little agreement on a standardised method for extracting qualitative evidence, i.e. evidence not containing numerical data. However, this document recommends descriptive mapping of the evidence according to keywords outlined in the primary question PICO elements and secondary questions. The focus will be upon systematically extracting the relevant information surrounding those keywords so that synthesis of the evidence can be undertaken. For quantitative evidence, i.e. evidence that is expressed in numbers or statistics, the extraction process requires the numerical data to be captured for use in subsequent synthesis.

As an REA requires evidence found to be critically appraised, additional information on the methods used in each evidence source should also be recorded. How the evidence will be assessed for quality needs to be agreed at the protocol stage and will determine the design of the template used for extraction. This will be discussed further in section 3.
3 Critical Appraisal of the Evidence for REAs

An essential part of an REA is to critically appraise the evidence found by the search. This ensures more relevant and reliable evidence is given greater consideration at the synthesis stage. Such detail is crucial in providing an objective and transparent assessment of the REA question. Critically appraising the evidence involves assessing each piece of evidence to consider both the relevance of the evidence to the REA question and also the robustness of the methodological quality utilised. The assessments for both of these aspects must then be combined to provide an overall appraisal for each piece of evidence returned by the review.

In order to facilitate the appraisal of evidence it is useful to describe and categorise each piece of evidence included by the REA in terms of study type, design and method.

There are three main types of evidence;

- Primary research - which empirically observes a phenomenon at first hand, collecting, analysing or presenting ‘raw’ data.
- Secondary reviews - which interrogate primary research studies, summarising and interrogating their data and findings
- Theoretical or conceptual studies - which focus almost exclusively on the construction of new theories rather than generating, or synthesising empirical data (DfID, 2014)

Evidence can also take the form of expert opinion gathered in a structured manner. At the protocol stage it may have been agreed that certain types of evidence would not be considered by the REA, for example not to include theoretical studies or secondary studies.

Once the evidence type has been identified, the design and method used to produce each individual piece of evidence should be determined. A research design is the framework in which research is undertaken, it employs one or more methods to collect and analyse data (DfID, 2014). Primary research tends to employ one or more of the following:
Experimental research design (also called intervention designs or randomised control trials): These: 1) manipulate independent variables, and 2) randomly assign subjects to treatments/interventions and controls. This increases the chances that any effect recorded is a direct result of the treatment.

Quasi-experimental research designs: employ one but not both of the key features of experimental research designs. For example the study may consider an intervention treatment but not randomly assign, or be used where it is ethical or practical to manipulate an intervention, e.g. a pollution spill. Here researchers exploit other naturally occurring factors to control for differences between the subjects in the study.

Observational; these display neither of the key features of experimental design. An impact may be investigated but the researcher does not manipulate the intervention and does not assign subjects to the intervention or control and is acting merely as an observer. These can use quantitative data collection and data analysis techniques to infer causal relationships between phenomena e.g. case control designs. Other examples include case studies and interviews (DfID, 2014)

Secondary research may be in the form of reviews that either systematic or non-systematic in nature. Expert opinion may be in the form of questionnaires, interviews or workshops.

Categorising evidence in such a manor allows an initial understanding of how the evidence was produced; this helps the review team to make judgements about the appropriateness of the evidence for the question being addressed by the REA.

3.1 Assessing the Relevancy of the Evidence

Using the categorisation of the type, design and method used by the individual pieces of evidence as outline above, the relevancy of that evidence can then be assessed. As a potential wide range of questions could be addressed by a REA it must be recognised that different research designs and methods are more or less appropriate for answering different research questions. However, assessments of the relevancy of evidence to the REA question should consider:

- The relevancy of the method used to the REA question
- The relevancy of the evidence to the target subject/population of the REA
The relevancy of the intervention assessed
The relevancy of the outcome measured

3.2 Assessing the Robustness of the Evidence

The review team should then make an assessment of the robustness of the evidence returned by the REA, i.e. the quality of the evidence and the degree to which bias has been minimised. Again using the categorisation of the type, design and method used for each piece of evidence will be important for doing this.

