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Strategic Environmental Assessment (SEA) and future aggregate extraction:

In the East Midlands Region

Economic Minerals and Geochemical Baseline Programme

Commissioned Report CR/04/003N



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BRITISH GEOLOGICAL SURVEY

COMMISSIONED REPORT CR/04/003N

Strategic Environmental Assessment (SEA) and future aggregate extraction: In the East Midlands Region

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Executive Summary

Aggregate development, like all types of development, has to compete for land. However, unlike other forms of development quarrying is a temporary use of land. Quarrying is also a unique form of development because aggregates can only be extracted where they occur. This means extraction is limited to certain geological areas. Often these geological areas are in areas of inherent beauty or value because of the relationship between geology and the landscape. However, quarrying is an essential part of modern society and aggregates are a vital resource for economic growth and development.

The entire lifecycle of quarrying activity (from exploration to post-closure) is already well regulated in the UK, and there is little need for additional prescriptive approaches at the individual project level, given the widespread use of Environmental Impact Assessments (EIAs) to predict, prevent and manage potential environmental impacts. However, at a strategic level, there is a lack of appropriate guidance and transparency when considering the cumulative impacts of individual projects. Strategic Environmental Assessment (SEA) is designed to address this issue.

SEA, which is complementary to the project-level EIA, is the environmental assessment of a plan or programme before implementation. Although the implementation of SEA in the UK is prescribed by the transposition of an EU directive (2001/42/EC) this does not imply that a host of prescriptive tools and guidance is necessary to support that implementation. However, it does highlight that there will be a growing need for information that is transparent and consistent across regions and that increasingly all stakeholders in the aggregates sector will need good information regarding the location of aggregate resources and the characteristics of the physical and cultural environment in which they occur.

This project may help contribute to a SEA by providing a non-prescriptive tool to aid the understanding of the relationship between aggregate resources and the environmental and cultural assets that overlay them. The research aimed to achieve this through the production of a map entitled a '*future aggregates sensitivity map*'. The map shows the gradation between the most and least 'sensitive' areas for future aggregate extraction based on the relative significance of environmental and cultural assets in the area. The higher the significance or value of the assets, or the higher the number of assets in the area, the higher the sensitivity score will be.

The map was developed through various stages that were integrated in a Geographical Information System (GIS) to produce the map. These stages involved; the development of a method for identifying and scoring environmental and cultural assets, the identification of aggregate resources in the study area, the development of GIS methodologies that could integrate the numerous data layers into one layer for display on the map, and finally stakeholder consultation. The East Midlands Region including the Peak District National Park was chosen as the trial study area in order to test the methodology. The method could however, be applied to other regions.

In theory, assets can be defined as anything on which society places a value, or from which something of value arises. Consequently, when considering land underlain by aggregate resources, the list of potential assets is extensive. The focus here was on assets that could reasonably be defined as either environmental or cultural in nature. Defining the relative significance of each asset is potentially a highly subjective and contentious task and a number of methods were used to minimise the subjective element and link asset weighting to one or more externally validated 'anchor points'. For each asset the policy and law, and planning guidance and regulations, were reviewed in order to ascertain each component's relative importance or significance.

Aggregate resource data for the map were taken from the BGS series of maps '*Mineral Resource Information in Support of National, Regional and Local Planning*'. Aggregate resources were merged into two categories; sand and gravel (chiefly river terrace deposits and glaciofluvial deposits) and crushed rock (chiefly limestone, dolomite and igneous rock). Aggregate resources are treated equally, when in reality they are variable.

Preliminary exploration for a suitable GIS method to analyse and display the data centred on a gridded data format. This enabled asset data to be integrated and enabled generalisation of data (boundaries of assets became 'fuzzy', this was deliberate in order to focus the map on the regional scale and general considerations, rather than providing specific local information). A central problem was to adopt a suitable grid size (resolution) that minimised the loss of the smallest data assets (e.g. SSSIs and Ancient Scheduled Monuments) whilst also minimising the overestimation of the area covered by environmental and cultural assets. After analysis, a one hectare grid resolution was chosen. This was the best compromise in terms of the least over-representation of the assets and the processing time required to convert each layer of asset data to the grid. The scores for each asset were input into the GIS and a cumulative layer representing the total scores of each hectare in each layer was the result. These scores were converted to colour and a draft map produced.

A half-day consultation workshop was held (November 7th 2003, BGS, Keyworth, Nottingham) at which stakeholders were invited from the minerals sector including; Local and Regional Mineral Planners, Industry, Government Organisations (GOs) and non-government organisations (NGOs). The workshop provided an open forum in which the map methodology and the scores assigned by the project team to environmental and cultural assets could be discussed, assessed and, subsequently, modified, so that they accurately reflect the values of stakeholders. The workshop was an important part of the research and the methods were modified and a revised map was produced based on this consultation.

This research did not set out to produce a 'sieve' or 'constraints' map and the map produced here should not be interpreted as such. Sieve or constraints mapping are not realistic approaches in terms of aggregates development because most aggregate resources are covered by one or more environmental or cultural assets and by using these approaches virtually none of the resource would be available for development. Assets are not necessarily constraints on aggregates development and have not been treated as such in this research. The map produced in the research merely indicates where in the study area the most important or significant areas are, in terms of environmental and cultural assets. Higher sensitivity merely means there are more assets or assets of a higher value in a certain area, not that these areas are potentially unsuitable for aggregate development (or any other type of development).

The map produced in this research is not an end product and is only intended to aid general considerations of aggregate issues at the regional scale, not as a source of detailed information on specific sites. Local planners can provide detailed information if required and can provide their experience and local knowledge of other non-mapped assets or issues in their locality that may be important when considering future aggregates extraction. It is anticipated that the map will be a visual tool for all stakeholders involved in the SEA of future aggregate plans.

One of the main findings from the research and based on comments received from stakeholders during the consultation process, was that although the scoring system was 'anchored' to legislative reference points, it was still deemed too subjective and a broad range of stakeholders held the opinion that a consensus on scores would never be easily reached. Another major finding was that a paper map, that is limited in the data it can display, is not the best medium to convey the data. With a paper map the steps involved in generating the final map cannot be displayed and it is not possible to 'drill' down into the data to see why an area had low or high sensitivity. This was acknowledged by the research team during the preparation of the proposal, but for a short research project it was not possible to explore the possibilities of providing the information through a GIS because of the multiple data owners involved, so it was decided that

the primary output of the research would be a paper map. A GIS is a versatile way of displaying and interrogating spatial data and if future funding can be obtained the technical and data ownership issues involved with this can be investigated.

The method developed for scoring the assets and the method for integrating the assets data in the GIS were revised and modified in line with stakeholder comments and alternatives to the original method have been tested. Stakeholders suggested that the wider environmental and cultural picture was obscured on the map because only those assets that overlay resources were included in the analysis, i.e. the assets were restricted by the outline of the resources. This was carried out chiefly to reduce processing time in the GIS. However, this was subsequently tested using a smaller area (Nottinghamshire) and the results are displayed on the accompanying revised map.

Another stakeholder comment was that scores for assets should not be used at all and simply the number of assets per hectare grid should be totalled and converted to a colour for visual display, i.e. all assets are treated equally. This was also tested for a smaller area (Nottinghamshire) in the region and the results are displayed on the accompanying revised map.

Another concern on the part of a number of stakeholders was that the map was in a form in which the data cannot be interrogated, so suggestions by stakeholders for a quick and easy way of interrogation in a GIS based delivery were tested. A 'point and click' tool in the GIS that could identify all the assets in that hectare grid (and if used the score attributed) was investigated and tested. Some examples of this are shown on the revised map. This would enable user to quickly identify why an area was high or low sensitivity. Having all the data integrated into one layer means that the GIS is fairly quick to use as opposed to having numerous data layers in the GIS.

Clearly, a map is only one way of displaying the data used in this research. It is recommended that alternative ways of delivering the data are explored. Perhaps the best way would be to deliver the data through a GIS. The BGS already provides regional data for the West Midlands available through a licensed online GIS, so the architecture and expertise already exist. Further research will be needed to explore this.

Any tool developed will be more useful if the aggregate resources were not treated equally and could be divided into those most likely to be worked. Additional research at the BGS hopes to address this. Aggregate resources vary in quality according to their chemical, physical and mineralogical properties. They also have to be linked to the specific market they will be ultimately be used in (e.g. 'ordinary' or high quality roadstone). A more refined analysis of resources quality will inform decisions relating to resource priority. The BGS hopes to devise a methodology that takes into account the quality and grade of aggregate resources.

The project has been a responsive and flexible stakeholder-led project using different approaches to assess environmental and cultural assets and their significance for future aggregate extraction. As noted by a number of stakeholders, this research is timely and also of wide interest to those involved in planning aggregate extraction in the future. However, it should be viewed as the preliminary step in moving towards a more transparent and consistent approach to such extraction in areas with varying environmental and cultural assets.

1 Introduction

This report and the accompanying map describes a one year research project – *Strategic Environmental Assessment (SEA) and future aggregates extraction: in the East Midlands Region* – which started in February 2003, undertaken by the British Geological Survey as part of the Mineral Industry Sustainable Technology Programme (MIST). MIST is managed by the Mineral Industry Research Organisation (MIRO) on behalf of the Department for Environment, Food and Rural Affairs (DEFRA) and contributed 50% funding to the project. The remaining funding was contributed by the BGS. The BGS funding was provided by the Minerals Information Systems and Environmental Indicators (MISEI) project, managed by Andrew Bloodworth under the Economic Minerals and Geochemical Baseline (EMGB) Programme managed by Dr Mike Petterson.

1.1 PROJECT AIM AND OBJECTIVES

The aim of this research was to provide a ‘tool’ for the minerals sector to use in the Strategic Environmental Assessment (SEA) of plans for future aggregate extraction. This was achieved through the development of a ‘future aggregates sensitivity map’. The map shows the gradation between the most and least sensitive areas for future aggregate extraction based on the relative significance of environmental and cultural assets in the area. Those involved in the SEA process may use the map to aid decision making about future aggregates development.

The ‘future aggregates sensitivity map’ was developed through the following objectives:

- Development of a consistent and transparent methodology for identifying and assigning relative scores to **environmental and cultural assets**.
- Collation of a **regional Geographical Information System (GIS)** for the East Midlands (including all of the Peak District National Park) comprising various data layers such as aggregate resources, environmental and cultural assets, infrastructure etc, for use by the BGS.
- Development of **methodologies in a GIS** to incorporate the environmental and cultural assets information into a single layer of information.
- Production of a **draft ‘future aggregates sensitivity map’** for **stakeholder consultation**.
- **Modification and revision** of the methodologies based on analysis of feedback from stakeholder consultation exercises.
- Production of a **revised map**.

1.2 PROJECT OUTPUT

The principal output from the project is a ‘future aggregates sensitivity map’ for the East Midlands Region as modified and revised following stakeholder consultation.

1.3 PROJECT ASSUMPTIONS AND LIMITATIONS

This project makes several assumptions. It assumes that aggregates are vital for construction (see Section 2.5) and it assumes that there will be a demand for primary aggregates in the future, despite the increase in use of recycled and secondary products. In order to test the methodologies all aggregate resources identified have been treated as ‘equal’. That is, they have all been assumed to have an equal chance of being developed. In reality, of course, this may not be the case, as economic and social factors will influence whether a resource is extracted.

The methods developed here have been tested using the East Midlands Region, however, if appropriate, the methodology can be applied to other regions.

A limitation of the research is its reliance on ‘measured’ assets and also its reliance on those assets that are available digitally. The revised map is not an end product, but a means of demonstrating the methodologies developed.

1.4 JUST ANOTHER ‘SIEVE’ MAP?

It was not the intention of this research to produce a ‘sieve’ map, where aggregate resources covered by an asset is effectively sterilised. This is not a realistic method. In the East Midlands study area the majority of aggregate resources are covered by at least one type of asset. The authors have taken the approach that **assets are not constraints** on aggregate extraction, nor do they necessarily make a presumption against quarrying. For example agricultural land may be quarried and effectively restored back to its original state or better and is thus not a constraint on quarrying. However, good quality agricultural land is of national significance and even its temporary loss needs to be considered carefully.

The map produced from this research is intended for general consideration of aggregate issues at the regional scale, not as a source of detailed information on specific sites. Local planners can provide detailed information if required and can provide their experience and local knowledge of other non-mapped assets or issues in their locality that may be important when considering future aggregates extraction. It is anticipated that the map will be a visual tool for all stakeholders involved in the SEA of future aggregate plans.

1.5 REPORT STRUCTURE

Section 2 provides background information on; what Strategic Environmental Assessment (SEA) is and how this research may contribute to the process of SEA; what aggregates are and why society needs them; why the East Midlands Region was chosen as a study area; and statistical information about aggregates in the East Midlands Region.

Section 3 provides a summary of the approach taken in the research and introduces the various methods that were involved in producing the map. Each of these is discussed in more detail in Section 4 to 7.

Section 4 describes the identification of environmental and cultural assets and the process by which scores were attributed to each of these.

Section 5 describes the method of identifying aggregate resources for use in the research.

Section 6 describes the data and methods used in the Geographical Information System (GIS) to produce the map.

Section 7 describes the stakeholder consultation process and outlines the main findings from this.

Section 8 provides an overall discussion followed by the research conclusions in **Section 9** and recommendations in **Section 10**.

Appendix 1 provides an overview of the mineral planning system in England and the related regulations and designations relevant to aggregates extraction. This section provides a review of other plans and programmes relevant to aggregates.

Appendix 2 This summarises the methodological approach taken to consistently assess and analyse the assets identified in Section 4.

Appendix 3 provides a list of those who attended the stakeholder workshop on November 7th 2003.

2 Background

2.1 AGGREGATES DEVELOPMENT

Aggregate development, like all types of development, has to compete for land. However, unlike other forms of development quarrying is a temporary use of land. Quarrying is also a unique form of development because aggregates can only be extracted where they occur. This means extraction is limited to certain geological areas. Often these geological areas are in areas of inherent beauty or value because of the relationship between geology and the landscape. Quarrying is an essential part of modern society (see Section 2.5) and has in many areas brought benefits to existing environmental and cultural assets of an area and in other areas created new assets. Assets are defined as anything on which society places a value or from which something of value arises. For example restored quarries may enhance local and regional biodiversity, or provide new recreational facilities (Figure 1). Alongside these benefits exist the more obvious economic and social benefits arising from direct employment and investment, increased revenues for suppliers and associated service industries and so on.

Figure 1 Attenborough Nature Reserve, Nottinghamshire; a restored aggregate quarry



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However, although it is a temporary land use, quarrying activity brings with it a range of transient and long-term environmental and socio-cultural changes that may have negative implications for one or more stakeholder groups. Therefore the planning process must balance and address any potentially negative impacts with the fact that aggregates can only be worked where they occur and that sterilisation of resources should be avoided given the significance of aggregates to modern society. Consequently, the best possible locations must be sought for future extraction to minimise conflicts of land use and to promote the sustainable use of land and associated resources at local, regional and national levels.

The entire lifecycle of quarrying activity (from exploration to post-closure) is already well regulated in the UK, and there is little need for additional prescriptive approaches at the level of

individual projects, given the widespread use of Environmental Impact Assessments (EIAs) to predict, prevent and manage potential environmental impacts. However, at a strategic level, there is a lack of appropriate guidance and transparency when considering the cumulative impacts of individual projects. Strategic Environmental Assessment (SEA) is designed to address this issue.

SEA, which is complementary to the project-level EIA, is the environmental assessment of a plan or programme before implementation (see Section 2.2 for more detail on SEA). Although the implementation of SEA in the UK is prescribed by the transposition of an EU directive (2001/42/EC) this does not imply that a host of prescriptive tools and guidance is necessary to support that implementation. However, it does highlight that there will be a growing need for information that is transparent and consistent across regions and that increasingly all stakeholders in the aggregates sector will need good information regarding the location of aggregate resources and the characteristics of the physical and cultural environment in which they exist.

This project may help contribute to a SEA by providing a non-prescriptive tool to aid the understanding of the relationship between aggregate resources and the environmental and cultural assets that overlay them, especially at the regional scale. The eight planning regions in England and Wales prepare regional planning guidance with full public participation. The traditional system of planning for aggregates in England and Wales has combined a series of central government demand forecasts with mechanisms for apportioning projected total demand between the regions. This, and the geographical imbalances between supply and demand have resulted in an important role for Regional Aggregates Working Parties (RAWPs) in regional aggregates planning. Each RAWP contributes to the preparation of guidelines for the provision of aggregates in England and Wales and is also a key forum for discussions on the apportionment of regional figures between its constituent local Mineral Planning Authorities (MPAs). The RAWPs draw their membership from minerals planning officers, industry representatives, the Environment Agency, central government and other interested parties. Each RAWP will meet several times a year for the purpose of collating and monitoring aggregates output of the RAWP's specific region. This research may aid that process, which is why, where possible, only those assets that are universally recognised throughout England and Wales have been used.

2.2 EC STRATEGIC ENVIRONMENTAL ASSESSMENT (SEA) DIRECTIVE

The EU Directive on Strategic Environmental Assessment (SEA) was issued in June 2001 as *Directive 2001/42/EC* entitled '*On the Assessment of the Effects of Certain Plans and Programmes on the Environment*'¹. Member States must comply with the Directive by 21st July 2004.

The objective of the Directive is to provide high-level protection of the environment, integrate the consideration of environmental issues into the development and implementation of plans and programmes, and contribute to sustainable development. It does not address project-level assessments, which are the domain of Environmental Impact Assessments (EIA). Therefore, SEA is complementary to, not a replacement for, the EIA process.

Plans and programmes in the context here incorporate those at local, regional and national scales undertaken through administrative, regulatory and legislative routes, for example:

- Local authority plans (e.g. Local Transport Plans, Community Strategies).
- Plans and programmes of agencies (e.g. Regional Development Agency strategies, Environment Agency River Basin Management Plans and Water Resources Plans).

¹ See europa.eu.int/comm/environment/eia/full-legal-text/0142_en.pdf for the full Directive text.

- Any plans introduced under the reforms proposed in the Government's Planning Policy Statement 'Sustainable Communities – Delivering through Planning'.
- All plans and programmes which set a framework for future development consent of projects listed in Annexes I and II to *Council Directive 85/337/EEC* (the EIA Directive), and all plans and programmes which have been determined to require assessment pursuant to *Council Directive 92/43/EEC* (the Habitats Directive).²

Environmental protection objectives may be set by legislation or policies or by other plans or programmes, such as:

- Planning Policy Guidance Notes or other Government policy initiatives (see Appendix 1).
- National and local strategies (e.g. air quality, energy and climate change).
- Biodiversity Action Plans, species action plans and habitat action plans.
- European Directives, including the Habitats, Birds, Nitrates, Air Quality, Water Framework and Waste Framework Directives.
- International undertakings such as those on greenhouse gases in the Kyoto Protocol.

More specifically SEA will include plans and programmes prepared for town and country planning, or for projects listed as Schedule 1 or 2 in the EIA Directive. This means SEA will be directly relevant to minerals development at all levels in the UK.

The key stages in a SEA (as defined in the Directive) are:

- Outlining the contents and main objectives of the plan or programme and the relationship with other relevant plans and programmes.
- Detailing the relevant aspects of the current state of the environment and its likely evolution without implementation of the plan or programme.
- Determination of the environmental characteristics of areas likely to be significantly affected.
- Carrying out consultations (with the public, environmental authorities and other bodies, together with any neighbouring states as may be potentially affected).
- Definition of any existing environmental issues that are relevant to the plan or programme.
- Determination of the environmental protection objectives, established at international, Community or Member State level, which are relevant to the plan or programme and the way those objectives and any environmental considerations have been taken into account during its preparation.
- Predicting the likely significant effects on the environment, including biodiversity, population, human health, fauna, flora, soil, water, air, climatic factors, material assets, cultural heritage including architectural and archaeological heritage, landscape and the interrelationship between the above factors.
- Definition of the measures envisaged to prevent, reduce and as fully as possible offset any significant adverse effects on the environment of implementing the plan or programme.
- Outlining the reasons for selecting the alternatives dealt with, and a description of how the assessment was undertaken including any difficulties in compiling the required information.
- Description of the measures required for monitoring.

² See europa.eu.int/comm/environment/nature/legis.htm for full background and Directive text.

- Preparation of an environmental report that identifies, describes and evaluates the likely significant effects on the environment of implementing a plan or programme.
- Non-technical summarisation of the information provided under the above headings.

The Government has issued guidance on SEA with respect to land use and spatial planning (Strategic Environmental Assessment Directive: Guidance for Planning Authorities)³ and more guidance is expected to follow as the Directive is transposed into law in July 2004. Guidance to date is primarily for plans rather than programmes and can be summarised by the following points:

- SEA should be fully integrated into the plan-making process and should be started as soon as a new or revised plan is first considered, and should make inputs at each stage where decisions are taken.
- SEA should also be used in developing the arrangements for monitoring the implementation of a plan, in order to identify problems and inform the next revision or replacement.
- For plans that *'determine the use of small areas at local level'* or are *'minor modifications'* to existing plans, the Directive only requires SEA where they are likely to have significant environmental effects. The expressions 'small area', 'local level' and 'minor modification' are not defined in the Directive, and must be interpreted in relation to the nature and scope of a particular plan via screening according to criteria noted in Annex II of the Directive:
 - The degree to which the plan or programme sets a framework for projects and other activities, either with regard to the location, nature, size and operating conditions or by allocating resources.
 - The degree to which the plan or programme influences other plans and programmes.
 - The relevance of the plan or programme for the integration of environmental considerations in particular with a view to promoting sustainable development.
 - Environmental issues relevant to the plan or programme,
 - The relevance of the plan or programme for the implementation of Community legislation on the environment (e.g. plans and programmes linked to waste-management or water protection).
 - Characteristics of the effects and of the area likely to be affected, having regard, in particular, to the probability, duration, magnitude, spatial extent, frequency, reversibility, cumulative nature and transboundary nature of the effects, the risks to human health, the environment, special natural characteristics or cultural heritage.