For each piece of evidence assessments of the robustness of evidence should consider whether:

- Specific questions and hypotheses are addressed
- Related existing research or theories are acknowledged
- Sources of funding and vested interests are declared
- The methodology used is clearly and transparently presented
- The degree to which the method reduces bias
- The method is appropriate for the research question and the conclusions reached by the study
- Assumptions made are outlined
- The geography and context of the study is clear, with a discussion of how relevant findings are to other contexts
- The methods used for measurements and analytical techniques are reliable
- Measurements and analytical techniques have been validated and verified
- Conclusions are backed up by well presented data and findings
- Links between descriptions of existing research, data, analysis and conclusions are clear and logical
- Limitations and quality have been discussed

The criteria and process used to assess methodological robustness will be dependent on the type and amount of evidence found by the review. Where the evidence base is mainly quantitative in nature and reports on details such as method and data confidence, the assessment can be guided by SR approaches that assess specific elements of study design. There are a number of published critical appraisal guidelines that could be used as a guide, some examples of which have been provided in the appendix (section 8.4). However, the majority of these have been
established for reviews in the health sciences, often using a hierarchy of research methodology based on the degree to which bias and error has been minimised. Whilst such hierarchies are useful in informing the design of quality assessments for reviews regarding the environment they must be modified to ensure relevance to the individual review questions.

Where evidence being considered is more qualitative in nature then the REA may need to develop a novel method by which to assess methodological quality. Civil Service guidance on quality in qualitative evaluation states that criteria used should assess findings, design, sample, data collection, analysis, reporting, reflexivity and neutrality, ethics and auditability (Spencer et al., 2003). Any criteria and process used needs to be transparent and consistent to ensure confidence in the REA.

The two elements used to assess evidence, relevancy and robustness, should be combined in order to provide an overall weighting for each piece of evidence. This can be done in a number of ways that depends upon the evidence being considered. One example is to use a matrix, whereby the weighting of relevance and methodological quality are combined to prove a combined weighting. This could be achieved by considering: (i) a score for relevance between 1 and 3, where 1 is of low relevance, and 3 is of high relevance; and (ii) a score for methodological quality, where 1 is low and 3 is deemed high – according to specific indicators outlined. These scores can then be combined so that we can weight studies from scores 1 (1*1) to 9 (3*3) – whereby those articles that are most relevant and have the best quality methods are weighted the highest, and those with little relevance and poor method are ranked lowest.

Judgements applied for the assessment of relevancy and robustness can be used to exclude evidence as well as for weighting. For example, a minimum quality appraisal level can be set that defines those articles to be included and those of insufficient quality for use in any synthesis. This would be up to the review team and will often require an iterative process of consideration as when articles are read and data extracted it may become clear that certain study types are not relevant or have a methodological quality that is unacceptable.
A novel method for applying quality assessments to scientific data and synthesising data is provided by the open access EcoEvidence Analyser Software developed by the eWater Cooperative Research Centre in Australia (Norris et al, 2011). This looks at weighting the evidence according to study design and sampling units through the application of a standard tool. This is particularly suited to testing cause-effect hypotheses and impact type questions.

Once each piece of evidence found by the ER has been critically appraised the overall quality of the evidence base should then be assessed. For example, whether the majority of the evidence found is of a high or low quality, or whether there are marked differences in the quality of the evidence base.

**Key Principle: Critical Assessment of the Evidence**

Critical assessment of the evidence found by the review process is a key component of a REA. This must assess information for both relevancy and robustness. This could be done in a number of ways depending upon the information being considered but must be presented clearly to ensure transparency.
4 Synthesis of the Evidence

The synthesis stage requires all evidence that has met the screening stages to be read and used to generate findings to answer the ER question and to enable conclusions to be made on the adequacy of the evidence base.

The principles of synthesising evidence for a REA and a QSR are similar and are outlined below. However, a REA includes a critical appraisal of the evidence, so that evidence that is more relevant and reliable is given greater weight when establishing an answer to the question/s being addressed by the REA.

The synthesis of the evidence needs to describe four aspects:

- The volume and characteristics of the overall evidence base
- What the evidence base indicates in relation to the question(s) posed by the ER
- The implications of the findings for policy and/or practice
- Suggestions for further research

4.1 Describing the Volume and Characteristic of the Evidence Base

Providing a description of the volume and characteristics of the evidence found by the review enables the adequacy of the overall evidence base to answer the primary question to be determined.

The details described will be specific to each question but could include descriptions of the following:

- Types of evidence (e.g. amounts of primary research/ amounts of peer reviewed evidence and grey literature)
- Research design used (e.g. experimental/ quasi-experimental/ observational)
- Populations studied
- Interventions studied
- Outcomes measured
- Details of context (for example geographical region and climatic conditions).

Summarising details in such a way will also enable any gaps or gluts of evidence to be identified which is of value when commissioning future research and can also...
highlight any concerns regarding the evidence base’s ability to address the ER’s primary question. A description of the volume and characteristics of the evidence found for a REA also needs to include an overall summary of the critical appraisal of the evidence found, e.g. How much similarity there is in the quality of evidence, how much of the evidence was assessed as good quality.

4.2 Describing What the Evidence Indicates

The synthesis stage then needs to consider what the evidence indicates in relation to the ER’s primary question. Again, how to do this will be context specific, depending on the question and the evidence base. However, for both a QSR and a REA it is likely that a narrative synthesis, as opposed to a quantitative synthesis or meta-analysis, will be required as these are likely to be beyond the scope of most of these types of ERs.

Narrative syntheses have been identified as being particularly useful when communicating findings for policy and practice (Popay, 2006). Such syntheses primarily rely on the use of words and text to summarise findings from multiple studies. However, tables and graphical descriptions can also be used to support narrative descriptions, for example a matrix of all the screened evidence against criteria relating to the primary question, e.g. keywords, data types and outcomes measured could be used. Additionally, this could include some quantitative data if suitable.

The UK Economic and Social Research Councils Methods Programme produced guidance on ways in which the process of narrative synthesis can be made more systematic and transparent (Popay, 2006). First it states that a theory of how pressures or interventions work is required. Whilst this will have been done during the development of the conceptual model (see section 1.2) it will be of value to reconsider it at this stage in order to focus the synthesis. Then the synthesis should develop a preliminary description of the results of the evidence included. Here it will be useful to organise the results of the evidence so that they are able to describe patterns in the findings. As patterns emerge from the preliminary description, the relationships between the studies should be explored, focusing both on the characteristics and the findings of the individual pieces of evidence. Any factors that may explain differences between the studies should be explored, e.g. how and why interventions or pressures have/do not have an effect in a particular way.
Based on the relationships within the evidence base, statements regarding the consistency and convergence of the evidence can be made. Examples could include:

- **Consistent evidence** = A range of different forms of evidence point to identical, or similar conclusions
- **Contested evidence** = One or more study/studies directly refutes or contest the findings of another study or studies
- **Mixed evidence** = Studies based on a variety of different designs or methods, applied in a range of contexts, have produced results that contrast with those of another study (DfID, 2014).

Such statements will need to be backed up with the evidence, e.g. how many individual pieces of evidence support, how many contest and under what scenarios.

During the synthesis stage consideration should also be given to the strength of the synthesis. The strength of the synthesis will depend on both the quality and the quantity of the evidence base it is built on. However, the quality of the synthesis will also be dependent on steps taken to minimise bias at this stage and throughout the project. A good synthesis will acknowledge the limitations within the ER process.

### 4.3 Implications of the Findings

Once the evidence found has been used to answer the ER question the final part of the evidence synthesis must relate the findings of the ER to the policy context outlined at the inception meeting. For example, is the evidence supportive of current policy and/or practice and is further research required?

### 4.4 Suggestions for Further Research

Finally, the synthesis of the evidence should include a discussion of suggestions for further research, including whether a more in depth ER is recommended.

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**Key Principle: Synthesis of evidence**

The synthesis stage requires all evidence that has passed screening to be used to generate findings that answer the ER question. The synthesis should contain an overview of characteristics of the evidence base, a summary of what the evidence indicates, the policy and practice implications and suggestions for further research.
5 Communication of the Evidence Review Findings

Ensuring that the outputs of the ER are communicated effectively will be essential to ensure the success of the ER. A report communicating the findings in a concise and transparent manner appropriate for the steering group and a wider readership must be produced.