Authorities which prepare and/or adopt a plan or programme that is subject to the Directive will have to prepare a report on its probable significant environmental effects, consult environmental authorities and the public, and take the results into account before the plan is implemented. It is hoped that SEA will contribute to more transparent planning, by involving the public and integrating environmental considerations at a strategic level.

With regional planning becoming a key focus and the EU Directive on SEA needing to be implemented by 2004, tools like the one developed here will become more and more important. Planning on a regional scale is vital for the principles of sustainable development to be applied. Planning on this scale also allows for scenarios to be run which will allow for the effective

³ See http://www.odpm.gov.uk/stellent/groups/odpm_planning/documents/page/odpm_plan_025198.pdf

assessment of cumulative impacts. For example, one sand and gravel quarry in an area may have a very low negative or low positive impact on the environment, but ten quarries all in the same locality could together create a large negative impact.

2.3 SEA AND SUSTAINABILITY APPRAISALS

It is important to note that SEA is not the same as a Sustainability Appraisal, although the two are closely linked and certainly complementary. Sustainability Appraisals, which superseded Environmental Appraisals, are a form of assessment used in the UK since the late 1990s, that consider social and economic effects alongside environmental effects. Sustainability Appraisals have tended to be less detailed and more qualitative than many forms of environmental assessment. It is anticipated that Sustainability Appraisals will be mandatory for both Local Development Documents and Regional Spatial Strategies (the planning documents under the forthcoming Planning and Compulsory Purchase Bill).

Future definitions will make it clear to authorities carrying out Sustainability Appraisals that they must fully meet the requirements of the SEA Directive. ODPM will produce guidance for authorities on sustainability appraisal when the new planning system is brought into effect. This will also give further details on the relationship between SEA and Sustainability Appraisal above and beyond what can be found in the ODPM guidance noted above. The ODPM is also considering the possibility of combining SEA and SA to avoid duplication and enhance the sustainability of plans and programmes

2.4 THIS RESEARCH AND STRATEGIC ENVIRONMENTAL ASSESSMENT (SEA)

It was not the purpose of this research to carry out a Strategic Environmental assessment (SEA). The purpose was to develop a tool that may be used by those undertaking an SEA as an aid to the process. More specifically this research may provide information in line with the following stages of an SEA (stages are in italics):

- *Outlining the contents and main objectives of the plan or programme and the relationship with other relevant plans and programmes.* This project has attempted to identify other plans and programmes that are relevant to aggregates extraction (Appendix 1).
- *Determination of the environmental protection objectives, established at international, Community or Member State level, which are relevant to the plan or programme and the way those objectives and any environmental considerations have been taken into account during its preparation.* The research outlines the environmental protection objectives, established at international or Community level that are relevant to aggregates extraction (Appendix 1).
- *Determination of the environmental characteristics of areas likely to be significantly affected.* A SEA of a plan for future aggregates extraction will need to state where those areas likely to be developed are. In theory all aggregate resources could be developed. This research provides information on where future aggregate resources are located and it begins the process of characterising the environmental and cultural features of those areas in order that those carrying out the SEA can make decisions about future aggregate development.
- *Stakeholder consultation.* This is paramount to any SEA process, this map may help as a visual tool in the stakeholder consultation process. The project has also undertaken stakeholder consultation, as any method used in the SEA process should be consulted upon.

2.5 AGGREGATES - A VITAL RESOURCE FOR CONSTRUCTION

This section attempts to provide information on what aggregates are and why society needs them and more specifically why society requires primary aggregates. Statistical information about aggregates production in England and specifically for the study area, the East Midlands Region, is also provided.

2.5.1 What are aggregates?

Aggregates are granular or particulate material, either naturally occurring (sand and gravel) or produced by crushing (crushed rock) which, when brought together in a bound (with cement, lime or bitumen) or unbound condition, is used in construction to form part or whole of a building or civil engineering structure. Also referred to as ‘construction aggregates’ and used mainly as concrete, mortar, roadstone, asphalt or drainage courses, or for use as constructional fill and railway ballast. Aggregate may be natural (primary), artificial (secondary) or recycled.

Primary or natural aggregate is aggregate produced from naturally-occurring mineral deposits and used for the first time.

Secondary aggregates are by-products and comprise mineral waste of the processes from other quarrying and mining operations (e.g. colliery waste or minestone, china clay and slate waste), and industrial by-products (e.g. blastfurnace and steel slag, power station ash).

Recycled aggregates are aggregates resulting from the processing of inorganic material previously used in construction (e.g. construction and demolition wastes, asphalt road planings and railway track ballast).

Alternative materials comprise secondary and recycled aggregates.

2.5.2 Aggregates are essential for growth and development

The construction industry is a critical sector of the national economy. In 2001 the total value of the work done in the construction sector in Great Britain was £74.7 billion: £40 billion of new work and £34.7 billion repair and maintenance (ONS, 2003). Construction minerals, and in particular aggregates, are essential raw materials for the construction sector. Total usage of aggregates in Great Britain is of the order of 250 million tonnes a year.

The Government believes that Britain needs an active and efficient construction industry in order to secure its further economic and social development. Economic growth depends on the maintenance and development of the nation’s basic infrastructure. This means efficient and effective transportation, affordable housing for all, and investment in essential services in the regions. This will require new or improved roads, rail links, airports facilities, homes, hospitals, schools, offices and shops. For their construction large quantities of aggregates will be required, even though new approaches to construction may reduce the overall proportion used compared with previous decades. Thus despite a considerable expansion of the UK economy during the last 30 years, demand for aggregates is less now than in the early 1970s.

The Government is committed to improving the built environment and transport infrastructure. A scarcity of affordable housing in key areas has resulted in the Government’s Sustainable Communities Plan to address this problem. The Plan concentrates on four main areas; Milton Keynes, Stansted in Essex, Ashford in Kent and the Thames Gateway. In addition, it identifies key areas for regeneration in the Midlands and North of England.

In 2000 the Government also announced its Ten Year Plan for improving transport networks in England. The plan includes major spending on the railways, national roads, local transport, and transport in London. To alleviate congestion on many roads a further list of projects was announced in 2002, including improvements to the M1 and M6, and a number of new bypasses.

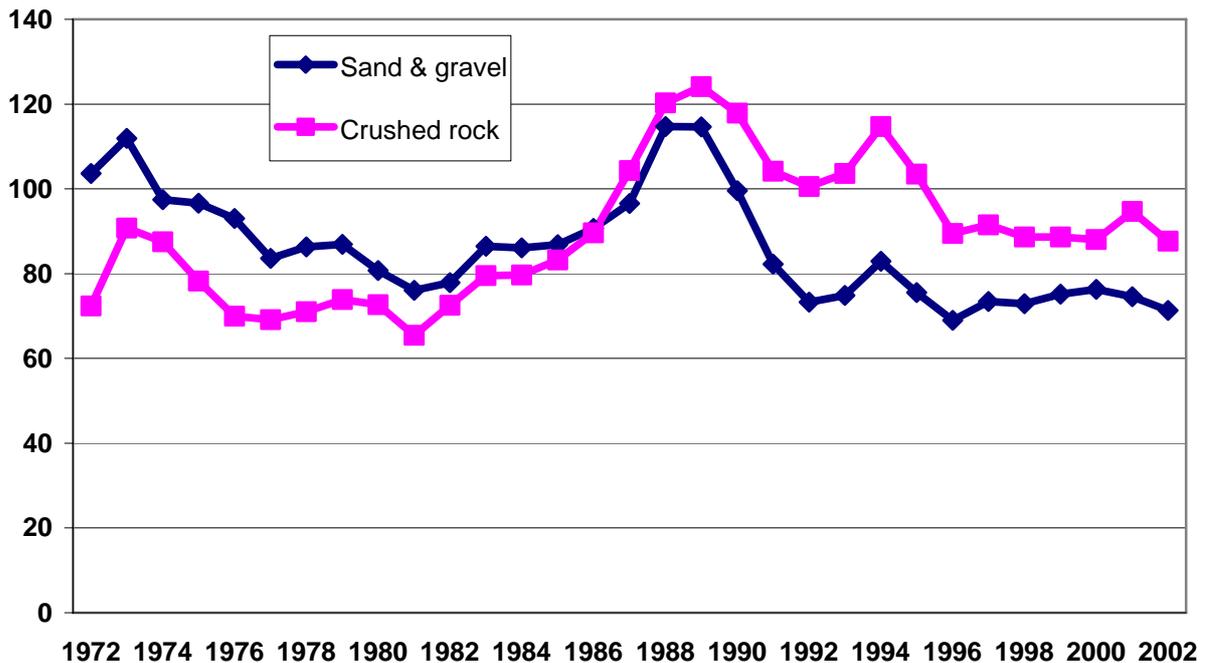
All of these developments will require construction raw materials and, in particular, aggregates.

2.5.3 Uses of aggregates

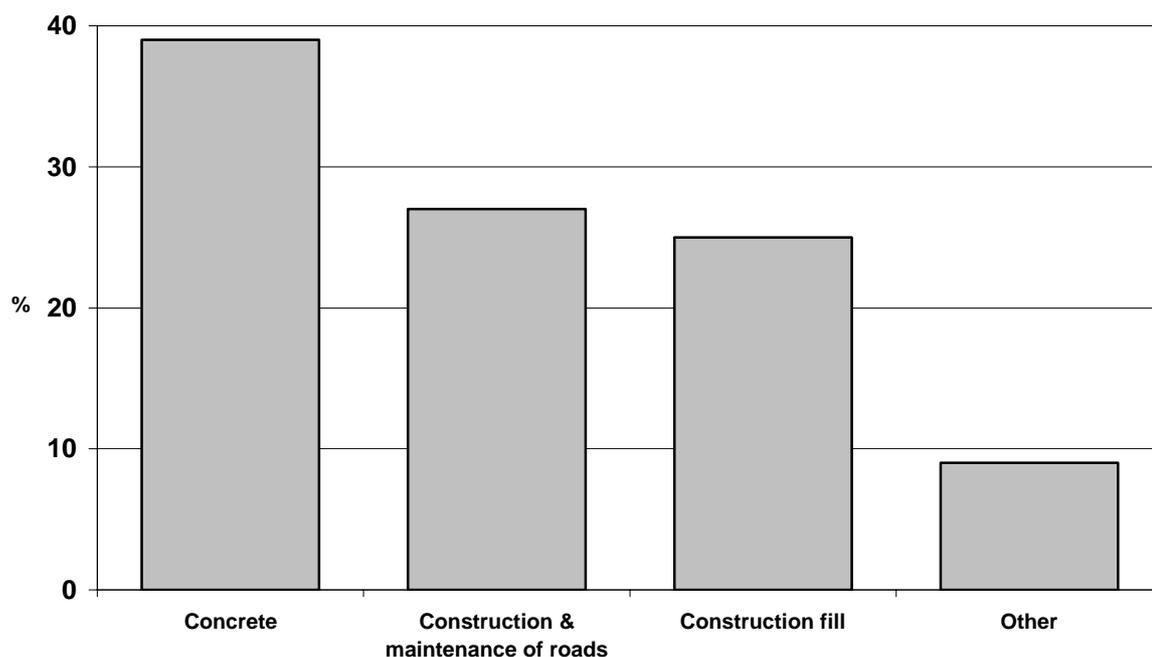
Trends in aggregate production for the period 1972 – 2002 for England are shown in Figure 2.

In 2002, the total production of natural aggregates in England was 173 million tonnes, of this 39% was used for concrete aggregate, 27% was used in the construction and maintenance of roads, and 25% for construction fill, including pipe bedding/drainage layers (Figure 3) (Highley et al, 2003). Other smaller uses included sand for mortar and asphalt, railway track ballast and armour stone. Concrete is the most important use for sand and gravel only, accounting for 68% of total output (Highley et al, 2003). Crushed rock is used principally (50%) in road construction, both as unbound roadstone primarily for the foundations of the road, and also bound with bitumen to produce asphalt in the upper layers, including the road surface. Some 95% of Britain's roads are made of asphalt. As with all uses of aggregates, rigorous tests are used to evaluate the suitability of the aggregate, whether newly dug or recycled, for a particular construction use. In road construction the aggregates must be sound enough to withstand repeated freezing and thawing and be strong enough to take the load of the traffic. The aggregates used in the surface, or wearing course, of the road must also be highly durable to withstand continuous abrasion by tyres, as well as have high skid resistant properties. Recently introduced porous asphalts reduce traffic noise and spray, and provide a more comfortable ride.

Figure 2 Sand & gravel and crushed rock for England 1972 – 2002 (million tonnes)



Source: Annual Mineral Raised Inquiry, Office for National Statistics.

Figure 3 Principal uses of aggregates in England, 2001

Source: Aggregates Minerals Survey, 2001

2.5.4 Meeting the demand for aggregates

The traditional and most important sources of aggregates in Britain are primary aggregates. These comprise sand and gravel, in which the individual particles have been produced by the natural weathering and erosion of pre-existing rocks, and hard rocks which are crushed to artificially produce a granular product (crushed rock aggregate).

Sand and gravel is both extracted from the ground and dredged from the seabed, whilst crushed rock is only quarried from the ground. In England, of total output of primary aggregates of 173 million tonnes in 2001, 36% was land-won sand and gravel; 8% marine-dredged sand and gravel; and 56% crushed rock (Highley, 2003). The principal sources of crushed rock in England are limestone, including dolomite (68%), igneous rock (23%), sandstone (8%), and small amounts of chalk and ironstone (1%).

Increasing quantities of alternative materials are being used as aggregates. These are recycled aggregates, and so-called 'secondary' aggregates. In April 2002 the Government introduced an Aggregates Levy of £1.60/t on sales of primary aggregates. The Levy is intended to encourage demand for, and supply of, alternative aggregates.

Currently, alternative aggregates meet about 20-25% of total demand and, in line with the principles of sustainable development, it is Government policy to maximise their use. However, alternative materials will only be able to meet part of total requirements because of their limited availability, suitability for all applications and distribution relative to major centres of demand. A substantial demand for primary aggregates will continue into the foreseeable future.

In the *National and Regional Guidelines for Aggregates Provision in England for 2001 to 2016*, the Office of the Deputy Prime Minister (ODPM) has assumed that total aggregate provision will be 73% from primary aggregates (Table 1).

Table 1 National guidelines for aggregates provision 2001 - 2016

Aggregate type		Provision (million tonnes)	%
Primary	Land-won sand and gravel	1,068	73
	Land-won crushed rock	1,618	
	Marine-dredged sand and gravel	230	
Alternative materials		919	23
Net imports to England		169	4

Source: Office Deputy Prime Minister (2003)

2.5.5 Distribution of aggregates

Aggregates have an uneven distribution in England and do not always occur where they are in demand. Sand and gravel deposits are the prime source of concrete aggregate. Production is mainly obtained from superficial deposits of Quaternary age, occurring in river valleys and as glaciofluvial deposits resulting from the melting of the Pleistocene ice sheets. Southern and central England are important sources of sand and gravel. Some bedrock deposits are important sources of sand and, in some areas, notably the West Midlands, both sand and gravel. Marine-dredged landings of sand and gravel are mainly into the South East and London.

Hard rock with a crushing strength and porosity low enough to be used for concrete aggregate and high quality roadstone have a very uneven distribution and the softer sediments of central, southern and eastern England are largely devoid of suitable material. Consequently, where aggregate resources occur in relative proximity to major centres of demand they are intensively worked.

2.6 STUDY AREA – THE EAST MIDLANDS REGION

The East Midlands Region (including all of the Peak District National Park) was chosen as the study area for several reasons. Firstly, the East Midlands Region was the next scheduled region to be collated for a larger BGS project *Minerals Information On-line*. This project is collating regional information on mineral resources, together with a wide range of related data, for the whole of England. The data are hosted within a Geographical Information System (GIS) but will be accessible and capable of integration on-line. Secondly, the BGS's main offices are located in the East Midlands, which minimised travelling time. Thirdly, the BGS has well-established contacts in the East Midlands with whom to consult. Finally the East Midlands Region is an important source of aggregates (see below and Figure 4).

2.6.1 East Midlands – an important source of aggregate

The East Midlands is well endowed with both sand and gravel, and hard rock resources. The Trent and Idle valleys are important sources of sand and gravel, although considerable quantities of sand are also derived from the bedrock deposits comprising the Sherwood Sandstone of Triassic age in Nottinghamshire. There are extensive resources of Carboniferous Limestone in Derbyshire and the Peak District, which in addition to the supply of limestone for aggregate are also an important source of limestone for industrial applications and cement manufacture. The Permian Magnesian limestone is extensively worked for both aggregates and industrial use. The small outcrops of igneous rock in Leicestershire provide one of the few sources of hard rock in

the Midlands and are well placed to serve markets in the South East. They are of economic importance out of proportion to their relatively small size (Table 2).

Figure 4 Sand & gravel and crushed rock production in the East Midlands (million tonnes)

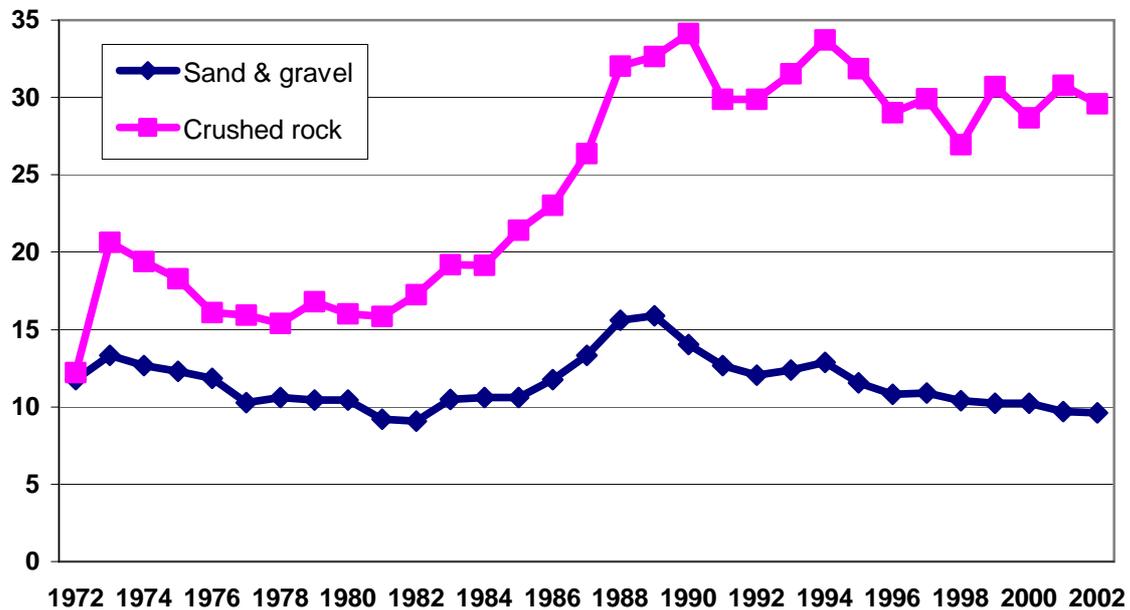


Table 2 National and regional guidelines for aggregates provision in England 2001 - 2016 (million tonnes)

New Regions	Guidelines for land-won production		Assumptions		
	Land-won sand & gravel	Land-won crushed rock	Marine sand & gravel	Alternative materials	Net imports
South East England	212	35	120	118	85
London	19	0	53	82	6
East of England	256	8	32	110	8
East Midlands	165	523	0	95	0
West Midlands	162	93	0	88	16
South West	106	453	9	121	4
North West	55	167	4	101	50
Yorkshire & the Humber	73	220	3	128	0
North East	20	119	9	76	0
England	1068	1618	230	919	169

Source: Office Deputy Prime Minister (2003)

As a result of its extensive aggregate resources and its proximity to large centres of demand in the South East and North West, the East Midlands is not only the largest aggregate producing region in England, but also the largest exporter to other regions (see Table 3).

Total sales of crushed rock aggregate and sand and gravel and sales by Mineral Planning Authority (MPA) are shown in Tables 4 and 5. The importance of Derbyshire, including the Peak District National Park, and Leicestershire as sources of limestone and igneous rock, respectively is clearly shown. (MPAs are local authorities with responsibility for planning control over mineral working within their areas).

Total sand and gravel, and crushed rock production for the periods 1997- 2001 is shown in Tables 6 and 7.

Table 3 East Midlands: Aggregate sales, consumption and net exports, 2001

	Land-won sand & gravel	Crushed rock	Total primary aggregates
	Thousand tonnes		
Sales	10,046	31,254	41,300
Consumption	8,703	14,448	23,151
Net exports	1,343	16,806	18,149

Source: Aggregates Minerals Survey for England, 2001.

Table 4 East Midlands: Sales of crushed rock for aggregate purposes by Mineral Planning Authority, 2001

CRUSHED ROCK	Limestone /Dolomite	Igneous Rock	Chalk	Sandstone	Total
Thousand tonnes					
Derbyshire	8,257	-	-	115	8,372
Leicestershire/ Rutland	1,748	14,357	-	-	16,105
Lincolnshire	1,539	-	370	-	1,909
Northamptonshire	317	-	-	50	367
Nottinghamshire	26	-	-	-	26
Peak District National Park	4,490	-	-	(a)	4,490
Regional Total	16,377	14,522	370	165	31,269

Source: East Midlands Regional Aggregates Working Party.

(a) Included in Derbyshire

Table 5 East Midlands: Sales of sand and gravel for aggregate purposes by Mineral Planning Authority, 2001

SAND & GRAVEL	Sand	Gravel	Sand & Gravel (undiff)	Total
Thousand tonnes				
Derbyshire	690	885	9	1,585
Leicestershire/Rutland	872	434	97	1,403
Lincolnshire	1,482	1,313	107	2,902
Northamptonshire	348	366	43	757
Nottinghamshire	2,143	1,225	134	3,502
Peak District National Park	-	-	-	-
Regional Total	5,535	4,223	391	10,149

Source: East Midlands Regional Aggregates Working Party.

Table 6 East Midlands: Sales of sand and gravel for aggregate purposes by Mineral Planning Authority, 1997 – 2001

SAND & GRAVEL	1997	1998	1999	2001	2001
	Thousand tonnes				
Derbyshire	1,615	1,667	1,966	1,480	1,585
Leicestershire/Rutland	1,671	1,028	911	1,264	1,403
Lincolnshire	3,330	3,065	3,042	3,049	2,902
Northamptonshire	1,217	1,054	1,062	762	757
Nottinghamshire	3,482	3,181	3,388	3,384	3,502
Peak District National Park	-	-	-	-	-
Regional Total	11,314	9,996	10,369	9,939	10,149

Source: East Midlands Regional Aggregates Working Party.

Table 7 . East Midlands: Sales of crushed rock for aggregate purposes by Mineral Planning Authority, 1997 – 2001

CRUSHED ROCK	1997	1998	1999	2001	2001
	Thousand tonnes				
Derbyshire	9,588	8,971	10,348	8,46	8,372
Leicestershire/Rutland	15,130	15,343	15,180	15,131	16,105
Lincolnshire (a)	1,133	1,294	1,342	1,489	1,539
Northamptonshire	326	344	349	422	367
Nottinghamshire	-	-	-	-	26
Peak District National Park	5,158	4,830	3,066	3,430	4,490
Regional Total	31,334	30,782	30,284	2,9418	30,899

Source: East Midlands Regional Aggregates Working Party.

(a) Excludes chalk.

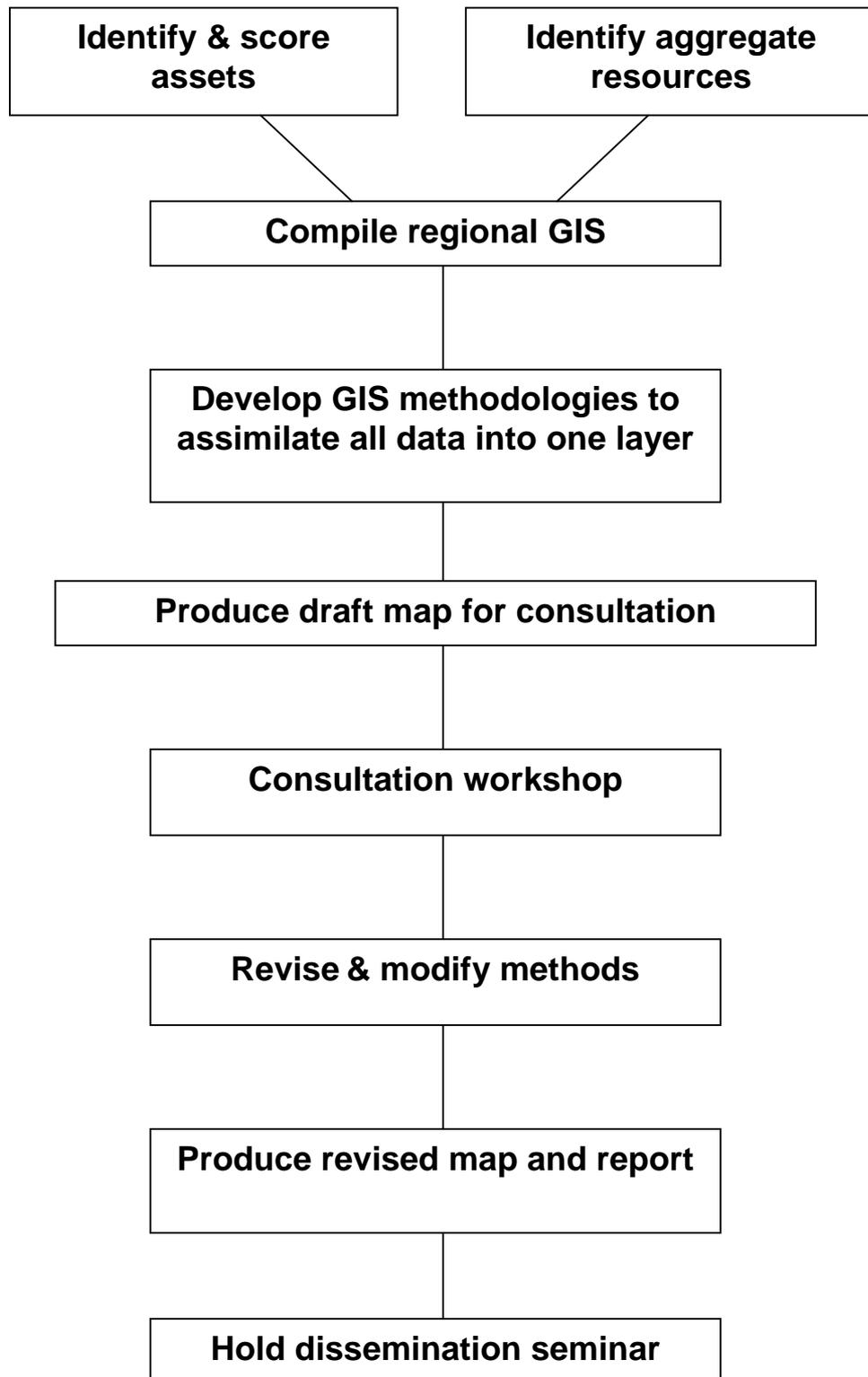
3 Research approach

This section introduces the various stages that were involved in producing the map. Each stage is described separately in the subsequent sections as follows:

- Identification and scoring of environmental and cultural assets (Section 4)
- Identification of aggregate resources in the study area (Section 5)
- Development of GIS methodologies (Section 6)
- Stakeholder consultation (Section 7)

Although for clarity the different stages are presented separately the first three were all dependent on the issues raised during the stakeholder consultation. Figure 5 provides a schematic overview of the research process. The research methods were modified and revised according to issues raised during the consultation process. The original methods are retained and presented followed by a discussion on the changes made according to stakeholder comments.

Figure 5 Research process



4 Identification & scoring of environmental & cultural assets

4.1 IDENTIFICATION OF ASSETS

In theory assets can be defined as anything on which society places a value or from which something of value arises. Consequently, when considering land underlain by aggregate resources, the list of potential assets is an extensive one. The focus here was on assets that could reasonably be defined as either environmental or cultural in nature.

It is important to recognise that the presence of one or more assets does not preclude the extraction of minerals. However, specific or additional measures may be necessary in certain areas to prevent or minimise unwanted temporary or permanent changes in asset characteristics.

4.1.1 Criteria for identifying assets

A number of criteria were applied to narrow the focus to only the most significant assets, such that those chosen were:

- Drawn from a widely recognised designation, namely:
 - Nature conservation
 - Landscape conservation
 - Heritage and cultural conservation
 - Geological
 - Biodiversity
 - Agricultural land
 - Groundwater
 - Surface water
- Generally considered important by a significant proportion of stakeholders.
- Protected legally or covered by some widely upheld voluntary initiative or non-statutory designation. High profile areas may lack any statutory protection. Therefore it is important to include assets other than those with statutory protection as this approach would be certain to ignore a number of significant assets in all regions of the UK.
- Well-defined in terms of data availability (digital or otherwise) and physical boundary.

A total of 54 significant environmental and cultural assets were identified using these criteria, spread across the eight designations noted above. This list was then narrowed further to 20 assets, which were subsequently applied in the development of the ‘future aggregates sensitivity map’ using a consistent methodology based upon:

- Determination of the timely availability of information in a suitable (digital) format (i.e. assets for which GIS information was available or could be readily acquired). Further assets could in principle be added as data become available.
- Analysis of the legal or voluntary process from which the asset derives its protection (e.g. quality and consistency of the protection process, degree of enforcement of protection, current status of assets).

A full description of each potential asset and the methodological approach is given in Appendix 2.

A number of other potential assets were also identified that, although they could not be defined as either environmental or cultural and did not necessarily meet the criteria noted above, had implications for the sensitivity of an area and consequently a capacity to influence the planning process. These are summarised in Table 8 and may be considered in more detail in future research efforts, particularly if social and economic factors are integrated.

Table 8 Potential non-environmental and non-cultural assets

DESIGNATION	ASSET
Economic and employment	Tourism value > average Tourism value ≤ average Tourism-related employment > average Tourism-related employment ≤ average
Infrastructure	Roads – major/minor Pipelines – major Canals Railway-related Pylons Waste disposal area Cables – above/below ground
Existing quarry	Adjacent < 0.5 km 0.5 - 1 km > 1 km
Topography	Elevated Flat Undulating
Transport	Distance to nearest trunk road
Health and Safety	Bird strike exclusion zone

4.2 ASSET SCORING

Defining the relative significance of each asset is potentially a highly subjective and contentious task and a number of methods were used to minimise the subjective element, and to link asset weighting to one or more externally validated ‘anchor points’. For each asset the policy and law and planning guidance and regulations were reviewed in order to ascertain each component’s relative importance or significance. The review of each component is summarised in the later parts of this section. To maximise transparency a simple linear scoring system of 1-10 was adopted, with 10 representing an extremely significant asset, while a score of 1 represented an asset with very limited significance. A scale of 1-10 was preferred to a narrower scale (e.g. 1-5) as it allowed a greater distinction between assets that would in the narrower scale receive an identical score. Using a more complicated system would give the impression that the system is more quantitative and hence more objective than it is. Even though the system is essentially subjective it aims to provide a consistent method such that if one individual uses it they will arrive at the same result as another individual.

It is important to recognise that the scores are designed to reflect the sensitivity of the area rather than be related to the actual or potential impacts of a quarry operation. Therefore, although crushed rock and sand and gravel operations are significantly different with respect to duration, impacts and restoration, both are treated equally in this system. It is the inherent sensitivity of the area that is the focus here.

As a preliminary step the following scores were assigned:

- *Locally significant – 4*: these are assets valued for their local importance. Within policy and law and planning guidance and regulations they will be a material consideration in planning applications. However, they are not statutory so in effect are offered little or no protection from development. Different mineral planning authorities will also give varying levels of consideration to these components.
- *Regionally significant – 6*
- *Nationally significant – 8*
- *Internationally significant – 10*: these assets are of such significance that it is in international interests to conserve them. These assets are afforded protection by international law or treaties and to impact on them would constitute a breach of international law, agreements or obligations.

However, these are not immovable and variations are made according to the nature of the component. Therefore, these scores were then revised according to the degree of legal or voluntary protection (e.g. under international conventions, national laws, byelaws and voluntary initiative) to generate a ‘baseline’ score. It is suggested that the baseline scores be used except where the user has a reasonable and transparent reason to alter it. Any alterations must be clearly justified. For components where the baseline score is tied to some statutory provision it is recommended that any alterations below that baseline be avoided (i.e. scores should be increased rather than decreased). Reflecting the need for flexibility, baseline scores were supplemented by a score range, the lower and upper limit of which was considered to be the minimum and maximum realistic score respectively for that asset. The range addresses the fact that local policies contain nuances that cannot be reflected on the map (e.g. the use of offsets to replace one asset by the creation of one in another location).

Non-asset factors, such as the desire on the part of planners to avoid certain end-uses for land in some areas may be more significant in some instances than the presence of environmental and cultural assets.

Despite the methodological approach of scoring relative to external ‘anchor points’, different stakeholder groups will assign varying degrees of significance to each asset. For example, there may be a sharp distinction between the views of local, regional and national stakeholders, each of which has a degree of validity and relevance.

‘Anti-assets’ (e.g. contaminated land, high levels of unemployment) are not shown on the map. However, these are important in as much as the development of such areas may improve environmental and social standards and lead to the creation of environmental and cultural assets that would otherwise be absent.

4.3 DESCRIPTION OF DESIGNATIONS AND ASSETS

4.3.1 Introduction

The following sections give details for each asset (grouped according to their designation). Table 9 summarises the principle comments regarding each of the eight designations, of which three are pre-eminent: nature conservation, landscape conservation and heritage and cultural conservation. A significant area of land in England, Wales and Scotland is protected by these conservation designations, which collectively protect wildlife, landscape and cultural aspects of the countryside. There are a large number of assets within these designations, some with statutory protection, and others without and they account for more than half of the total environmental and cultural assets identified using the criteria noted in Section 4.1.1.

Table 10 summarises the complete list of environmental and cultural assets along with the baseline and range score for each (in order of descending baseline score for each designation). Assets used in the development of the map are shown in bold. Only 20 assets were used to produce the map, this reflects the data that could be obtained in a suitable format.

Table 9 Summary of designations

DESIGNATION	SUMMARY
Nature, landscape and heritage/cultural conservation	<p>Guidance on nature conservation is provided in <i>Planning Policy Guidance (PPG) Note 9 Nature Conservation (2002)</i> in which it states ‘local planning authorities should have regard to the relative significance of international, national, local and informal designations in considering the weight attached to nature conservation issues..... nature conservation objectives should be taken into account in all planning activities which affect rural and coastal land use, and in urban areas where there is wildlife of local importance’. The protection of international designations takes priority over other designations in order to avoid breaking international agreements. However, planning permission cannot be refused on the basis of nature conservation, particularly if planning conditions can be imposed that will prevent any damage to the asset. Also if there are other factors such as economic benefits or benefits for human health the asset may be considered less significant.</p> <p>Regional landscape character has been defined in the “Character of England” map, published by the Countryside Agency in parallel with English Nature’s Natural Areas. Many local authorities have also published landscape character assessments that provide further detail. Landscape is an environmental quality that is ‘valued by humans for ethical, aesthetic and cultural reasons and the degradation of landscape entails both a loss of naturalness and historic cultural values’ (OECD, 1994). One way of preserving landscapes that are important is to assign them a designation that will give them protection against degradation. <i>Planning Policy Guidance Note 7 The Countryside – Environmental quality and economic and social development (2002)</i> outlines how designated landscapes are protected.</p> <p>According to <i>Planning Policy Guidance (PPG) Note 16 Archaeology and Planning</i> ‘archaeological remains should be seen as a finite resource...where nationally important archaeological remains, whether scheduled or not, and their settings, are affected by proposed development there should be a presumption in favour of their physical preservation’ (PPG16, 2002).</p>
Geological	<p>Geological designations are similar to landscape and nature conservation designations but are for the conservation of geological or geomorphological feature or landscapes. They include Limestone Pavements, Geological Sites of Scientific Interest (GSSIs) and Regionally Important Geological Sites (RIGS).</p>
Biodiversity	<p>The UK Biodiversity Action Plan identifies priority habitats. Local Biodiversity Action Plans have identified further habitats of local significance, several of which have regional importance. Regional Biodiversity Forums produce ‘Regional Targets for Biodiversity Supporting Information’ which presents the information from which targets are derived.</p>
Agricultural land	<p>Social well being and economic success depend fundamentally upon a healthy environment. At the heart of regional planning is the question of how best to accommodate development which meets the social and economic objectives of the region while ensuring that environmental quality is maintained. Sustainable development can only be achieved if environmental protection and enhancement is an integral part of regional policy and planning. The maintenance and enhancement of biodiversity (the variety of life) is essential to achieving the overall aim of sustainable development. It is necessary to ensure that change does not result in a net loss of either the quantity or quality of biodiversity in the region, and wherever possible contributes positively to its enhancement.</p>
Groundwater	<p>Groundwater is a vital source of potable water in England. The protection of groundwater is essential. The location of all aquifers and abstraction wells therefore need to be considered.</p>
Surface water	<p>Water is a special component in that all major development projects are likely to have hydrological impacts (Morris & Therivel, 2001). Water quantity and quality are important in terms of environmental significance. Water quantity is concerned with the storage and flows of water, while water quality is concerned with the materials that the water carries. There is significant potential to identify strategic river corridors that would link many different Biodiversity Action Plan habitats. Careful development and management are essential if different uses of water are to co-exist successfully.</p>

Table 10 Comprehensive list of environmental and cultural assets

(Those assets shown in bold were used in the research)

DESIGNATION	ASSET	BASELINE SCORE	SCORE RANGE
Nature conservation	Ramsar	10	10
	Special Areas of Conservation (SACs)	10	10
	Special Protection Areas (SPAs)	10	10
	RSPB Important Bird Areas (IBAS)	8	6-10
	National Nature Reserves (NNR)s	8	7-9
	Marine Nature Reserves (MNRs)	8	7-9
	Sites of Special Scientific Interest (SSSIs)	8	5-9
	Sites of Special Scientific Interest 2 km buffer	4	1-6
	Local Nature Reserves (LNRs) including Wildlife Trust sites and Notified Road Verges	4	2-8
RSPB Reserves	4	2-8	
Sites of Important Nature Conservation	2	2-8	
Landscape conservation¹	National Park	8	6-10
	Heritage Coast	8	6-10
	Area of Outstanding Natural Beauty	8	6-10
	Green Belt	8	5-9
	Millennium Greens	7	4-8
	Ancient woodland	6	4-8
	National Forest	6	4-8
	Footpaths, rights of way, access to open spaces	6	4-8
	Important hedgerows	6	6-10
	Community forest	4	2-8
	Community woodland	4	2-8
	Woodland Trust	4	2-6
Tranquil Areas	4	3-5	
Heritage and cultural conservation	World Heritage Sites	10	10
	Scheduled Ancient Monuments	8	7-8
	Listed Buildings:		
	Grade I	8	7-8
	Grade II*	6	5-6
	Grade II	4	3-4
	National Trust Land	8	8-10
	Conservation Areas	4	4-6
	Historic Parks and Gardens:		
	Grade I	8	7-8
	Grade II*	6	5-6
	Grade II	4	4-5
Geological	Limestone pavements	10	8-10
	Geological Conservation Review Site (GCRS)	8	5-9
	RIGS	4	2-6
	Local Geodiversity Action Plan	4	2-6
Biodiversity	Biodiversity Action Plan area	4	2-8

DESIGNATION	ASSET	BASELINE SCORE	SCORE RANGE
Agricultural land	Agricultural Land Quality (ALC):		
	Grade 1 & 2 or	8	7-9
	Grade 3 or	6	5-7
	Likelihood of best & most versatile (BMV) land		
	High	8	5-9
	Moderate	6	5-9
	Low	4	4-7
Groundwater	Aquifers:		
	Major	8	8-9
	Minor	6	6-8
	Groundwater Source Protection Zones:		
	GSPZs 1 & 2	8	8-9
	GSPZ 3	7	7-8
Surface water	National water quality:		
	Grades A and B	8	5-9
	Grades C and D	4	2-7
	Flood zone:		
	High risk	8	7-9
	Low to medium risk	5	4-6
	Little or no risk	1	1-3

1) There are a large number of non-statutory landscape designations, often designated by local authorities, which lack consistency at national and regional levels, and which few authorities attempt to explain (Bloomer Tweedale Architects and Towner Planners, 1992). Although these are not addressed within the scope of this project due to the problems of comparison across a region or nationally, it is important to recognise that these areas are afforded some degree of protection by their designation.

The following pages provide detailed information about each asset listed in the above table.

4.3.2 Nature conservation-related assets

RAMSAR SITES, SPECIAL PROTECTION AREAS AND SPECIAL AREAS OF CONSERVATION [BASELINE 10, RANGE 10 FOR ALL]

Ramsar sites are designated by the Secretary of State under international obligation under the Wetlands Convention. Under the agreement, signatory states must protect wetlands that are of international importance, particularly waterfowl habitats. Special Areas of Conservation (SACs) are designated under the EC Habitats Directive and Special Protection Areas (SPAs) are designated under the EC Birds Directive. Within SACs the aim is to safeguard rare and threatened species and habitats in accordance with the Directive. Globally threatened habitats and species are given priority status and strict measures to protect them are generally enforced. Within SPAs special measures are required to protect wild birds and their habitats, particularly rare or vulnerable species listed in the Directive, but also regularly occurring migratory species. The European network of SPAs and SACs are known as the Natura 2000 Network. The overall aim of the Network is to protect habitats of threatened species of wildlife. Member states must take appropriate steps to avoid significant deterioration of natural habitats and restrict development that is likely to have a significant affect on a SPA or SAC. Eventually all SPAs and SACs will be notified as Sites of Special Scientific Interest and English Nature will then have to be consulted during any planning application.

Where mineral proposals affect internationally designated areas, such as Special Protection Areas or Special Areas of Conservation, they will need to be considered against advice in PPG9, which explains the appropriate assessments required under the European Habitats Directive.

RSPB IMPORTANT BIRD AREAS [BASELINE 8, RANGE 6-10] AND **RSPB RESERVES** [BASELINE 4, RANGE 2-8]

The most important sites for birds are known as Important Bird Areas (IBAs). The IBA Programme is a worldwide initiative aimed at identifying and protecting a network of sites, critical for the conservation of the world's birds. Unlike other species birds have a greater international significance because their migration between countries and continents means that development in one area has consequences for sites hundreds or thousands of miles away. In the UK, these sites may be protected under the EC Wild Birds Directive (1979), Ramsar Convention (1971) and other statutes, but some may have no legal protection. RSPB Reserves are treated as being equivalent to Local Nature Reserves (see below), although many of them have some degree of crossover with a range of statutory designations.