Essential elements to be included in the ER report are:

- A non-technical executive summary of the ER findings (not exceeding 2 pages)
- Background drivers for the work and the policy context, along with a conceptual model of what the work is investigating
- Details of the method used by the ER
- Synthesis of the evidence found by the ER (including descriptions of the volume and characteristics of the evidence base, summary of what the evidence indicates and the policy and/or practice implications of this)

In addition to the report, the review team should also supply the databases of all the evidence found at each stage of screening (i.e. initial search, 1st pass and 2nd pass), so that an audit trail of how the ER was conducted can be followed. The systematic map of the extracted information from the evidence meeting the inclusion criteria should also be provided. These could be of use for those interested in conducting further work in relation to the ER or in a topic similar in nature.

The non-technical executive summary is required to ensure that the ER findings can be readily understood, both by those on the steering group and additional people who have an interest in the topic of the ER. It should provide an overview of the whole project but should primarily focus on communicating the results of the evidence synthesis and what the evidence indicates in relation to the primary question and the policy context.

The non-technical executive summary should be accompanied by a more detailed report of the work, outlining the background drivers for the work, the method used, the volume and types of evidence found, and a full description of the synthesis of what the evidence tells us with respect to the question/s posed.
The background and policy context of the work will have been defined at the inception meeting and captured in the protocol but should be included with the final outputs of the ER for completeness. The final report should also include a section providing a clear description of how the ER was conducted. This is essential to ensure transparency in the ER process and to provide confidence that bias has been minimised and the outputs are credible. Details of how the search was conducted should include:

- The search terms used
- The inclusion/exclusion criteria
- The number of records found by each search
- The number of records meeting the screening criteria at the 1st pass
- The number of records meeting the screening criteria at the 2nd pass

Using a flow diagram is a clear way to communicate the number of records included and excluded at each stage of the ER, an example is provided in Figure 4.

---

**Figure 4**: An example flow diagram to document the records of evidence found at each stage of the ER adapted from The PRISMA Group, 2009 (http://www.prisma-statement.org/2.1.4%20-%20PRISMA%20Flow%202009%20Diagram.pdf)

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Where an REA has been conducted there will also need to be communication of how evidence was critically assessed, with the criteria used to assess relevancy and robustness detailed, along with records of the scores for each evidence source found.

Finally the detailed synthesis of the evidence found by the review should be communicated. This is likely to be the stage that the steering group and particularly the individual commissioning the work, are most interested in, therefore the reporting of the evidence synthesis should be in a format that meets their needs, paying particular attention to drawing out implications for policy and practice and any implications for further research.

<table>
<thead>
<tr>
<th>Key Principle: Communication of findings</th>
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<tbody>
<tr>
<td>Ensuring that the findings are reported in a clear and transparent manner will be essential to the success of the ER. A non-technical executive summary, description of the background drivers of the work and the methods used along with the synthesis of the findings are required to ensure transparent communication with the steering group and wider audiences.</td>
</tr>
</tbody>
</table>
6 Final steps

Once the summary of the ER has been completed it should be passed back to the steering group for final review. They should consider whether:

- The ER has provided a clear and sufficient response to the question(s) proposed
- The quality of the ER is the highest possible given the scope of the review
- The implications of the findings of the ER for policy and practice have been clearly set out
- Suggestions for further research and analysis have been clearly set out

The potential need to build on the review, i.e. conduct a REA after a QSR or a SR after a REA, should then be considered. The need for this will be dependent on the findings of the completed ER e.g. if there is sufficient evidence and a clear demand from the commission client.
7 References


8 Appendices

8.1 Checklist for the completion of a QSR

Initial steps.
Has.......  
- A steering group, containing those who have identified the need for the work and those who will benefit from it been established?
- The need for the QSR assessed, outlining:
  - why there is a need for the QSR?
  - the policy and/or practice context of the work?
  - the resources available for the review?
- A review team who will undertake the work been formed?
  - do they have experience of reviewing evidence in a strategic manner?
  - have some technical knowledge in the area and an understanding of the policy and/or practice context?