NATIONAL NATURE RESERVES [BASELINE 8, RANGE 7-9]

National Nature Reserves (NNRs) are sites containing natural or semi-natural habitats of national importance and interest that are designated by English Nature. In order to designate the site English Nature must have control over it which it achieves by either buying or leasing the land or entering into a management agreement with the owner under the National Parks and Access to the Countryside Act 1949 (amended by the Wildlife and Countryside Act 1981). All NNRs are also Sites of Special Scientific Interest (SSSIs) and some also contain Biogenetic Reserves (representative examples of natural habitats used for long-term research on ecosystems, environmental change and diversity of species). Byelaws for the protection of the site can be made with confirmation from the Secretary of State. There are 383 NNRs in the UK covering 2198 km² (Cullingworth & Nadin, 2002).

MARINE NATURE RESERVES [BASELINE 8, RANGE 7-9]

Marine Nature Reserves (MNRs) are similar to NNRs but apply to coastal areas. They are designated under the Wildlife and Countryside Act 1981 in order to conserve marine flora and fauna or geological or physiographical features. English Nature can make byelaws to protect the sites. Currently there are only 3 sites in the UK covering 194 km² of coast (Cullingworth & Nadin, 2002).

SITE OF SPECIAL SCIENTIFIC INTEREST [BASELINE 8, RANGE 5-9] AND **SSSI 2 KM BUFFER** [BASELINE 4, RANGE 1-6]

Sites of Special Scientific Interest (SSSI) were introduced under the National Parks and Access to the Countryside Act 1949. Management agreements were added under the Countryside Acts of 1967 and 1968. Management plans and a list of potentially damaging operations are used to prevent damage to sites and ensure that operations take conservation into account. In 1982 much of this was changed and strengthened under the Wildlife and Countryside Act, Part 2. Sites are designated purely on scientific grounds and they are intended to represent sample British habitats, with the aim of '*maintaining the present diversity of wild animals and plants in Great Britain*' (Bell & McGillivray, 2000). Most SSSIs are privately owned or occupied and there are 6,545 SSSIs in the UK covering a total area of 22,682 km² (Cullingworth & Nadin, 2002). SSSI status does not change the use of the land but owners and occupiers have a duty to notify English Nature of any change or development they wish to undertake – to not do so would be an offence. Although theoretically protected (and sensitive), degradation of many sites has occurred through development. However, the government's target is that 95% of SSSIs (by area) should be in a

favourable condition by 2010. If a development area is within 2 km of an SSSI this is considered important due to the possible remote impacts on the SSSI itself. The actual score assigned to the buffer zone should depend on proximity and nature of the potential risks.

According to Regional Planning Guidance 8, there are 384 sites that are designated as either SSSIs or form part of the European Natura 2000 network of internationally important sites of Special Protection Areas (SPAs) for birds or Special Areas of Conservation (SACs).

An extensive review of geological sites covered by the SSSI network (the Geological Conservation Review (GCR) – see 4.3.5 below) is being undertaken. Geological SSSIs arising from the GCR that are designated for fossil, mineral or some other geological interest will be afforded the same protection as SSSIs.

LOCAL NATURE RESERVE INCLUDING WILDLIFE TRUST SITES AND NOTIFIED ROAD VERGES [BASELINE 4, RANGE 2-8]

Local Nature Reserves (LNRs) are, as their name suggests, sites of local importance as opposed to national importance. They are designated by local authorities (e.g. borough, county, district and regional councils) in conjunction with a range of conservation organisations under the National Parks and Access to the Countryside Act 1949. There are 718 sites in the UK with a total area of 435 km² (Cullingworth & Nadin, 2002). Most are privately owned subject to a management agreement, but some are owned by voluntary organisations such as the RSPB and County Wildlife Trusts who manage their own sites. With respect to this project, Wildlife Trust sites and Notified Road Verges are both treated as LNRs.

SITES OF IMPORTANT NATURE CONSERVATION [BASELINE 2, RANGE 2-8]

Sites of Important Nature Conservation (SINCs) include County Wildlife Sites and sites of local importance, for instance in urban areas where the site may provide the only local access to nature conservation. English Nature will often take the lead in designating such sites, in partnership with local councils and planning authorities and other interested stakeholders. These sites are voluntary in their nature and are therefore afforded no statutory protection. However, as with other nature conservation assets, it is likely that they will be a material consideration in planning decisions.

4.3.3 Landscape conservation-related assets

NATIONAL PARK [BASELINE 8, RANGE 6-10]

The National Parks and Access to the Countryside Act 1949 provided legislation and protection of areas designated as National Parks. The Act has had a great deal of amendment since then, with the latest in 1995 in the Environment Act. The Act of 1995 established independent national park authorities. There are two basic aims of National Parks: *‘to conserve and enhance the natural beauty, wildlife and cultural heritage of the areas’* and *‘promote opportunities for the understanding and enjoyment of the special qualities of those areas by the public’* (PPG7, 1997). There are currently seven national parks in England covering 9936 km² and 8 % of the total land area (Cullingworth & Nadin, 2002). National Parks are of high national importance as reflected in their planning autonomy. Development is controlled in national parks through the town and country planning system and as such the national park authorities have control over all planning functions. It is important to bear in mind that the name National Park does not signify national ownership. Most of the land in National Parks is in the hands of farmers and other private landowners. Public bodies such as the Forestry Commission, the National Park Authorities or English Nature also manage some areas and some are managed by voluntary conservation organisations such as the National Trust. Under RPG 8 - Policy 53 (Mineral Proposals Affecting Statutory Designated Areas), where mineral proposals are in the Peak District National Park,

they should be subject to the most rigorous examination and all minerals development should be demonstrated to be in the public interest before being allowed to proceed.

HERITAGE COAST [BASELINE 8, RANGE 6-10]

The non-statutory Heritage Coast classification scheme was initiated in 1972 to protect coastline of special scenic and environmental value from undesirable development. In England the Countryside Agency and the local planning authority select the areas (Bell & McGillivray, 2000). Designation allows for the dual purposes of conservation and managed recreation, as is the case for National Parks and the protected area extends inland for an average of 2.5 km. There are 45 designated Heritage Coasts in England and Wales protecting nearly 1500 km of coast (Cullingworth & Nadin, 2002). The National Trust owns much of the designated coastline. In England the heritage coasts are managed by the Countryside Agency, and some 31% of the coast in England is protected. Many of these coasts are part of larger National Parks or Areas of Outstanding Natural Beauty (AONBs – see below), and therefore although the Heritage Coast classification offers no statutory protection most are afforded the protection of the larger designation of which they are part. Constraints on coastal development are outlined in Planning Policy Guidance (PPG) 20 Coastal Planning.

AREA OF OUTSTANDING NATURAL BEAUTY [BASELINE 8, RANGE 6-10]

The National Parks and Access to the Countryside Act 1949 provided for the designation of Areas of Outstanding Natural Beauty (AONBs), the purpose of which is to conserve the natural beauty of the landscape rather than to provide means for public access and enjoyment. Protection may be limited as many of the powers available are optional rather than statutory. However, under the Countryside and Rights of Way Act (2000), many of the provisions relating to National Parks have been extended to AONBs. There are 41 AONBs in England and Wales covering 18% of the countryside in England and Wales (National Association for Areas of Outstanding Natural Beauty website – www.aonb.org.uk).

GREEN BELT [BASELINE 8, RANGE 5-9]

Policy and Planning Guidance Note 2 (PPG2) Green Belts provides a map of approved Green Belts in England. Green Belts have been designated in England, Scotland and Northern Ireland to restrict the spread of built up areas on to previously undeveloped land and to preserve the character of historic towns. PPG2 states '*the essential characteristics of Green Belts is their permanence. Their protection must be maintained as far as can be seen ahead*'. In planning terms Green Belts are protected nationally and there is a '*general presumption against inappropriate development within them*' (PPG2, 2002) so it is significant as to whether a development will be within or outside of the belt. However, there are many developments that are not considered to be inappropriate such as mineral extraction so long as the site is well restored. In 1997, designated Green Belt land in England amounted to 1.65 million hectares (approximately 13% of the land area).

MILLENNIUM GREENS [BASELINE 7, RANGE 4-8]

Millennium Greens are new areas of open space to be held on trust as a permanent resource for the local community. Anybody may use any part of the land on foot, for informal enjoyment and play. Although they have no statutory protection, local community ownership and rights may be significant and a number of legal and community instruments constrain the sale or other disposal of Millennium Greens. Although only locally significant, the baseline and range scores have therefore been increased to reflect this.

ANCIENT WOODLAND [BASELINE 6, RANGE 4-8], **COMMUNITY FORESTS** [BASELINE 4, RANGE 2-8], **COMMUNITY WOODLANDS** [BASELINE 4, RANGE 2-8] AND **WOODLAND TRUST SITES** [BASELINE 4, RANGE 2-6]

Ancient Woodland is land that has had continuous woodland cover since at least 1600AD. There are two types of ancient woodland. The first is ancient semi-natural woodland that has retained the native tree and shrub cover. The second is Ancient Replanted Woodland. These woodlands are where the original native tree cover has been felled and replaced by planting, usually with conifers. Community Forests are non-statutory designations that aim to promote the creation, regeneration and multipurpose use of well-wooded landscapes around major towns and cities (Bell & McGillivray, 2000). Community Woodlands are similar to Community Forests, but are being created near centres of population. The only control is that development proposals must respect the woodland setting; other than this, development control relies on the private rights of the Forestry Commission. There are 12 community forests in England together with the National Forest in the Midlands. While the Woodland Trust is not a statutory consultee on planning applications involving woodland, it owns significant areas of woodland and is therefore a locally significant stakeholder. There are over 22,000 ancient woodland sites in England (EN, 2002).

NATIONAL FOREST [BASELINE 6, RANGE 4-8]

The total area of the National Forest is planned to be around 520 km² (200 square miles), of which one-third will be wooded. Therefore, while of national significance there are substantial areas that could accommodate sympathetic development and the baseline score is therefore reduced from 8 to 6. Although the Forest has no statutory protection, a number of areas within may do. It is anticipated that tree planting within the National Forest (along with the Greenwood Community Forest and other major initiatives at Sherwood, Rockingham and East Derbyshire Forests) will help redress the regional deficiency and contribute to the national programme.

FOOTPATHS, RIGHTS OF WAY AND ACCESS TO OPEN SPACES [BASELINE 6, RANGE 4-8]

Under the Countryside and Rights of Way Act 2000 “*any person is entitled ... to enter and remain on any access land for the purposes of open-air recreation...*” Access land is land that appears to the Countryside Agency to consist wholly or predominantly of mountain, moor, heath or down and registered common land (Open Spaces Society – www.oss.org.uk). In England access will commence on a regional basis, starting in two regions in Autumn 2004. Other regions will follow with all English access land opened up to walkers by the end of 2005. When it is fully implemented the Countryside and Rights of Way Act 2000 will provide a new form of legal protection for public access to open countryside and common land in addition to the existing provisions for rights of way.

IMPORTANT HEDGEROWS [BASELINE 6, RANGE 6-10]

Hedgerows are an important part of the landscape in England. ‘*Important*’ hedgerows are protected under the 1995 Environment Act, which prohibits their removal, damage or destruction. The 1997 Hedgerows Regulations also provide protection for important hedgerows. To be classified as an important hedgerow certain relatively stringent criteria must be met, which in reality narrows the protection of qualifying hedgerows. Example criteria include that the hedgerow is part of a pre-1850 parish or township boundary or is associated with a pre-1600 estate or manor, incorporates an archaeological feature or is part of, or associated with, an archaeological site or forms an integral part of a pre-Parliamentary enclosure field system. In reality this means that very few hedgerows are actually protected. An owner must notify the local planning authority before removing any hedgerow and consent can only be refused if is deemed an important hedgerow.

TRANQUIL AREAS [BASELINE 4, RANGE 3-5]

The Council for the Protection of Rural England (CPRE) has produced Tranquil Area maps of England that show areas that they consider tranquil. According to the CPRE tranquil areas are ‘*places which are sufficiently far away from the visual or noise intrusion of development or traffic to be considered unspoilt by urban influences*’ (e.g. 4 km from the largest power stations 3 km from high traffic volume motorways and large towns, 2 km from most other motorways and major trunk roads and the edge of smaller towns, 1 km from medium disturbance roads and some main line railways) (CPRE website - www.cpre.org.uk).

4.3.4 Heritage and cultural-related assets**WORLD HERITAGE SITES** [BASELINE 10, RANGE 10]

There are currently 15 sites within England that the government has pledged to protect under the UNESCO World Heritage Convention. There is no specific legislation related to World Heritage Sites and protection relates to the importance given to them in the planning process. *Planning Policy Guidance (PPG) Note 15 Planning and the Historic Environment* states ‘*Local planning policies should...place great weight on the need to protect them [World Heritage Sites] for the benefit of future generations as well as our own*’ (PPG15, 2002). Areas of outstanding natural or cultural value can be designated as a World Heritage Site. They can include exceptional examples of outstanding natural habitats or natural and manmade features. A high standard of management is a prerequisite to listing of the site.

SCHEDULED ANCIENT MONUMENTS [BASELINE 8, RANGE 7-8]

The principal legislation for the protection of archaeological remains is the Ancient Monuments and Archaeological Areas Act 1979 and the Town and Country Planning Act 1990. The 1979 Act provides protection for archaeological sites or monuments that have been designated as being of national importance and these are known as Scheduled Ancient Monuments (SAMs). The Monuments Protection Programme (MPP), overseen by English Heritage, underpins the creation of SAMs. The MPP is a comprehensive review and evaluation of England’s archaeological resource. One of its principal aims is to identify those monuments and sites whose national importance and conservation requirements justify some form of statutory protection (such as scheduling). Scheduling is applied only to sites of national importance, and then only if there is no better alternative means of protection (e.g. other local authority-based planning controls or listing – see below). There are approximately 18,300 SAMs in England. However, according to the latest (2004) figures from English Heritage, there are approximately 1 million archaeological sites or find spots of all types currently recorded in England, and perhaps less than half might qualify for consideration for scheduling as monuments.

LISTED BUILDINGS [GRADE I: BASELINE 8, RANGE 7-8; GRADE II: BASELINE 6, RANGE 5-6; GRADE II: BASELINE 4, RANGE 3-4]

When buildings are listed they are placed on statutory lists of buildings of ‘*special architectural or historic interest*’ compiled by the Secretary of State for Culture, Media and Sport under the Planning (Listed Buildings and Conservation Areas) Act 1990, on advice from English Heritage. Listed buildings are buildings with an architectural or historic interest. Listed buildings are graded to show their relative importance: Grade I buildings are those of exceptional interest, Grade II are particularly important buildings of more than special interest and Grade II are of special interest, warranting every effort to preserve them. There are approximately 370,000 entries currently protected by listing, and of those over 92% are Grade II.

NATIONAL TRUST LAND [BASELINE 8, RANGE 8-10]

Originally established to act as a guardian for the nation in the acquisition and protection of threatened coastline, countryside and buildings, the National Trust currently protects an estate of more than 272,000 hectares of land associated with which are approximately 20,000 buildings as well as 230 houses of historic interest, 114 gardens, 62 landscape parks, 1,000 scheduled ancient monuments and over 40,000 sites of archaeological interest. The Trust also protects over 356 SSSIs in England and Wales, 11 National Nature Reserves and 55 Local Nature Reserves. Most of these properties are held in perpetuity.

CONSERVATION AREAS [BASELINE 4, RANGE 4-6]

Conservation areas are concerned with areas as opposed to individual sites or buildings. Local Planning Authorities can designate areas as Conservation Areas based on special architectural or historic interest, the character of which it is desirable to preserve or enhance (Cullingworth & Nadin, 2002). If an area has been designated as a Conservation Area planning decisions are scrutinised more thoroughly. Currently there are over 9,000 areas designated in the UK (Cullingworth & Nadin, 2002). There is much criticism as to the value of these sites due to the varied nature in which they are designated. For this reason these sites are only considered to be of local importance.

HISTORIC PARKS AND GARDENS [GRADE I: BASELINE 8, RANGE 7-8; GRADE II: BASELINE 6, RANGE 5-6; GRADE II: BASELINE 4, RANGE 3-4]

The National Heritage Act 1983 enables English Heritage to compile a Register of Parks and Gardens and other land of special historical interest. Historic parks and gardens are sites that are regarded as an essential part of the nation's heritage, but they are not afforded any statutory protection (Morris & Therivel, 2001). There are just over 1,300 historic parks and gardens in England (Cullingworth & Nadin, 2002). There are no duties on local authorities to maintain these parks and according to Cullingworth & Nadin (2002) *'there seem to be no clear responsibilities in relation to parks'*. As with listed buildings the gardens are graded as follows; Grade I – parks and gardens of exceptional interest, Grade II – parks and gardens which are not of exceptional interest but nevertheless of great quality and Grade II – parks and gardens which are of special interest.

4.3.5 Geological-related assets**LIMESTONE PAVEMENTS** [BASELINE 10, RANGE 8-10]

Whilst limestone pavement orders are issued by Local Authorities they are protected nationally by designation under the Wildlife and Countryside Act 1981. They are designated for their *'great natural beauty and scientific interest'* (Cullingworth and Nadin, 2002). Protection was given under the legislation mainly to prevent gardeners taking the material for use in rockeries and walling stone. There are only 2,000 hectares of designated limestone pavements in England and Wales (Cullingworth & Nadin, 2002). The most important pavements in Britain have been designated as SACs (see 4.3.2 above) under the EC Habitats Directive and the Government is required to protect and restore pavement within these SACs. In England, all areas of limestone pavement are protected by Limestone Pavement Orders. These make it illegal to remove stone or damage pavement. In the rest of Britain however, many pavements may receive no legal protection.

GEOLOGICAL CONSERVATION REVIEW SITE [BASELINE 8, RANGE 5-9]

Geological Conservation Review Site (GCRS) were identified through the Geological Conservation Review (GCR), a systematic site selection exercise carried out throughout the UK between 1977 and 1990 (Ellis et al. 1996). The aim of the review was to systematically identify the key geological sites in Britain using three criteria: site is of international geological importance, contains exceptional features and are nationally important because they are representative of a geological feature, event or process which is fundamental to understanding Britain's geological history. The GCR identified a network of nationally and internationally important sites throughout Great Britain and these form the basis for statutory geological and geomorphological site conservation in Britain. In England, more than 1,300 GCR sites have been safeguarded through designation as SSSIs. The results of the review have also helped instigate the development of a network of Regionally Important Geological Sites (RIGS – see below).

REGIONALLY IMPORTANT GEOLOGICAL/GEOMORPHOLOGICAL SITES [BASELINE 4, RANGE 2-6]

A national network of Regionally Important Geological/Geomorphological Sites (RIGS) exists in England. Regional groups are made up of '*professional and amateur geologists and geomorphologists*' (Oliver, 1999). There are over 50 local RIGS groups in the UK. RIGS may be sites that '*do not meet the criteria of GSSIs (see above) but are nevertheless of significance in a local context*' (Carson, 1998). RIGS are not afforded statutory protection but can be viewed as a material consideration by local authorities.

4.3.6 Biodiversity-related assets**BIODIVERSITY ACTION PLAN AREA** [BASELINE 4, RANGE 2-8]

Biodiversity refers to the variety of life among both plants and animals. Its conservation and enhancement is a key foundation of sustainable development. Areas subject to the statutory or non-statutory designations noted elsewhere in this Section are a selection of the best examples of wildlife habitats and natural features. However, the protection of these assets alone is not necessarily enough to halt the loss of biodiversity from a region. It is a statutory requirement that development plans encourage the management of features of the wider environment of importance for biodiversity as well as protecting designated sites. The UK Biodiversity Action Plan sets priorities and targets for restoring biodiversity and these have been translated to a local level via local Biodiversity Action Plans (BAPs). Regional targets therefore reflect both national and local BAPs. BAPs should take into account regional and local distinctiveness and variety and include a broader understanding of biodiversity and environmental issues at regional, local and site levels.

4.3.7 Agricultural land-related assets

AGRICULTURAL LAND CLASSIFICATION (ALC) [GRADE 1 & 2: BASELINE 8, RANGE 5-9; GRADE 3: BASELINE 6, RANGE 5-7] **LIKELIHOOD OF BEST AND MOST VERSATILE (BMV) LAND** [HIGH BMV: BASELINE 8, RANGE 5-9; MODERATE BMV: BASELINE 6, RANGE 5-9 ; LOW BMV: BASELINE 4, RANGE 4-9]

Agricultural land has been classified into Grades by MAFF (now part of DEFRA) in the Agricultural Land Classification (ALC). Planning Policy Guidance (PPG) Note 7 The Countryside - Environmental Quality and Economic and Social Development states that Grades 1, 2 and 3a are considered '*the best and most versatile agricultural land*' (BMV). PPG7 also states, '*land in these grades is the most flexible, productive and efficient in response to inputs. It is best suited to adapting to the changing needs of the agricultural industry in both the short term and the long term national interest...local planning authorities should give considerable*

weight to protecting such land against development' it is treated as a nationally significant asset because it is an important non-renewable natural resource. PPG7 states that *'agricultural land in grades 3b, 4 and 5 is of moderate or poor quality and is less significant in terms of the national agricultural interest...little weight in agricultural terms should be given to the loss of this land'* (PPG7, 1997)

The published provisional ALC maps do not show a breakdown of Grade 3 into its component subgrades, 3a and 3b. This is because these provisional ALC maps were produced in the late 1960s/early 1970, prior to a requirement for grade 3 land to be subdivided. In general, therefore, subgrades of Grade 3 have only been identified more recently as a result of more detailed local surveys in areas of specific land use planning pressures, often on a site-specific basis. Thus the published provisional maps do not identify the extent of BMV land. Nevertheless they remain a useful source of land quality information at a strategic level. Grades 1 and 2 are treated as nationally significant. Available data do not distinguish between Grades 3a and 3b, and while ideally only Grade 3a should be considered regionally significant Grade 3 *in toto* is assigned this score.

In order to overcome this limitation, DEFRA have developed a predictive methodology to identify where BMV land is likely to be most extensive. Three categories of land were identified:

- **High likelihood of BMV land** - Land where >60% of the area is likely to comprise BMV land.
- **Moderate likelihood of BMV land** - Land where 20-60% of the area is likely to comprise BMV land
- **Low likelihood of BMV land** - Land where <20% of the area is likely to comprise BMV land

These predictive maps do not supersede the provisional ALC data, but form a companion dataset at a similar level of detail i.e. strategic uses at 1:250,000 scale. However, it is important to appreciate that this mapped BMV data is a prediction of the likely extent of BMV land within a mapping unit and is designed to be no more specific than this in locational terms. All BMV land needs to be afforded the appropriate protection wherever it is (i.e. irrespective of which of the three BMV map categories it might occur in). The scorings applied here reflect the likely amount of it in an area and hence the overall impacts of development at the strategic scale.

4.3.8 Groundwater-related assets

AQUIFERS – [MAJOR: BASELINE 8, RANGE 8-9; MINOR: BASELINE 6, RANGE 6-8]

Aquifers are bodies of rock that contain and store water. They are the largest supply of fresh water and a cheap source of water for the public. The Environment Agency has published the document "Policy and Practice for the Protection of Groundwater" (PPPG), which is perhaps the single most important tool used in England for the protection of groundwater from point source contamination. However, it is non-statutory and is used instead in a consultative manner. The Environment Agency makes use of the PPPG in conducting its own statutory authorisation processes and in contributing to the decision-making processes of other regulatory bodies and stakeholders with interest in or influence on groundwater. In addition to the non-statutory PPPG, groundwater protection is also effected through the following Acts and Regulations:

- EC Directive on the Protection of Groundwater Against Certain Dangerous Substances (80/68/EEC)
- Environmental Protection Act 1990
- Town and Country Planning Act 1990

- Water Resources Act 1991
- Water Industry Act 1991
- Environment Act 1995
- Groundwater Regulations 1998

GROUNDWATER SOURCE PROTECTION ZONES 1 & 2 [BASELINE 8, RANGE 8-9] AND ZONE 3 [BASELINE 7, RANGE 7-8]

The provision of water for public supply, industry and agriculture in the East Midlands depends in part upon abstraction from underground water resources and the potential for pollution of vulnerable aquifers is a major threat. Groundwater Source Protection Zones (GSPZs) are defined by the Environment Agency as areas around abstraction wells that may be sensitive to pollution based on the estimated groundwater travel times (Zone 1 – 50 days, Zone 2 – 400 days and Zone 3 – entire catchment). The use of GSPZs allows a balance to be struck between the protection of the groundwater resource as a whole and the protection of specific water supplies. The zones are used to signal that within specified areas there may be particular risks to groundwater quality should certain land use activities take place. Delineation of these zones can therefore influence land use. The Environment Agency has defined GSPZs for over 2,000 water supplies in England and Wales. However, it may not be practicable or efficient to define zones around 76,000 smaller sources due to lack of data.

4.3.9 Surface water-related assets

NATIONAL WATER QUALITY [GRADES A AND B: BASELINE 8, RANGE 5-9; GRADES C AND D: BASELINE 4, RANGE 2-7]

Water quality is an important environmental indicator and is a UK Government Headline Sustainability Indicator. Water quality is also regulated by several EC Directives, which require member states to set Water Quality Objectives (WQOs). There is no specific Planning Policy Guidance on water. The Environment Agency is the consulting body and regulator for all matters related to water and discharges to it. The Environment Agency (EA) uses chemical, biological and aesthetic quality data to measure water quality. Rivers are classified from Grade A (very good) to Grade F (bad) for their biology and chemistry and from 1 (good) to 4 (bad) for their aesthetic quality. Rivers are also classified on their nutrient content (using chemical data). Grades from very low to excessively high are provided for nutrient content but these grades do not necessarily reflect high or low-grade rivers as this may reflect natural variability around the country. The nutrient content is therefore not suitable for use in the determination of asset sensitivity. The aesthetic quality is also unsuitable due to the small number of rivers and canals sampled. For example just 452 sites were sampled for aesthetic quality in November and December 2000, compared with 7,000 sites every month for chemistry (EA, 2002).

It is important that high-grade rivers are not impacted upon and consequently degraded. This does not mean that lower grade rivers can be polluted, just that higher-graded rivers warrant more protection to maintain their high-grade status. All watercourses are protected and regulated by the EA and any future development would have to consider mitigation measures to prevent any pollution incidences. River stretches graded E or F are of less importance and are not considered within the context of this project.

FLOOD ZONE [HIGH RISK: BASELINE 8, RANGE 7-9; LOW TO MEDIUM RISK: BASELINE 5, RANGE 4-6; LITTLE OR NO RISK: BASELINE 1, RANGE 1-3]

Flooding may occur on river floodplains and in certain coastal areas where the possibility of inundation of low-lying areas exists. The implications of climate change for the severity and

duration of floods are not certain. Even where extensive inland and coastal areas are safeguarded by drainage or defence works, these cannot give total protection, and therefore a sustainable approach that accepts flooding as a natural process is increasingly required. Local environment agency plans, shoreline management plans and the Environment Agency's indicative flood plain map are essential tools during the preparation of development plans. The threat of flooding should be managed to ensure that developments remain safe throughout their lifetime and do not increase flood risk elsewhere.

4.4 ASSET SCORING AND STAKEHOLDER CONSULTATION

4.4.1 Identification of assets

Some of the assets identified in this research were not regarded as assets by the stakeholders. For example, Biodiversity Action Plan Areas. The list identified here was very much a preliminary list and in the initial stages all conceivable assets were included based on the criteria set out in Section 4.1.1. The authors thought that compiling a complete list of possible assets that could be edited later was the best approach.

4.4.2 Scoring

Some stakeholders regard asset scoring as subjective and an inappropriate method of comparing the relative value of different assets. One stakeholder noted that if scores were used people would no longer focus on the reasons why an area is important, but focus on the numbers attached to it. However, the authors believe that the methodology detailed in this section has still been very worthwhile as it identified all the assets and in most cases outlined the legal context and justification for considering those assets. Based on stakeholder comments and suggestions about the scoring system an alternative method was explored and tested in the GIS and this is detailed in Section 6.5.

5 Identification of aggregate resources

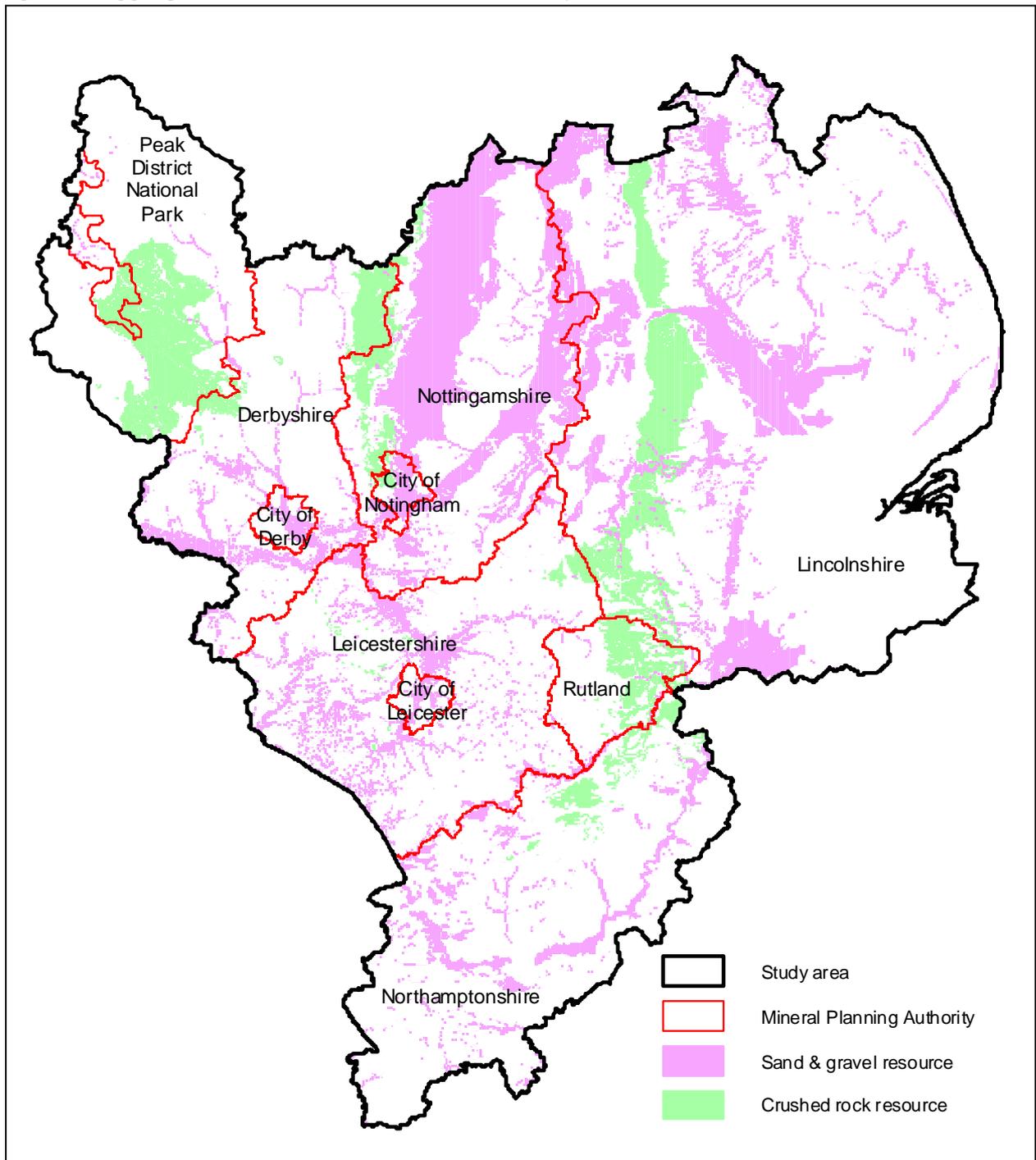
Aggregate resource data for the consultation map were taken from the BGS series of maps ‘*Mineral Resource Information in Support of National, Regional and Local Planning*’ (Table 11). Aggregate resources were merged into two categories; sand and gravel (chiefly river terrace deposits and glaciofluvial deposits) and crushed rock (chiefly limestone, dolomite and igneous rock). Figure 6 shows the aggregate resources identified in the study area. Non-aggregate mineral resources were excluded. Also excluded were the Cretaceous Chalk, which covers large areas of Lincolnshire, and the Jurassic ironstones, which outcrop over wide areas of Northamptonshire, southeast Leicestershire, Rutland and adjacent areas of Lincolnshire. The former is a soft limestone, only suitable for low-grade aggregate applications; the latter is a thin, variable deposit and is not considered to be a resource.

Active quarry sites that overlay aggregate resources are displayed on the revised map. These were obtained from the BGS ‘*BRITPITS*’ database.

Table 11 Minerals resource information reports for the East Midlands Region

Mineral Resource Information in Support of National, Regional and Local Planning: Reports for the East Midlands Region	Report Number
Harrison, DJ et al (2002). <u>Mineral Resource Information in Support of National, Regional and Local Planning: Nottinghamshire</u> . British Geological Survey Commissioned Research Report.	CR/02/23N
Harrison, DJ, Henney, PJ, Cameron, DG, Spencer, NA, Evans, DJ, Lott, GK, Linley, KA and Highley, DE (2002). <u>Mineral Resource Information in Support of National, Regional and Local Planning: Leicestershire and Rutland (comprising City of Leicester, Leicestershire and Rutland)</u> . British Geological Survey Commissioned Research Report.	CR/02/24N
Harrison, DJ et al (2002). <u>Mineral Resource Information in Support of National, Regional and Local Planning: Lincolnshire</u> . British Geological Survey Commissioned Research Report.	CR/02/128N
Bloodworth, AJ et al (2000). <u>Mineral Resource Information for Development Plans Northamptonshire: Resources and Constraints</u> . British Geological Survey Technical Report Mineral Resources Series.	WF/00/4
Cameron, DG & Highley, DE (1995). <u>Mineral Resource Information for Development Plans Derbyshire: Resources and Constraints</u> . British Geological Survey Technical Report Mineral Resources Series.	WF/95/3
Cameron, DG & Highley, DE (1995). <u>Mineral Resource Information for Development Plans Peak District National Park: Resources and Constraints</u> . British Geological Survey Technical Report Mineral Resources Series.	WF/95/4

Figure 6 Aggregate resources identified in the study area



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6 GIS data and methods

This section describes the Geographical Information System (GIS) data layers used and the methodologies involved in integrating the asset information to produce the consultation map and its revision.

6.1 BGS REGIONAL GIS DATA

As noted in the introduction the BGS co-funded element of this project was provided by the BGS project - *Mineral Information Systems and Environmental Indicators (MISEI)*. The MISEI project aims to use a Geographical Information System (GIS) to integrate, display, analyse and output information relevant to sustainable mineral development. The systems developed by the MISEI project allows the relationship between factors which influence the location of mineral extraction to be identified and analysed. Making this information available in a single, integrated system should aid decision making for planners, industry and environmental organisations at local, regional and national level. One of the objectives of the MISEI project is the creation of regional minerals GISs based on integration of ODPM-funded '*Mineral Information for Local, Regional and National Planning*' map series (England). The project is also carrying out the development of a user-friendly web-based interface for the regional GISs (*Minerals On-line*), as well as developing the methods reported here. Regional GISs for the West Midlands and North East have already been compiled, with the remaining English regions being completed by 2005. The East Midlands is the next region to be compiled. Each regional GIS holds the same basic data layers (Table 12) that are either owned by, or licensed to, the BGS. These data layers were available for use in this research.

Table 12 Typical data layers in the BGS regional GISs

Data type	Data Layers in GIS
Minerals information	Mineral resources Active quarries Planning permissions (valid, expired and dormant) BGS Mineral Assessment areas Coal Licence areas BGS 1:50,000 geology map sheets
Topographical information	Major roads Ordnance Survey urban areas* Mineral Planning Authority, County, District and Regional boundaries
National Environmental Designations	National Park, Heritage Coast SPAs and SACs Sites of Special Scientific Interest National Nature Reserves Areas of Outstanding Natural Beauty (AONB) Scheduled Ancient Monuments Ramsar Wetlands,

*Only those urban areas over 900 hectares are displayed on the map

6.2 REGIONAL DIGITAL DATA LAYERS

In order to test the asset scoring method developed in Section 5, data layers additional to those held by the BGS, were required. Many of these were sourced through the Multi-Agency Geographic Information for the Countryside (MAgiC) (<http://www.magic.gov.uk>). All this data was consistent in that it was available for the whole region. Agricultural Land Classification based on the likelihood of land being the best and most versatile was supplied by DEFRA. Table 13 shows the 20 data layers used in the research with the corresponding scores they were attributed in Section 5.

Table 13 Assets and scores used in the consultation map

Assets in alphabetical order	Minimum score	Baseline score	Maximum score	Data Source
Agricultural Land Grade 1 & 2*	7	8	9	DEFRA
Agricultural Land Grade 3*	5	6	7	DEFRA
Ancient Woodland	4	6	8	English Nature
Area of Outstanding Natural Beauty	6	8	10	Countryside Commission
Community Forest	2	4	8	Countryside Agency/ Forestry Commission
Groundwater Protection Zone 1 & 2	8	8	9	Environment Agency
Groundwater Protection Zone 3	7	7	8	Environment Agency
Millennium Green	4	7	8	Countryside Agency
National Forest	4	6	8	www.nationalforest.org
National Nature Reserve	7	8	9	English Nature
National Park	6	8	10	
Ramsar Wetlands	10	10	10	English Nature
RSPB Important Bird areas (IBAS)	6	8	10	RSPB
RSPB Reserve	4	4	4	RSPB
Scheduled Ancient Monument	7	8	8	English Heritage
Woodland Trust Site	2	4	6	Woodland Trust
Site of Special Scientific Interest	5	8	9	English Nature
Site of Special Scientific Interest 2 km buffer	1	4	6	BGS generated
Special Protection Area	10	10	10	English Nature
Special Area of Conservation	10	10	10	English Nature

* The revised map used the likelihood of best and most versatile (BMV) land

6.3 LOCAL DIGITAL DATA LAYERS

Several Mineral Planning Authorities in the study area had asset data in digital form that they were able to provide (Table 14) for use in the research. However, because the data were inconsistent across the region it was not feasible to use this information in this research. The Nottinghamshire data were however used after the stakeholder consultation workshop to demonstrate alternative methods to the original method (see 6.5 below).

Table 14 Local data layers supplied by Mineral Planning Authorities

Mineral Planning Authority	Digital data layers supplied
Peak District National Park	Natural Zones
Derbyshire County Council	Special Landscape Areas
Leicestershire County Council	Ancient Monuments (polygon) Conservation areas Historic Parks Listed Buildings Public Rights of Way
Nottinghamshire County Council	Conservation area Grade 2 Listed Buildings Listed Buildings Local Nature Reserves Other Historic Park Other Natural History Site Registered Historic Park Sites of Important Nature Conservation (confirmed)

6.4 GIS METHODOLOGY FOR CONSULTATION MAP

6.4.1 Conversion of asset data to grid data

Preliminary exploration for a suitable method to integrate, analyse and display the assets data centred on a gridded data format. This format enables generalisation of the data and analysis in the GIS. The central problem was to adopt a suitable grid cell size that minimised the loss of the smallest data features, e.g. SSSIs and Ancient Scheduled Monuments, whilst minimising the overestimation of the area covered by environmental and cultural assets. This was evaluated by focusing on the smallest polygon data features, SSSIs, of which 91% were less than 1 km² in area.

There are several ways of converting features (asset data) in a GIS to a grid format. Initially a '*contained within*' method was explored. In this method the GIS looks in each grid cell and if it finds a feature in the grid cell it converts the whole grid to represent that feature. However, this method has limitations in that the GIS only looks in the centre of each grid cell. The resolution of the grid is therefore very important because the likelihood of the smallest features being in the centre of the grid are quite low. Using the '*contained within*' method with a 1 km² grid was

likely to overestimate the representation of the large features and completely underestimate or omit the small features (Figure 7). With the '*contained within*' method a very fine resolution grid would be required e.g. grid cells of 10 m², which in initial tests proved to be extremely slow in terms of processing time. Also even at this resolution of grid cell size 31 % of the SSSI data set covered less than one grid cell.

An alternative way of converting features to grids is to use an '*intersect*' method (Figure 8). In this method the GIS converts a grid cell to a feature wherever the feature intersects the grid cell. Tests proved that using this method did not over estimate the size of the features as much and it allowed the use of a coarser grid resolution that still reflected the footprint of the smallest features. After some testing it was decided that a 1 hectare grid cell would be used. Figure 8 shows how the data is converted to grid. Adoption of a larger cell size would lead to a considerable overestimation of the area to be included in the analysis, this is illustrated in Table 2 and Figure 7 for the SSSI data. It must also be noted that some data, for instance Scheduled Ancient Monuments, representation is point format and although spatially these features cover a larger area they still reflect relatively small features that should not be over estimated. The grid was aligned to the British National Grid permitting the method to be extended to further Regions and enabling the regional results to simply be 'bolted' together seamlessly as they become available ultimately producing a national mosaic.