Inception meeting
Has.......  
- The policy context been outlined?
- The conceptual model of the interactions that are the focus of the ER been outlined?
- The question been refined:
  - The primary question agreed?
  - Is the primary question a well-defined and closed question?
  - Is it an impact or non-impact question?
  - The PICO elements of the question been identified?
  - The secondary questions (if any) been identified?
- The roles of the steering group and review team been clarified?
- The date for the submission of the protocol set?

Development of a protocol
Has....  
- A protocol containing the elements on page 14 been drawn up
- The search strategy been trialled and adjustments made to the protocol if necessary
- Agreement from the steering group been achieved
- Milestones and deadlines for the evidence search and synthesis been agreed between the review team and steering group
Evidence Search
Have......
- The identified keywords been used?
- The identified databases and sources been searched?
- Any necessary refinements to the search strategy been made and recorded?
- The results returned recorded in a database?

Results Screening
Have......
- The inclusion and exclusion criteria, identified in consultation with the steering group, been used?
- The results returned from the search scanned for the inclusion/exclusion criteria?
- Outcomes of the applications of the inclusion/exclusion criteria clearly recorded for all search results?
- Results meeting the inclusion criteria stored in a systematic manner?

Synthesis of the evidence
Has....
- The volume and characteristics of evidence found been described?
- The findings of the evidence meeting inclusion criteria outlined?
- The implications for policy and/or practice been described
- Suggestions further research been made?

Communication of findings
Has.....
- A report been provided that contains:
  - A non-technical executive summary (not exceeding 2 pages)?
  - Background drivers for the work and an outline of the scope of the work?
  - A clear and transparent description of the methods used to search for and synthesise evidence?
  - A synthesis of the evidence containing the elements above?
- A database of the evidence returned from all searches been provided
- A systematically organised database of the extracted evidence (a systematic map) been provided

Final steps
Has......
- The QSR has provided a clear and sufficient response to the question(s) proposed
- The quality of the review is the highest possible given the scope
- Implications for further work have been discussed and decided upon

JWEG - Making the most of our water evidence
8.2 Checklist for the completion of a REA

Initial steps.

Has......

- A steering group, containing those who have identified the need for the work and those who will benefit from it been established?
- The need for the REA assessed, outlining:
  - why there is a need for the REA?
  - the policy and/or practice context of the work?
  - the resources available for the review?
- A review team who will undertake the work been formed?
  - do they have experience of reviewing evidence in a strategic manner?
  - have some technical knowledge in the area and an understanding of the policy and/or practice context?

Inception meeting

Has......

- The policy context been outlined?
- The conceptual model of the interactions that are the focus of the ER been outlined?
- The question been refined:
  - The primary question agreed?
  - Is the primary question a well-defined and closed question?
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  - The PICO elements of the question been identified?
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- The date for the submission of the protocol set?

Development of a protocol

Has....

- A protocol containing the elements on page 14 been drawn up
- The search strategy been trialled and adjustments made to the protocol if necessary
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Evidence Search
Have......
- The identified keywords been used?
- The identified databases and sources been searched?
- Any necessary refinements to the search strategy been made and recorded?
- The results returned recorded in a database?

Results Screening
Have......
- The inclusion and exclusion criteria, identified in consultation with the steering group, been used?
- The results returned from the search scanned for the inclusion/exclusion criteria?
- Outcomes of the applications of the inclusion/exclusion criteria clearly recorded for all search results?
- Results meeting the inclusion criteria stored in a systematic manner?

Critical assessment of the evidence
Has.....
- The relevancy of the evidence been assessed consistently?
- The robustness of both quantitative and qualitative evidence assessed consistently?
- The measures of relevancy and robustness been combined?

Synthesis of the evidence
Has....
- The volume and characteristics of evidence found been described?
- The findings of the evidence meeting inclusion criteria outlined?
- The implications for policy and/or practice been described
- Suggestions further research been made?