Figure 7 Example of a SSSI polygon, showing the effect of using different grid cell sizes on the represented size of the feature

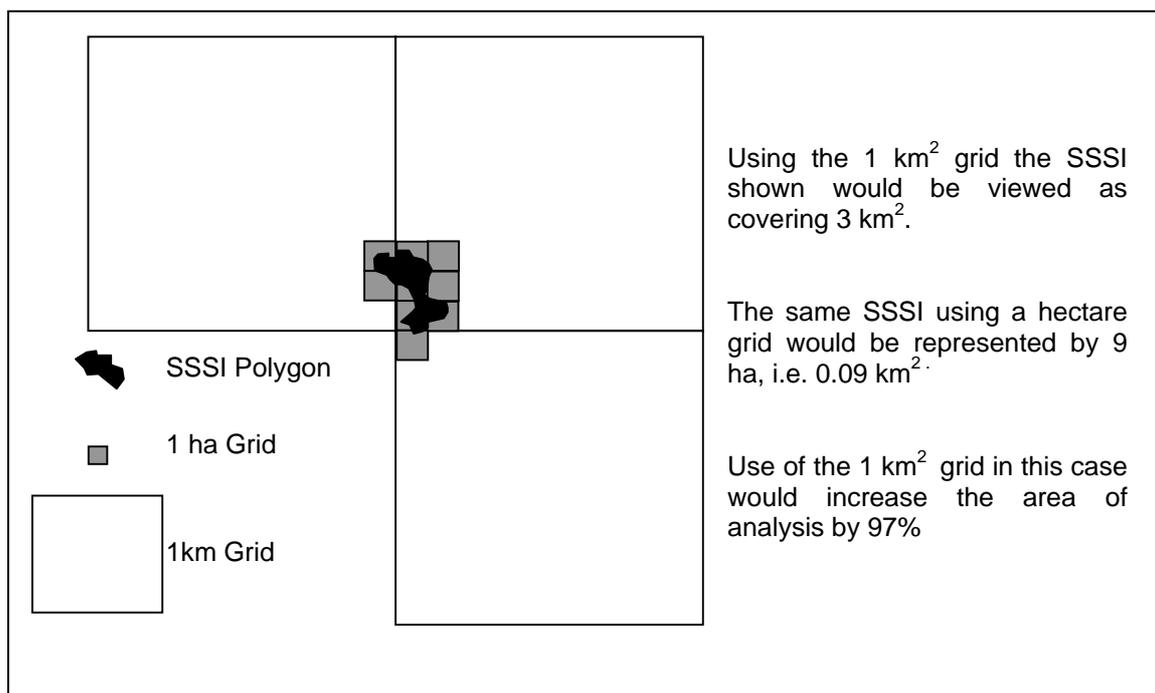
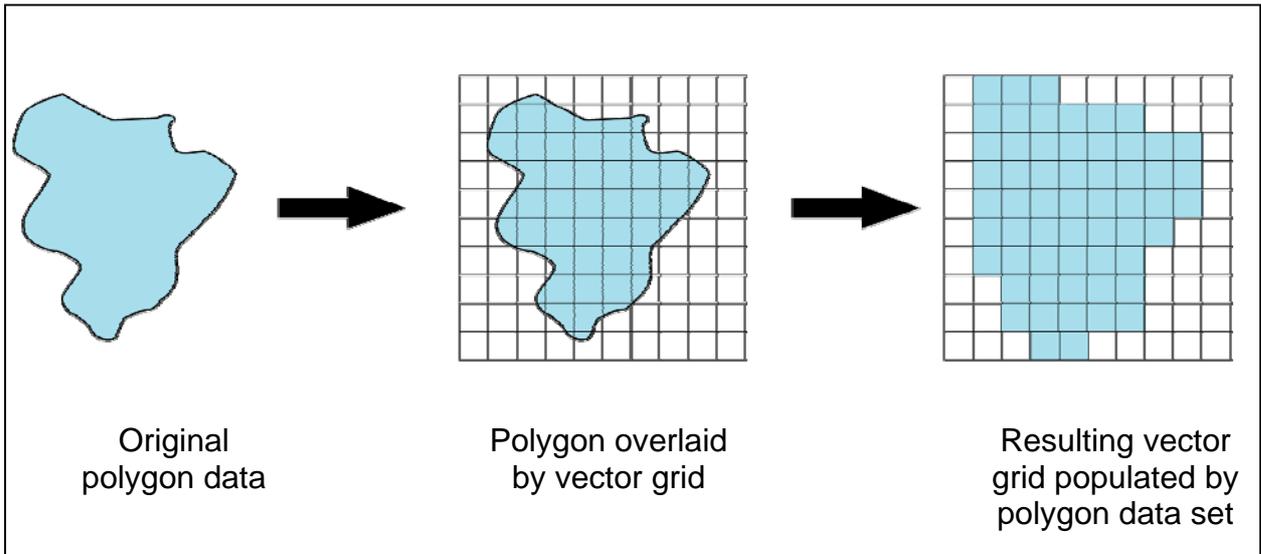


Table 15 SSSI polygon size and percentage increase using different grid cell sizes

	Area covered (hectares)	% increase in area covered
SSSI polygons	87200	
SSSI polygons converted to ha grid	104400	20
SSSI polygons converted to 1 km grid	236400	170

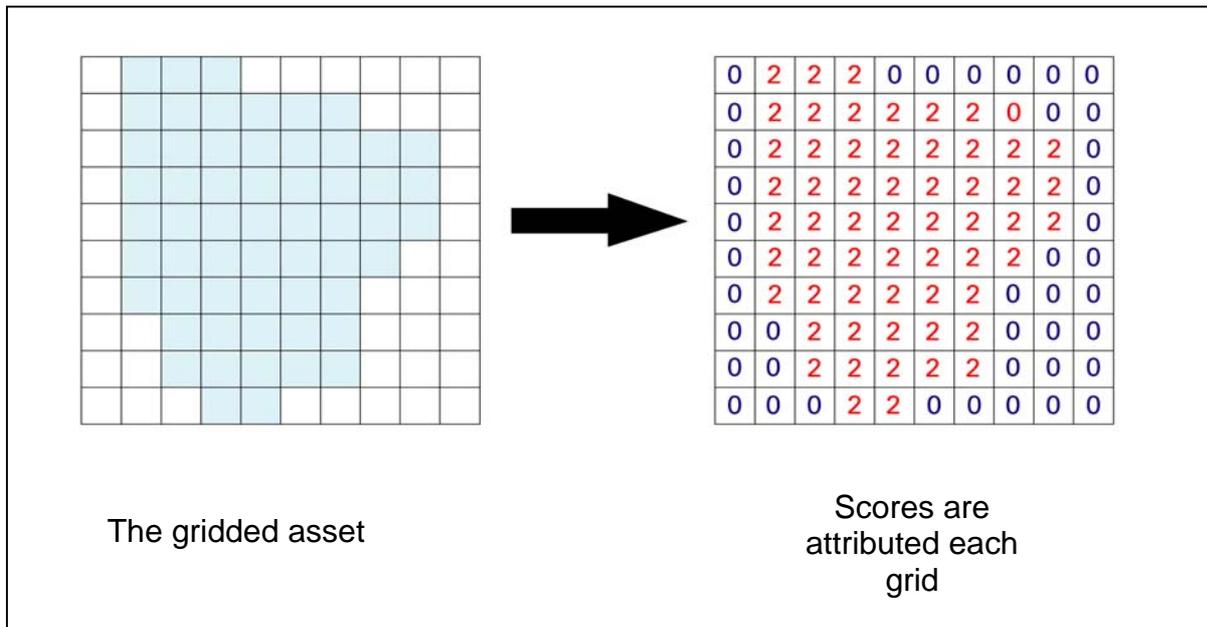
Figure 8 Grid conversion of a feature using the ‘intersect’ method



In order to carry out the grid conversion it was necessary to establish a clearly defined project area. This comprised the East Midlands Region including the whole of the Peak District National Park. The aggregate resource areas within the project area were merged to produce a constraining ‘mask’ to restrict the project analysis to the aggregate resource areas. A vector grid was produced covering the entire project area at a 1 hectare resolution and this initial stage took approximately 80 hours of processing time. However, this only needed to be carried out once and the study area was the largest area for conversion. All the asset data layers were converted to grid in exactly the same manner (but were much quicker to process). The scores devised for each asset (Section 4) were then attributed to each grid of that asset. (Figure 9).

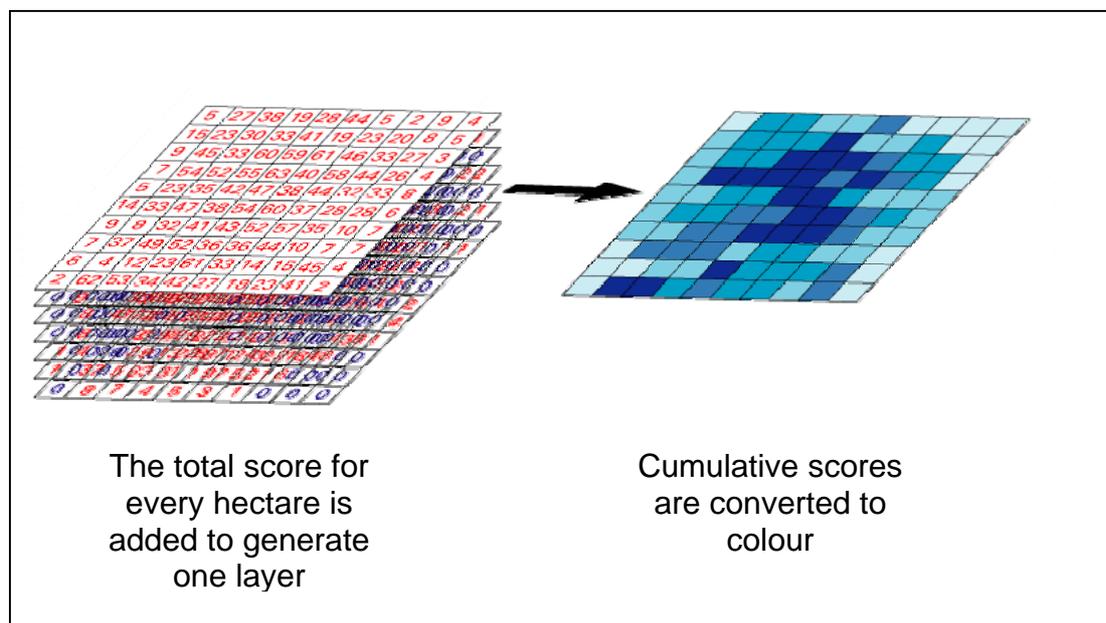
Conversion to grid has a robust, yet flexible, set-up enabling rapid integration of new information and re-classification of current data sets to reflect changes in asset data or changes to the scores attributed to the environmental and cultural assets.

Figure 9 Scores for the assets are applied to each grid cell



For the consultation map 20 layers of asset data were available (Table 13). The scores for every hectare on each layer were totalled and this cumulative layer is shown by colour to demonstrate the gradation between the most and least sensitive areas (Figure 10).

Figure 10 Cumulative scores for each data layer are converted to graduated colour



In Section 4 each asset was assigned a minimum and maximum range and a baseline score (Table 13). The baseline score was used to produce the consultation map. Two inset maps were produced on the consultation map to show how the map would look using the minimum and the maximum values (Table 13). As can be seen from this table, not many of the assets used had a great range of score so the resulting inset maps showed little variation from the original map. However they did demonstrate the flexibility of the method.

6.5 ALTERNATIVE METHODS BASED ON CONSULTATION

Following the comments and discussion at the stakeholder workshop in November 2003 re-evaluation of the analysis and presentation of the data was considered appropriate. Alternative methods of analysis and representing the data were tested using the original data layers plus the supplementary local data supplied by Nottinghamshire County Council, Environment Department. Using the county scale as opposed to a regional scale enabled results to be generated quickly.

Table 16 Additional data sets used to produce local map

Assets in alphabetical order ¹	Recommended Score
Grade 2 Listed Buildings	8
Local Nature Reserves	4
Listed Buildings	8
Conservation Area	4
Other Historic Park	4
Registered Historic Park	4
Site of Important Nature Conservation (confirmed)	2
Wildlife Trust	4

¹ All data supplied by Nottinghamshire County Council, Environment Department. Data is not current and is for indicative purposes only.

6.5.1 Extension of original methodology to include a wider range of local information

The supplementary datasets obtained from Nottinghamshire County Council (see Table 16) were integrated into the original 1 hectare vector grid with scores attributed to each. A greater level of detail was obtained by integrating this supplementary local data. The inclusion of this additional information also highlights the flexibility of the methodology, which can be implemented simultaneously on a regional and local scale. Also it demonstrates the ease with which new data can be integrated into the system.

6.5.2 Elimination of scores for assets

In response to stakeholder comments about the subjectivity of applying scores to assets an alternative approach was tested. The scores attributed in Section 4 were removed and instead the number of assets per grid cell was calculated. This was achieved in the GIS by analysing the presence or absence of an asset and then simply adding these to give the total number of assets per grid cell. The total was converted to a graduated colour. This was carried out for the Nottinghamshire area. Figure 11 represents this for a grid cell that has a eight assets in total.

Figure 11 Attribute table showing the presence and absence of assets for a given location and the cumulative number for a given grid cell

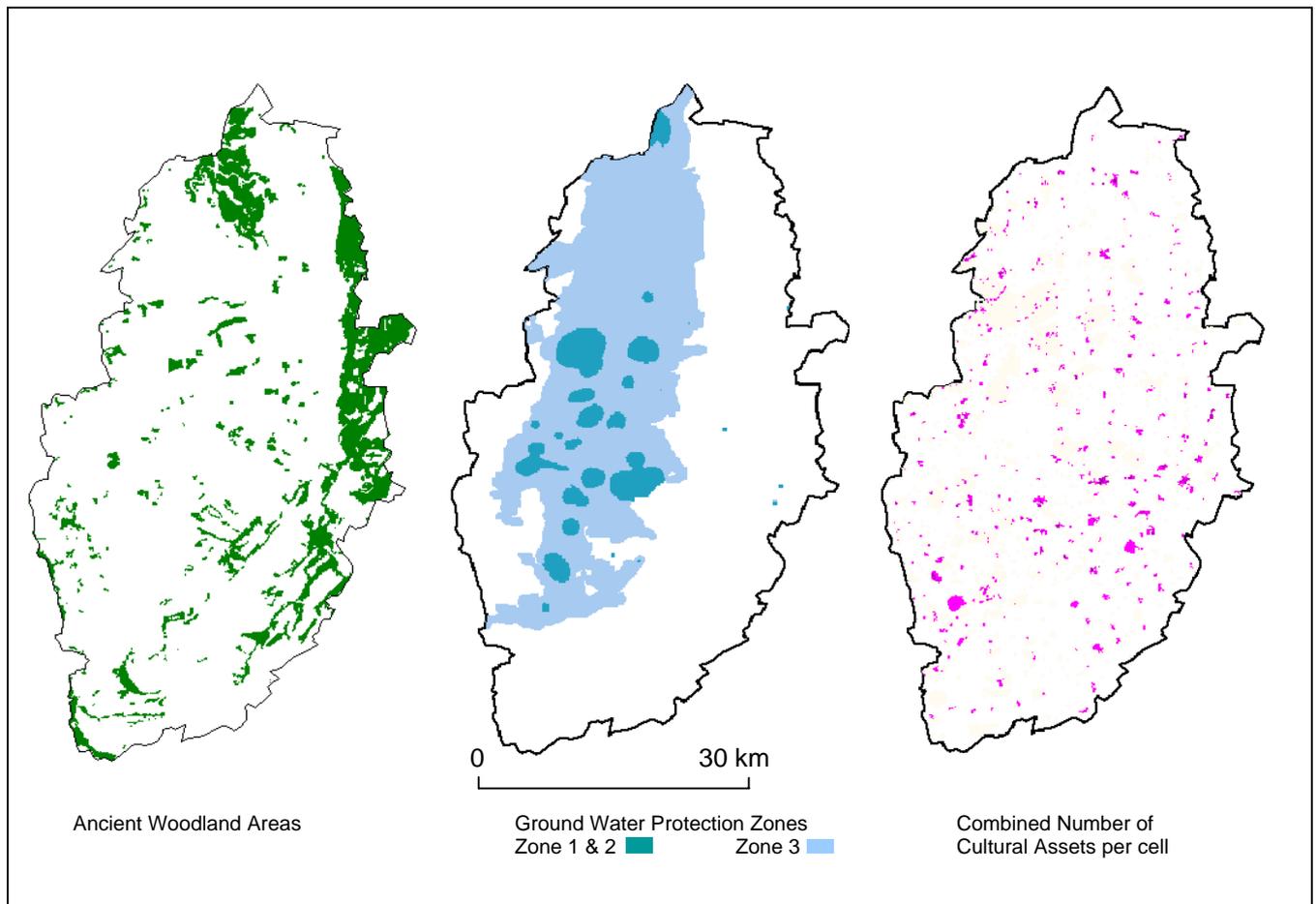
Location: (463739,369086)	
Field	Present/ absent
Conservation Area	0
Grade 2 Listed Building	0
Local Nature Reserve	0
Scheduled Ancient Monument	0
Site of Special Scientific Interest	1
Ancient Woodland	1
Listed Building	0
Notified Road Verge	0
Other Historic Park	0
Registered Historic Park	1
RSPB Reserve	0
SINC (confirmed)	1
Wildlife Trust	1
Woodland Trust	1
Community Forest	0
Ground Water Protection Zone	1
Millennium Green	0
National Nature Reserve	0
Special Area of Conservation	1
Total Number of Assets Present	8

2	2	4	1
4	5	3	2
5	3		1
5	6	4	1
8	6	3	1

6.5.3 Ability to interrogate data

The use of a vector grid allows the opportunity to store information relating to each cell in an associated attribute table and enables interrogation of the data layer to obtain scoring and asset information. All the information is represented in a simple single data layer which can be used to represent an individual feature type (such as Ancient Woodland); an individual scoring value (e.g. Ground Source Protection Zones); a combination of a set of scores or assets (e.g. all cultural asset locations) (see Figure 12) or a total number of assets or scores produced through a simple additive process (see revised map). Clearly these benefits can only be derived through the use of the data within a GIS, but add an immense amount to the flexibility and extensibility of the original data.

Figure 12 Single GIS data layers demonstrating different map outputs for Nottinghamshire



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6.5.4 Assets not to be restricted to resources

Restriction of assets to the aggregate resource area was raised during the stakeholder consultation and some stakeholders deemed this misleading. It was suggested that asset scoring should be carried out for the entire region. Re-evaluation of the data in the Nottinghamshire trial allowed presentation of an unrestricted version of the data. It would be a simple process to present this unrestricted information on a regional basis (see revised map).

6.5.5 Limitations on paper map production

In producing paper output from the project efforts were made to enhance the understanding and interpretation of the results. In order to achieve this a graduated colour scheme was adopted. Limitations arise from this regarding the quality of printer and tests on output made it clear that only six graduated colour shades could be easily recognised. This resulted in a maximum of six equal interval categories being used to represent the data.

From the revised map it can be seen that the equal interval scale represents the relative nature of the data i.e. one cell is more sensitive than the next. Using the number of assets per cell a true arithmetic value i.e. 1-2 assets per cell was adopted.

7 Stakeholder consultation

7.1 INTRODUCTION

Project decision-making strategies have been criticised in the past because they suffer from a lack of stakeholder input, de-emphasising affected interests and favouring ‘objective’ expert analysis. Recognising the equal importance of more subjective and contextual specific input in developing acceptable methods and representative asset scores, this stage of the project sought to incorporate the values and views of stakeholders to refine the scores and to refine the methodology used to produce the map. For this project, stakeholders are defined as those people or organisations that affect, or are affected by, aggregate development, or anyone else with an interest in the map or aggregate development in the East Midlands. They include, but are not limited to, the public, industry, NGOs, statutory bodies and planners.

This definition was used to help identify and invite representative stakeholders to be consulted through a series of one-to-one and group interviews and a workshop held at BGS headquarters in Keyworth on the 7th of November 2003. The workshop provided an open forum in which the map methodology and scores assigned by the project team to environmental and cultural assets could be discussed, assessed and, subsequently, modified, so that they accurately reflect the values of key stakeholders. A follow-up questionnaire was sent out to all project stakeholders to provide an opportunity for feedback from those unable to attend the workshop or those wanting to provide more detailed input on the proposed map scores. The information generated through all the consultation tools is documented in this section, and has been used to influence the development of the map. Results of the project’s entire consultative process will also be disseminated at a workshop for project stakeholders in Nottingham on the 10th of February 2004.

7.2 RATIONALE

Effective development planning requires processes that can combine technical expertise and rational decision making with public values and preferences. However, there has been continuing concern that traditional decision making strategies are insufficient because they de-emphasise the consideration of affected interests in favour of ‘objective’ expert analysis, downplay local knowledge and values, and suffer from a lack of popular acceptance (Renn et al 1995). At the same time, increasingly informed and able societies wish to more directly influence decisions made by those representing them (Petts 1999). Stakeholder consultation has grown in popularity as a solution to these challenges to decision making. Some of the key drivers for stakeholder consultation generally, and its inclusion in this project specifically, are identified below:

7.2.1 Statutory and non-statutory requirements

National, regional and international regulations and standards such as the European Union’s (2001) directives for Strategic Environmental Assessment (SEA) make stakeholder consultation mandatory procedures in project and programme development. In addition, government departments like DEFRA are making their projects and programmes contingent on the inclusion of stakeholder consultation. The UK Sustainable Development Strategy (1999) says; ‘*public involvement is essential for a truly sustainable community*’. The value of [local] participation is also highlighted as one of ten guiding principles for sustainable development in DEFRA’s sustainable development strategy: Foundations for our future (2002).

7.2.2 Public demand

Facilitated by information technology, and the growth in the global media, society has ever-greater access to information. As a result, stakeholder groups, including NGOs and the wider public, are much better informed to comment on social, cultural, environmental and ethical issues. Moreover, there is a shift occurring in society at large, which holds that *'democratising knowledge use in public and private policy arenas represents a significant step toward a more open and adaptive social order'* (Boggs 1991:7). Stakeholders are demanding greater disclosure, accountability from, and input into, public and the private sector decision-making.

7.2.3 Risk reduction

Stakeholders who have been consulted will better understand the trade-offs between project, programme or policy benefits and disadvantages and have greater trust and personal investment in the process. In this respect, stakeholder consultation can minimise the risk of unexpected negative reactions, ensuring greater sustainability by avoiding social unrest, political or legal disputes or negative publicity that can delay projects and be very costly (IFC 1998).

7.2.4 Improved decision making capacity

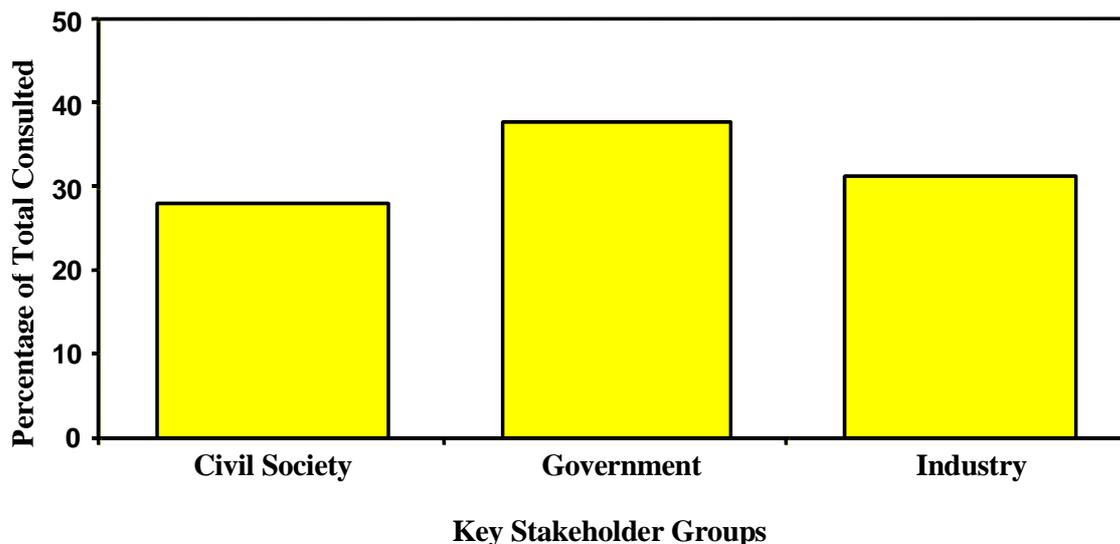
A fundamental predication for stakeholder consultation is that affected citizens, as the potential subjects of change, are in the best position to contribute to an understanding of many of the more direct impacts of a given action, and therefore, contributing to the identification, mitigation, or enhancement of many of the relative direct costs and benefits of project, policy or programme development. It is argued that stakeholders are often the 'experts' of their own environments, possessing critical insights into the effect of actions and their consistency with their values and priorities (Freudenburg & Olsen 1983, Roberts 1995).

7.3 METHOD

The project team are committed to a participatory methodological approach in development of the map, and, as such, identified and invited a wide range of representative stakeholders to voice, through a series of semi-structured interviews held between May and December 2004, and a workshop held in November 2004, their opinions and suggestions on the map project. The results of the workshop consultation are documented here and were used to refine and reform the subsequent strategic and technical direction of the project. Stakeholder identification and engagement have characterised the two key stages in the methodological approach to consultation to date, and are detailed below.

7.3.1 Stakeholder identification

BGS was well placed to initiate the identification of relevant stakeholders through its extended network of government, NGO, industry, and community partners and clients in the quarrying sector. From this network, and using the most widely accepted definition of 'stakeholders', a very broad mixture of representative stakeholder individuals and groups were identified and invited for consultation by interview or workshop. Following a well established process of investigative or 'snowball' sampling, stakeholders contacted in the first instance were asked if they could identify other individuals or groups who might have an interest in, or be significantly affected by, the project. These secondary contacts were also invited to participate in the map consultation process. The project team sought to maintain broadly balanced stakeholder representation throughout the consultation process. Figure 1 below, shows the proportional representation of workshop attendees. Appendix 3 provides a list of those who attended the workshop.

Figure 13 The proportional representation of stakeholders consulted through workshop

7.3.2 Stakeholder engagement

The methodology employed two respected stakeholder engagement techniques. The first was semi-structured interviewing. This technique is based on a checklist of general questions that can be revised or refined at any time (Chambers 1981) to allow a degree of flexibility, so that other issues raised during the interview can be explored. It was important that those interviewed were made to feel at ease. Therefore, the interviews started with general questions before moving on to more detailed areas. According to Patton (1987), non-disclosure of research aim is tantamount to manipulation; so all interviews were preceded by an explanation of the interview's purpose.

The second stakeholder engagement technique was a workshop, which provided a way of getting project stakeholders together to collectively identify and debate issues, raise concerns and generate suggestions. A facilitator, who can use a variety of techniques to assist stakeholders in discussing, 'brainstorming', or problem solving key project related issues, generally leads workshops. Workshops are an efficient and cost effective means of gathering data from a wide range of stakeholders in a short amount of time (Pratt & Loizos 1992). Workshops complement interviews because while they are less 'in depth' they generate unique benefits by allowing for the *simultaneous* expression of different stakeholder perspectives and interests.

The half-day workshop took place on the morning of the 7th of November 2003. Keynote presentations were provided by; Dr Mike Patterson (EMGB Programme Manager) who welcomed and thanked participants, and introduced BGS and the scope of work it conducts; Andrew Bloodworth (Principal Economic Geologist) who provided an overview of the BGS Minerals Information Strategy, and; Ellie Steadman (Project Leader) who provided an overview of the project. Stakeholders were then directed to the specific agenda, objectives, and time limitations of the workshop, before breaking away into smaller focus group discussions, each led by a project team facilitator.

The focus groups were composed of between five and six people and were arranged to combine stakeholders from government organisations, non-government organisations and industry in order to maximise the variety of perspectives within each group. Group discussions were divided across two sessions with the integrated results documented in the following sections of the report. The first session began with a brief review of the map and project background with reference to the project background handouts provided in the delegate packs to ensure that participants had understood the information presented to them during the plenary session.

Subsequent discussions in the first and second sessions were based on a series of questions, with the respective objectives of:

- Gaining feedback from project stakeholders on the map itself, particularly, the map's utility, other map related issues or concerns, and suggestions for improvements.
- Gaining feedback from project stakeholders on the mapping methodology, particularly, the method's transparency, asset scope and scores, and suggestions for methodological improvement.

The third stakeholder consultation technique employed was questionnaires. Following the workshop, questionnaires were sent out, with an accompanying report of the workshop results, to all project stakeholders. The purpose of the questionnaires was to provide an opportunity for feedback from those stakeholders who had been unable to attend the workshop or those stakeholders wanting to provide more detailed input on the proposed map scores in the context of the collective workshop results. The results of the entire consultation process have been used to influence further development of the map, and are summarised below.

7.4 RESULTS

7.4.1 Issue 1: Map utility

Would the Environmental Sensitivity Map be useful to you or your organisation? If so, how?

Prior to answering this question, a number of stakeholders sought to first understand and question the *intended* use of the map. A lot of the debate therefore centred on the degree of prescription attached to the map. For example, one group rhetorically asked whether the map, at the most ambitious and general level, was an intended reinvention of the mineral planner? Other groups questioned the nature of the map and whether it should be considered to be a 'tool' or even a 'guide', and whether it was useful at the local level. More specifically, one workshop group questioned whether the map was a 'constraints map', pointing out that it could be perceived to show nothing positive for industry, merely recognition of where not to develop.

One delegate said that the 'intended use' was wrong, and that the map should be used for coordinating data and not for any other formal guidance. As such, they claimed, there was no need for a scoring system, which was 'flawed' by virtue of its subjectivity. Indeed, while much less dismissive, the general consensus was that the map would not, and should not, replace or pre-empt the planning process or the mineral planner, but could, and should, influence or inform the planning process at an early stage. In this respect, the map's real utility was regarded not as a prescriptive tool, or as a definitive guide, but rather as an information source or database.

In this informative capacity, the map was regarded to be a useful mechanism for SEA mineral impact assessors and development planners in; (a) scoping, gathering and presentation of baseline data; (b) identification of possible factors that might need greater investigation (some referred to these as 'alert factors' and therefore viewed the map as a type of 'risk map'); (c) site selection or consideration of site alternatives. By temporal contrast, it was also suggested that the map could be employed to support planning decisions already made based on local judgement.

Reinforcing the emphasis of the map's temporal utility at the early strategic stages of the planning process, it was agreed that the map's geographic utility, if it gained wide acceptance, was for familiarising and informing decision-makers at the national, regional, and inter-regional level, particularly in comparing the development potential of one region with another region, since the map, necessarily and desirably, had the potential to be consistent across regions. While stakeholders could see supplementary value at an MPA level, the map was generally not regarded, at this stage, to be detailed enough to be very useful at the local level, although designations at this local level were considered most critical by some commentators.

In this respect, and in terms of its relatively formative development, many stakeholders regarded the map, and its associated text, as too prescriptive, and that this was likely to lead to problems in how the map was interpreted and used. While other stakeholders were less concerned about this issue, one stated that regardless of how the map was described or promoted it would be used as a prescriptive tool, since this was the nature of how such techniques are embraced.

On reflection, it was acknowledged by the group focusing on the ‘constraints’ issue, that the map’s assets should not necessarily be viewed as constraints, only as indirect potential constraints, since it was recognised that these assets only become constraints if they are not properly managed through the planning process. As a result, the map was not ultimately understood by this group to be either a ‘constraints map’ or a ‘development control tool’.

7.4.2 Issue 2: Other map issues or concerns

Are there any other concerns relating to the map or how it might be used that should be taken into account during its further development?

One of the most tangible concerns related to the language used to describe the map. In particular, there were reservations about the title of the map itself, with a number of stakeholders suggesting that the term ‘sensitivity’ was too emotionally weighted. One group suggested that they would prefer the term ‘issues’ to ‘sensitivity’, and another group felt that ‘assessment’ should be incorporated into the title, presumably because of its use in facilitating the impact assessment process. Overall, there was a request for assurance that the map’s final name would not imply it was something it was not, or should not be. As previously noted, the terms ‘tool’ and ‘guidance’ were viewed as deceptively prescriptive when the map was in fact an aggregation of information.

An issue raised by one of the groups concerned the nature of the map’s stakeholder consultation process; with the principal focus on the degree to which the workshop and other associated engagement mechanisms were inclusive. One delegate was particularly keen that there was equitable representation and transparency concerning these engagement processes. Their facilitator reassured them that this would be addressed in the write up, and was an integral consideration in the consultation process. One group expressed that they would have liked more time to examine the map in advance of the consultation and other people also requested copies of the map so that they could engage their organisations. A number of industry participants asserted that they should be able to have full input before any ‘action’ was taken regarding the maps use.

The map relies on the availability of digital data. Therefore, a concern adamantly expressed by one delegate related to the issue of accessing and affording the data needed to generate the maps in sufficient detail. He believed this was a fundamental issue, and one that would ultimately determine the map’s success or failure. It was the view of a number of other stakeholders that presently the costs of the requisite data were prohibitively high and that access to the requisite data was prohibitively restricted by complex intellectual property right and copyright problems. Related to this issue of data availability, was a concern that a technique relying wholly on GIS led to over reliance on available datasets, leading to a situation in which there was ‘valuation of what is measurable’ rather than ‘measurement of what is valuable’.

There was a general awareness among the stakeholders that other projects had created, or were in the process of creating, related map systems, such as Arup in Wales, and that these were generating similar, but ultimately incompatible methods and databases. While a degree of initial autonomy was widely held by stakeholders to be beneficial to the furtherance of the area, there was also a strong concern that, without subsequent coordination, a multiplicity of systems would be developed that were, in the wider context, individually weaker than any one collectively agreed system. The challenge noted across most of the groups then was the need to start systematically coordinating the development and dissemination of this type of sustainable mineral planning mapping activity. It was acknowledged that this was not necessarily something

that this project can address directly, but a problem that it should actively avoid adding to at the very least.

A recurrent technical theme was the map's aggregate or 'flat' form, which, it was said, 'masks as much as it reveals'. For a large number of stakeholders, the real utility of GIS is in its construction, and an ability to attribute weighting. There was, therefore, seen to be more value in being able to construct or change data layers than in using fixed cumulative totals, particularly at the local level. A number of additional comments and concerns follow. First, a seeming illogical disparity existed between fuzzy asset boundaries and the definite aggregate boundaries appearing on the map. Second, urban area outlines and greyed areas do not correspond, and therefore some assets appear to fall within urban areas, even though these areas are presumably excluded from the layering. Third, the active quarry sites shown are not complete or clear. Fourth, sand and gravel in the Trent valley is shown as a uniform colour when this is not the case. Finally, bird strike zones outside the project boundary may throw their 'shadow' into the project area.

7.4.3 Issue 2: Suggested map improvements

How could the map be made more understandable, transparent, accessible, manageable or useful?

In relation to some of the aforementioned concerns it was suggested that the map would be most usefully developed as an interactive system in which the user can drill down to the different data layers and, in terms of geographic focus, to the local scale. In answer to some of the data accessibility and affordability concerns, it was suggested that the information that is revealed through such an interrogation process needed only to encompass whom to contact for specific asset data of relevance to a particular area (Nottinghamshire County Council is doing something similar to this, offering a service-led alert system). In addition, it was suggested that if the map does develop in a more interactive direction, very good guidance should be developed to explain how the system could be flexibly used, such as how to turn different data layers on and off.

There was a collective sentiment that common ownership of the map will be essential to its success, and that it would therefore be important to market and pilot test the map and always derive asset scores and scope in consultation with local stakeholders, in particular EM RAWP, GoEM, County Planners, ODPM. However, it was also pointed out that extensive consultation could produce some very long and unwieldy criteria and that its nature would be inextricably linked to the map's input point in the planning process. It was therefore suggested that guidelines were needed to show how, at what stage, and in what areas, the map fits with the planning process and the EU directive on SEA, and that a flow diagram would usefully illustrate this.

Guidelines were also identified as desirable in explaining how the map relates, or is intended to relate, to the Arup study, since this system would likely steer emerging Welsh policy. However, ideally many stakeholders wanted BGS and Arup to work together to generate a single 'British Standard'. A number of additional suggestions follow. First, a QPA member offered to supply some alternative map text, which would specifically include a definition of why, and which, urban areas were included or excluded. Second, it was tentatively recommended that regional level plans and policies on development should be included in the map. Finally, a number of stakeholders wanted the map to include more local level detail, and county level resolution as a minimum, because decision-making often comes down to site-specific details.

7.4.4 Issue 4: Methodological transparency

Is the method of deriving the list of assets sufficiently objective and transparent?

A number of stakeholders felt that although the map was the end product, it was actually the underlying method and modelling that was key to the project, and that it was consequently the

method more than the map that needed to be transparently tested. Transparency of method was regarded to be especially important because of the subjectivity of the scoring process involved in its utilization. In general, the map's transparency was regarded to be good, and one stakeholder considered the BGS system to be simpler and more transparent than the one being developed in Wales by Arup. The only area that was identified as needing much greater transparency was in the derivation of the asset scores, with a need to disaggregate data layers, and make the raw data available to a range of stakeholders. It was suggested that if there was greater transparency in this area then the method had the potential to be very widely used.

Only one group directly addressed methodological objectivity, which they considered to have been largely achieved at regional level, but less so in generating data to be included at the local level. Nevertheless, the group also felt that such subjectivity was to be expected, and should not necessarily be considered negative. Indeed, an asset's importance would always be based on value systems that will vary and also change over time. Such a dynamic continuum of perspectives, they added, will make it inappropriate to seek to generate an objective value by universal scoring. Another group implicitly embraced such subjectivity in their expression that the method should be tested by stakeholders and then rolled out among a range of stakeholders for their own area usage, with each stakeholder group (e.g. government, industry, local communities, and NGOs) assigning their own asset scores prior to aggregation.

7.4.5 Issue 5: Asset scope

Which significant assets are missing from the current version of the map?

At the most general level, a number of groups suggested that both the selection and scoring of assets needed to be based on a balance between a technocratic top-down approach of legality and expert input, and a participatory bottom-up approach of stakeholder consultation. Stakeholders, however, offered no opinion on the degree to which the map project had already achieved this balance. Instead, more specific discussion ensued on the currently selected map assets.

One delegate was concerned that the restriction of asset mapping to resource areas gave an impression that only the extractive industry must address environmental and social impacts. In addition, they claimed, darker blue areas on the map seem more important than perhaps they are in the context of the entire region (i.e. large parts of what is currently white paper may in fact be areas that are sensitive). As a result, they wanted the whole project area screened for assets.

There were a number of specific assets that groups and individuals identified as being necessary or desirable to add to the map. Many stakeholders and groups wanted integral or parallel inclusion of; resource quality and value, as well as, economic and social data, including transport. Individual stakeholders and groups wanted inclusion of; World Heritage Sites; more cultural heritage data; archaeological sites and unscheduled monument data; wildlife trust reserves; Regionally Important Geological Sites (RIGS); biodiversity and recreational area opportunities and; area action plans.

In contrast, there were a number of assets and datasets identified as being necessary, or desirable, to remove from, or change on, the map or the original list of assets generated. Most significantly, one delegate felt that only assets that are universally applied nationally or across the region should be included (e.g. ideally those assets for which information is collected in a consistent fashion, but certainly not those assets that are 'created' by a limited number of stakeholders for a particular area, such as the Natural Zones used by the Peak District Authority). As related points, it was highlighted that under PPS7 there will no longer be any local designations, and that agricultural land quality grades have been replaced with a new approach that reflects 'likely' land quality.

One group preferred not to see infrastructure on the asset list as these assets appear to be rated as a handicap to development when they are actually a benefit. Moreover, although there was

greater debate on the latter, many stakeholders did not view infrastructure or tourism as environmental or cultural assets. Other assets regarded to be best removed from the map by individual stakeholders and groups included; biodiversity action plans, since their universality precluded differentiation between areas; greenbelt, because it is meaningless in practical terms; consultation zones, because they are not assets, and; bird strike zones, although not scored but only included as a visual guide, because this is a health and safety issue.

7.4.6 Issue 6: Asset scores

Is the method of applying scores to assets appropriate and consistent?

Responses by stakeholders to this question can be categorised as relating to the issue of consistency and appropriateness, and relating to the issue of the scores themselves. While the methodologies consistency was widely accepted, the suggestion noted earlier was that an asset's importance would always be based on variable value systems. This, they said, made it inappropriate to seek objective or universal scores, yet conversely impossible to determine which score is 'correct' or most valid at any given time. Acknowledgement of this duality led some participants to conclude that the appropriateness and consistency of the scoring system would depend on the degree to which the method was able to balance the competing needs of flexibility and manageability.

Exclusively in terms of scoring system consistency, it was noted that some assets did not always meet criteria set out in the text accompanying the map. Exclusively in terms of appropriateness, it was suggested that; if asset parameters are inclusive of each other, further exploration is needed of whether double or triple accounting is occurring; substitutability, adaptability and mitigability factor inclusion in the map scores; derivation of map scores should happen in consultation with regional government expertise, and; differentially scoring, geological and biological SSSIs, since the latter may be a positive aspect to locating a new quarry or extension.

One stakeholder expressed strong reservations about the use of the term 'scores' as it can lead to simple addition, and negate greater thought about the issues underlying the figures. As such, more generalised weightings, which forced the user to consider the implications of alternative courses of action, were deemed more appropriate. In relation to the scores themselves, on average there was relatively high agreement with the scores that had been proposed. Nevertheless, only a very small proportion of stakeholders agreed unreservedly with the entire range of proposed scores, and where disagreements existed, the following individual comments were received:

Nature conservation

- Sites of important nature conservation (SINCS) should be scored higher (4 suggested).
- SINCS should be scored higher (6 suggested).
- SINCS should have same score as community woods (4).
- SSSI scoring, and indeed anything of national importance, score too low (10 suggested).

Landscape designations

- National Parks should not be no-go areas.
- National Parks should be scored higher (8 suggested, 10 also twice suggested).
- Areas of outstanding natural beauty should be 10 if NP's are 10.
- Areas of community forest and woodland should be scored higher (6 suggested).
- Areas of community forest and woodland should be scored lower (3 suggested).

- Areas of ancient and national woodland should attract a higher score (8 suggested).
- Areas of national forest should have a lower score (2 suggested).
- Millennium greens should be scored lower (4 suggested, 2 also suggested).
- Footpaths etc. should be scored lower as they can be moved (4 suggested)
- Footpaths etc. should be scored higher (8 suggested).
- Urban areas should be scored lower (5 suggested)
- Greenbelt should be scored lower (5-7 suggested).
- Greenbelt - not same presumption against working as national park (7 or 6 suggested).
- Greenbelt – question if it should score so high, given government policy in PPG2.
- Important hedgerows – why do they score higher than SNIC's or LNR's?
- Important hedgerow score too low (7 suggested)

Geological designations

- Limestone pavements scored too high (8 suggested)
- Local geo-diversity action plan should be scored higher (6 suggested).
- RIGS – would classify these higher (6 suggested, 8 also suggested).
- Shouldn't RIGS and SINCs be similar scores?

Heritage and cultural designations

- Scheduled ancient monuments should be scored higher (10 suggested)
- World heritage too high as of international rather than national recognition (8 suggested)
- Listed buildings should be scored lower (6 suggested)
- Conservation areas score too low (6 suggested).
- Historic parks and gardens score too low (8 suggested, 6 also twice suggested).
- Historic parks and gardens should be the same score as SAM or listed building.
- National trust land score too high when compared to other designations (6 suggested).

Biodiversity

- All countries and regions have Biodiversity Action Plans (BAPs), therefore meaningless.

Agricultural land quality

- All grades of agricultural land were scored too high. (4,3,2 respectively suggested).
- All grades of agricultural land were scored too high – does not allow for special nature of minerals development, government policy, or opportunities to restore to non-agricultural.
- Agricultural land grades two scored too high (6 suggested, 7 also suggested)
- Agricultural land grade three scored too high (4 suggested)

Groundwater

- Major aquifers scored too low.
- Minor aquifers scored too low (8 suggested)

Water

- National water quality C and D should be scored the same as A and B

Additional Comments

- Whatever the final status of civil and military airfields on the map, we would find it more helpful if the map indicated the 13 km ‘consultation zone’ around each facility.
- Perhaps the title should make it clear that this is a ‘sieve analysis tool’ that relates predominantly to the natural environment. This compares with ARUP method that seeks to address all of the issues influencing possible mineral development.

7.4.7 Issue 7: Score improvements

In what ways could the scoring method be changed or improved?

A number of pragmatic suggestions were forthcoming in seeking an appropriate balance between flexibility and consistency. These included; standardising agreed scores at the national level within bounded margins of increasing flexibility at the local level; only assigning non-statutory protected assets a score range, and not assigning a score range to statutory protected assets, since the latter are either protected or not, regardless of condition, and; demarcating assets as absolute constraints if they score too highly, and differentiating these from other non-constraint assets.