Communication of findings
Has.....
- A report been provided that contains:
  - A non-technical executive summary (not exceeding 2 pages)?
  - Background drivers for the work and an outline of the scope of the work?
  - A clear and transparent description of the methods used to search for and synthesise evidence?
  - A synthesis of the evidence containing the elements above?
  - A database of the evidence returned from all searches been provided
A systematically organised database of the extracted evidence (a systematic map) been provided

**Final steps**

Has......

- The REA provided a clear and sufficient response to the question(s) proposed
- The quality of the review is the highest possible given the scope
- Implications for further work have been discussed and decided upon
8.3 Inception meeting form

Inception meeting checklist

Specific outputs of the inception meeting should include:

- An agreed conceptual model of the science-policy interface surrounding the primary question
- An agreed primary question
- Agreed secondary question(s) if relevant
- An agreed clear and achievable scope for the QSR or REA
- Clarification of the various roles of the steering group and review team
- Details required for the submission of the ER’s protocol

The table overleaf will help guide the inception meeting and ensure the necessary outputs that will enable the draft protocol to be developed are achieved.
### Background for the work:

**Conceptual model:** A description of how the policy, practice and science related to the evidence review topic interact and influence each other.
**Primary Question:** The main question to be addressed by the review

| Population: |  |
| Impact: |  |
| Control: |  |
| Outcome: |  |

**Secondary questions:** Additional questions to be addressed by the review that contribute to building up the evidence surrounding the primary question

<table>
<thead>
<tr>
<th>Scope of the work: clear limits of the question to be addressed by the review</th>
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<tbody>
<tr>
<td>Geographical reference</td>
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<tr>
<td>Climatic conditions</td>
</tr>
<tr>
<td>Language restrictions</td>
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<tr>
<td>Date restrictions</td>
</tr>
<tr>
<td>Population restrictions</td>
</tr>
<tr>
<td>Outcome restrictions</td>
</tr>
<tr>
<td><strong>Other restrictions</strong></td>
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<td>------------------------</td>
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</table>

**Potential Keywords:** words or phrases that could be developed into search strings and used in the systematic search for evidence

<table>
<thead>
<tr>
<th><strong>Keywords related to the population</strong></th>
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<tr>
<th><strong>Keywords related to the intervention</strong></th>
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<th><strong>Keywords related to the comparator</strong></th>
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<th><strong>Keywords related to the outcome</strong></th>
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<table>
<thead>
<tr>
<th><strong>Other relevant keywords</strong></th>
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</table>

**Potential Search locations:** Where evidence could be searched for

<table>
<thead>
<tr>
<th><strong>Locations for peer reviewed evidence (e.g. bibliographical databases)</strong></th>
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<table>
<thead>
<tr>
<th><strong>Locations for grey literature (e.g. websites of key organisations)</strong></th>
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<table>
<thead>
<tr>
<th><strong>Locations for unpublished data (e.g. key experts to be contacted)</strong></th>
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<tbody>
<tr>
<td>Question</td>
<td>Answer</td>
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<tr>
<td>-------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>Will other reviews and secondary reviews be considered?</td>
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<tr>
<td>Will theoretical or conceptual studies be considered?</td>
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<tr>
<td>Subsequent milestones:</td>
<td></td>
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<tr>
<td>Protocol submission date</td>
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<tr>
<td>Other deliverables</td>
<td></td>
</tr>
<tr>
<td>Timeline</td>
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</table>
8.4 Further Reading Critical Appraisal


http://ac.els-cdn.com/S1617138104700382/1-s2.0-S1617138104700382-main.pdf?_tid=2cc072dc-a2dc-11e3-b171-00000aab0f6b&acdnat=1393855407_f993d9605d703119caa97f0fe8d7685d

UK Government Civil Service Web Guidance (2013) Resources for appraising quantitative studies  
8.5 Further Reading Synthesis of Evidence

Arai, L; Britten, N; Popay, J; Roberts, H; Petticrew, M; Rodgers, M; Sowden, A (2007) Testing methodological developments in the conduct of narrative synthesis: a demonstration review of research on the implementation of smoke alarm interventions. Evidence & Policy: A Journal of Research, Debate and Practice 3(3) p361