One delegate recommended that the risk of double counting by simply adding scores for the different asset layers should be avoided either by only using highest scores, or, more significantly, not scoring altogether, and using the number of assets per grid square instead (each square could then be interrogated to obtain contact information for further specific data on each asset in that square). If this approach was used, it was then stated, the importance of getting the assets correct would come to the fore, and the map could only use those assets that were consistent and regionally or nationally applied. However, if the scoring system were retained they wanted an amended table of assets and scores sent to workshop attendees for comment.

One group considered that it would be beneficial but difficult to show environmental, social and economic data on the same map. Instead, they considered the overlaying of selected information from the social and economic dimensions on main map to be possible and desirable, as it would help to show the link between certain economic or social factors and the environmental assets.

7.5 KEY FINDINGS AND CONCLUSIONS

The following summary of key findings and accompanying conclusion are drawn from analysis of all the results of the consultation process. There are, as is to be expected by the nature of any democratising processes, a number of areas in which agreement could not be reached, and these will require further scrutiny in the future. However, for the purpose of more expedient constructive development, the following key findings and conclusions highlight those areas upon which there was significant agreement among a number of stakeholders or even broad consensus:

- The map’s real utility is regarded not as a prescriptive ‘tool’, or as a definitive ‘guide’, but rather as an information source or database for assessors and planners in the identification of possible factors that might need greater investigation. However, guidelines were needed to show how, at what stage, and in what areas, the map fits with the planning process.
- For many stakeholders, the terms ‘tool’ and ‘guidance’ should be changed since they do not reflect the map’s more facilitating role. Similarly, ‘sensitivity’ is emotionally

weighted, leading to misperception of the map as ‘constraints’. ‘Issues’ are considered more appropriate.

- A significant minority of stakeholders were concerned about accessing and affording the data needed to generate the maps in sufficient detail because of prohibitively high costs and proprietary issues. There was also concern that over reliance on available datasets could lead to a situation of ‘valuation of the measurable’ over ‘measurement of the valuable’.
- While a degree of initial autonomy was held to be beneficial to furtherance of the area, there is concern that a multiplicity of systems could develop, individually weaker than any one accepted system. The future challenge was therefore seen to be in coordinating sustainable mapping development.
- Guidelines were identified as desirable in explaining how the map relates to the ARUP study, since this system would likely steer emerging Welsh policy. However, ideally many stakeholders wanted BGS and ARUP to work together to generate a single ‘British Standard’.
- For many stakeholders, the real utility of GIS is in its construction, and an ability to attribute weighting or change data layers rather than in using fixed cumulative totals. The map could therefore be usefully developed as an interactive system in which the user can drill down to the different data layers and, in terms of geographic focus, to the local scale.
- It was suggested that if the map does develop in a more interactive direction, very good guidance should be developed to explain how the system could be flexibly used, such as how to turn different data layers on and off.
- There was a collective sentiment that common ownership of the map will be essential to its success, and that it would therefore be important to market and pilot test the map and always derive asset scores and scope in consultation with local stakeholders, in particular EM RAWP, GoEM, County Planners, ODPM.
- In general, the map’s transparency was regarded to be good. The only area identified as needing greater transparency was in derivation of the asset scores, with a need to disaggregate data layers, and make the raw data available to a range of stakeholders. It was suggested that with greater transparency in this area, the method had potential to be very widely used.
- An asset’s importance would always be based on value systems that will change over time. This continuum of perspectives makes the generation of fixed scores inappropriate. Selection and scoring of assets needs to be based on a balance between more rigid ‘objective’ expert input, and more dynamic ‘subjective’ stakeholder input.
- There were a number of specific assets that groups and individuals identified as being necessary or desirable to add to the map. Many stakeholders and groups wanted integral or parallel inclusion of resource quality and value, as well as, economic and social data, including transport. In contrast, there were a number of assets and datasets identified as being necessary, or desirable, to remove from, or change on, the map.
- In general, there was relatively high agreement with the scores proposed. Nevertheless, only a very small proportion of stakeholders agreed unreservedly with the entire range of proposed scores. The assets with scores that were most often contested were SINCS, National Parks, Greenbelt, Historic Parks and Gardens, Biodiversity, and Agricultural Land Grades.
- In seeking an appropriate balance between asset score flexibility and consistency suggestions included; standardising agreed scores at the national level within bounded

margins of increasing flexibility at the local level; only assigning non-statutory protected assets a score range, and not assigning a score range to statutory protected assets.

8 Overall Discussion

This section attempts to draw together some of the main issues and points associated with the methodologies developed and the stakeholder consultation. It is not possible to address every issue raised and many of these were dealt with in the respective sections. However, some are repeated here along with more general points.

8.1 INTENDED USE OF THE MAP

The revised map, accompanying this report, is not an end product but a means of demonstrating the methodologies developed in the research. The map produced from this research is only intended to aid general considerations of aggregate issues at the regional scale, not as a source of detailed information on specific sites. It is anticipated that the map will be a visual tool for all stakeholders involved in the SEA of future aggregate plans. The methods developed here have been tested using the East Midlands Region, however the methodology can easily be applied to other regions. The map is not intended to be used alone or in any way be prescriptive. It is intended to provide information that will be useful in the SEA process. Originally the map was described as a ‘tool’, however, many stakeholders viewed the map as an information source not specifically a tool. A more accurate description of the map might be an ‘information tool’.

8.2 LANGUAGE

It became apparent through stakeholder consultation that the language used to describe the map would be very important. The term ‘*sensitivity*’ was regarded as emotive and alternatives such as ‘*issues*’ and ‘*alert*’ map are not neutral either. The term ‘*index*’ may better describe the methodology, particular if the scoring system is not used and the map shows the frequency of assets per hectare instead. A suggested alternative title for the map could be ‘*Environmental Index Mapping of Future Aggregate Resources*’. As with all the issues raised by this report, the Project Leader welcomes any feedback on the language used.

8.3 ASSET SCORING

One of the findings from the research based on comments received from stakeholders during the consultation process was that although the scoring system was ‘anchored’ to legislative reference points, it was still deemed too subjective and a broad range of stakeholders held the opinion that a consensus on scores would never be easily reached. Many stakeholders regard asset scoring as subjective and an inappropriate method of comparing the relative value of different assets (i.e. apples and oranges cannot be compared). One stakeholder noted that if scores were used people would no longer focus on the reasons why an area is important but focus on the numbers attached to it. Using a scoring system may not be the best method. However, the approach was still very worthwhile as it identified all the assets and in most cases outlined the legal context for those assets.

8.4 ‘SIEVE’ OR CONSTRAINTS MAPPING?

It was not the intention of this research to produce a ‘*sieve*’ map whereby aggregate resources covered by an asset are effectively sterilised; this is not a realistic method. In the East Midlands study area for example the majority of aggregate resources are covered by more than one type of asset. The authors have taken the approach that assets are not constraints on aggregate extraction, nor do they necessarily make a presumption against quarrying.

8.5 AGGREGATE RESOURCES INFORMATION

A limitation with the resource information in this project is that all resources are treated equally. In reality, economic factors such as quality and quantity of the resources, distance to market and end use make some aggregate resources more likely to be extracted than others. Additional research at BGS hopes to address this limitation by devising a methodology that takes into account the economics of aggregates resources.

8.6 MAPPED ASSETS ONLY

The methods developed in this research rely on mapped assets. This is a limiting factor in the research and needs to be taken into account if the map is used. In reality these mapped assets tend to represent the '*best bits*'. However, just because an area has no mapped asset does not mean the area is of no value, it just means that nothing of significance has been measured and mapped yet. There are other ways of assessing the environment as a whole such as Natural Areas or Countryside Character mapping. Each Natural Area or Character Area is distinct from one another, not better or worse that is they cannot be ranked or compared against each other. Because they cannot be ranked or compared they were not used in this research. Character Areas and Natural Areas will need to be considered in the SEA process as any development should not be detrimental to the distinctness of the areas.

8.7 LOCAL DESIGNATIONS AND NEW PLANNING GUIDANCE

It appears that local designations may be falling out of favour, mainly due to the lack of standardisation in how areas are designated. In the draft government Planning Policy Statement (PPS) 7 – Sustainable Development in Rural Areas it states that, '*the Government does not believe that local countryside designations are necessary and considers that the policies set out in this PPS, when incorporated into development plans, should provide sufficient protection for the countryside. In reviewing their development plans, planning authorities should remove any existing designations and instead adopt criteria-based policies in development plans for the location and design of rural development throughout their area.*' This will not impact directly on this project because it has been difficult to obtain local data consistently and digitally for individual planning areas across the study area. However, this will have implications for the future development of this research. When this draft policy is adopted a review of the local data assets identified will be necessary.

8.8 AVAILABILITY OF DIGITAL DATA

The method developed in this research is inherently dependent on mapped assets (see 8.6 above) and the availability of this information in digital form. Only 20 data layers were used to create the map out of a possible 54 identified in the assets section. However, it would be possible in most cases, with adequate resources and time, to collect these data and convert them to digital form. Local data that are consistently available for the whole region are absent and this is disappointing as often local assets are valued more by the local community than regional or national assets. Integrating local assets on the map will ensure they are considered at the early stages of planning.

8.9 MAP VERSUS GIS DELIVERY

Clearly, a map is only one way of displaying the data used in this research. Paper maps are useful for discussion and general reference documents whilst GISs are useful for detailed analysis and data modelling. Paper maps and GISs are both useful deliverables. Alternative ways of delivering the data need to be explored. Perhaps the best way would be to deliver the data through a GIS. GISs are powerful tools that can integrate, display, analyse and output

information. The BGS already provides regional data for the West Midlands available through a licensed online GIS under the MISEI project, so the architecture and expertise already exist. However, there are numerous third party data providers involved with this project and copyright issues will need to be investigated and agreed before this could go ahead for this research.

8.10 ALL DATA ARE REPRESENTED ON ONE LAYER

The methods developed here have demonstrated that it is possible to have all the information on assets in one layer. Exact boundaries for assets are disguised, which is deliberate. The methods developed and the map produced are intended for general considerations at the regional scale so exact boundary details are not necessary. Within a GIS a single layer can be interrogated much quicker than multiple layers. This provides advantages in terms of the speed of processing.

8.11 SIMILAR RESEARCH

Some stakeholders made comparisons of this project to recent Arup research in Wales – *Establishing a methodology for assessing aggregates demand and supply*. However, the methods are quite different. With regard to supply, the Arup research has '*developed an environmental capacity methodology which can assess the capacity of different areas in Wales to accommodate future aggregates extraction*' (ARUP, 2003). The capacity of an area to withstand quarrying is based on several indicators which reflect impacts from quarrying within a 1 km² grid. This project does not consider the impacts of quarrying or make any judgement about the capacity of an area to withstand quarrying. This research has used GIS technology. This has enabled a 1 hectare grid to be used. This research has studied ways of measuring the total inherent value of an area in terms of the environmental and cultural assets in that area, regardless of whether this is important for quarrying or not, in order that general considerations at the regional scale can be explored.

9 Conclusions

The conclusions from this research are as follows:

1. The issue of pressure on land and landuse conflicts is becoming ever more important, particularly in densely populated regions and countries.
2. Legislative drivers, such as the SEA Directive, are increasingly requiring a more strategic, priority-driven and forwards-looking approach to land planning.
3. This research focuses on using information relating to crushed rock and sand and gravel aggregate resources in the context of a range of planning parameters, which may need to be considered for decisions related to mineral extraction.
4. Analysis of data has been undertaken using GIS technology. A range of outputs and scenarios models can be developed with this methodology.
5. This analytical tool is primarily aimed at an English regional scale to support strategic planning. However it can be applied to any region or county or country.
6. Aggregates are vital for the economy and primary aggregates will be required in the future despite the use of recycled and secondary materials. Information about the location of aggregate resources is essential for regional planning of aggregates development.
7. Information about environmental and cultural assets is also essential for aggregates development. This research has demonstrated that assets are numerous and diverse. It has also shown that in terms of legislation, guidance and planning assets are valued differently based on their significance or importance.
8. This research attempted to produce a consistent method of weighting assets that takes into account these value differences by assigning a relative score to each asset. The method developed was intrinsically linked, and anchored to, primary legislation and planning guidance surrounding each asset. The result was a ‘future aggregates sensitivity map’ that showed the gradation between the most and least sensitive areas for future aggregate extraction based on the relative significance of environmental and cultural assets in the area.
9. The ‘future aggregates sensitivity map’ is not an end product, nor does it provide a single answer. The map should be viewed as an information tool that can quickly identify significant environmental and cultural assets consistently across a region. The methods developed here may be of value to those carrying out an SEA particularly in the early stages of baseline information collection. The map may also be useful in other planning situations, and particularly useful in any communication process involving the general public.
10. Paper maps and GISs are both useful deliverables. Paper maps are useful for discussion and general reference documents whilst GISs are useful for detailed analysis and data modelling.
11. Stakeholder participation was a valuable part of the research and provided much needed insight into how the map and accompanying data may be used. Based on stakeholder consultation alternatives to the original method were explored, but further investigation and consultation will be necessary to validate these.
12. Some stakeholders regard asset scoring as subjective and an inappropriate method of comparing the relative value of different assets. One consultee noted that if scores were used people would no longer focus on the reasons why an area is important but

focus on the numbers attached to it. However, the methodology has still been very worthwhile as it identified all the assets and in most cases outlined the legal context for those assets.

13. Overall this project has been well supported by stakeholder consultation. The authors believe that a solid start has been made. Further development and refinement is required.

10 Recommendations

There are several recommendations that have arisen from this research these are as follows:

1. It is strongly recommended that further research is undertaken to develop this planning tool and ensure compatibility with stakeholder and legislative needs.
2. The methods developed require further stakeholder consultation. It is recommended that future research should involve discussion of the research with key groups such as Mineral Planners, Regional Planners, Trade Associations (QPA and BAA for example), Industry Planners, and GOs and NGOs associated with the environmental and cultural assets. A critical appraisal of the methodology should be sought from these key stakeholders.
3. A longer time frame is required to develop this planning tool than has been hitherto possible. It is recommended that a further two years at least is required to develop, refine, encourage take-up and assess its relative success.
4. Clearly, a map is only one way of displaying the data used in this research. It is recommended that alternative ways of delivering the data are explored. Perhaps the best way would be to deliver the data through a GIS.
5. It is possible that a range of tools could be developed for a range of end-users. This should be explored.
6. It is recommended that future work includes an assessment of the relative quality and grade of aggregate resources. Further research at the BGS is trying to develop a method of assessing the relative quality and grade of resources. Once this method is established, it might be combined with the methods developed here to provide an information tool that may be useful for scenario testing and modelling at the regional scale.
7. The research will need to keep abreast of new planning guidance for example Planning Policy Statement (PPS) 7 – Sustainable Development in Rural Areas which refers to the removal of local designations. When this draft policy is adopted a review of the local data assets identified will be necessary.

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Appendix 1 Overview of mineral planning and related regulations and designations

One of the stages in carrying out a SEA is to list all plans and programmes relevant to the plan under consideration and to note the relationship between these. This section attempts to provide this information.

This review summarises the mineral planning process, associated guidance and environmental regulation and other legal instruments that may influence the planning process for crushed rock and sand and gravel operations. Some are directly relevant to most operations (e.g. Mineral Planning Guidance), while others will only be relevant to a small number of sites (e.g. international conventions such as the Ramsar Convention). Where possible, the regulations detailed in the sections below have been used as the basis for values attached to the different environmental and cultural assets proposed in Section 4.

The summary is divided into four sections:

1. **Mineral planning in Britain** – including an overview of specific legislation relevant to the minerals sector, an outline of development plans and mineral control and overview of the principal authorities and their role in minerals planning and provision.
2. **National-level strategies, legislation and designations relevant to aggregates** - including relevant national sustainability strategies and environmental legislation and significant non-statutory designations.
3. **EU directives relevant to aggregates.**
4. **Relevant international conventions and designations relevant to aggregates.**

There is a degree of overlap between 2-4 as in some cases UK law is derived in part or wholly from EU directives or international conventions. Also, mineral planning guidance generally protects areas of designated landscape, nature conservation or heritage value from mineral development, and these designations may be derived from national, EU or international laws.

MINERAL PLANNING IN BRITAIN

The Framework for Land Use Planning

Mineral deposits suitable for use as aggregates are not evenly distributed and there are often imbalances between where demand arises and the location of the resources that can meet that demand. Therefore, considerable amounts may have to be transported from where aggregates are found to where they are used. Consequently the planning policies in one area may need to reflect not just their own needs but also the demands of neighbouring areas and areas further away. Even where suitable resources are found in apparent abundance, their extraction may be constrained by consideration of such matters as landscape, amenity, nature conservation, agriculture, cultural heritage and water interests.

Planning in general is concerned with competing pressures and demands on land. The role of planning is to resolve these competing, and often conflicting, demands. In Britain the Town and Country Planning legislation to a large extent provides the framework within which land use planning is conducted (see below for further information on Town and Country Planning legislation). The objective of land use planning is to determine and implement the most efficient and effective use of land in the public interest while reconciling the competing needs of development and conservation. Most forms of development in the UK, including mineral

extraction and related activities, require planning permission before development can take place. The key planning advice on minerals is set out in Mineral Planning Guidance 1 General Considerations and the Development Plan System. This guidance is currently being revised.

Land use planning is the direct responsibility of local authorities in Great Britain. The Office of the Deputy Prime Minister (ODPM) (www.odpm.gov.uk) has responsibility for the operation of the system in England. In Wales control now resides with the Welsh Assembly Government (www.wales.gov.uk) and the relevant mineral policy documents are Mineral Planning Policy Wales (MPPW), issued in 2000, and an Aggregate Technical Advice Note (TAN) that supports the MPPW and gives detailed advice on aggregates. In Scotland, the Scottish Executive (www.scotland.gov.uk) is responsible and the equivalent documents are National Planning Policy Guidelines (NPPG). NPPG 4 (Land for Mineral Working) covers all types of mineral extraction with the exception of open cast coal and related minerals (addressed in NPPG16). In Wales and Scotland, these departments are also responsible for developing national planning policy guidance, including that for mineral development, within which local authorities are required to operate. In Northern Ireland, the Planning Service (part of the Department of the Environment) (www.doeni.gov.uk/planning/index.htm) is responsible for the implementation of Government policies for town and country planning in consultation with the district councils and it is intended that it will publish a Planning Policy Statement relating to minerals.

Introduction to mineral planning

As noted above, the role of planning is to resolve competing, and often conflicting, demands on land. Minerals development is one type of development that requires land. However, mineral working is different from other forms of development in that:

- Extraction can only take place where mineral of the desired quality occurs in sufficient quantity (c.f. over forms of development such as housing or retail parks that do not have location constraints and could theoretically be developed in almost any location).
- It is a transient activity and cannot be regarded as a permanent use of land despite the long life of some operations (e.g. measured in several decades).
- When mineral working ceases, a well-restored site may encompass or lead to the development of new and diverse environmental, amenity or development assets. Equally, in some circumstances extraction can make land unfit for many later uses.

The extraction of minerals is substantially different from building and engineering operations. It bears more similarity to the ‘use’ aspect of the definition of development, as it is a continuing activity, which can take place over many years and is an end in itself. Although for the general purposes of the 1990 Town and Country Act (see below) mining is treated as an ‘operation’, it is a continuing operation and each load of material extracted is treated as a mining operation constituting a separate act of development.

Based on these differences, it is considered that mineral extraction warrants its own set of regulations and guidance, the overall aim of which is to meet the need for minerals while minimising associated short-term and long-term social, economic and environmental costs.

Mineral Planning Guidance 1 *General Considerations and the Development Plan System* (MPG1, see below) sets out the Government's policies on minerals and planning issues and provides advice on the operation of the development plan system with regard to minerals. MPG1 also provides advice on aspects of the development control system of particular relevance to minerals and on the preparation and determination of individual planning applications.

Town and Country Planning legislation

Town and Country Planning legislation is the most important legislation related to minerals. Section 57 of the *Town and Country Planning Act 1990* notes that planning permission is

generally required before any land development can be carried out. Development is defined in section 55(1) of the Act as *'the carrying out of building, engineering, mining or other operations in, on, over or under land, or the making of any material change in the use of any buildings or other land'*. 'Mining operations' are not defined in the Act but includes the removal of material of any description from:

- A mineral-working deposit.
- A deposit of pulverised fuel ash or other furnace ash or clinker.
- A deposit of iron, steel or other metallic slags.

However, 'mining operations' are separately defined for the purposes of the Town and Country Planning (General Permitted Development) Order 1995 (the 'GPDO') as *'the winning and working of minerals in, on or under land, whether by surface or underground working'*.

The control of mineral planning in England is carried out primarily under the legislation noted above. The legislation makes provision for the preparation of development plans (see below) and deals with planning applications. In England land-use planning legislation is primarily set out in Regional Planning Guidance (RPG) notes, Planning Policy Guidance (PPG) notes⁴, Mineral Planning Guidance (MPG) notes, Marine Minerals Guidance notes⁵ and Departmental Circulars⁶ prepared by the ODPM. These provide guidance on a range of general and specific issues.

Where there is doubt as to whether an intended operation or use of land requires planning permission, an application can be made to the Mineral Planning Authority (MPA) under section 192 of the 1990 Act to determine whether planning permission is required. Paragraph 12 of MPG1 explains which planning authorities are MPAs.

Regional Planning Guidance notes

Regional Planning Guidance notes provide a strategic planning framework for each of the eight English regions (in London, the Mayor prepares a Spatial Development Strategy). Development plans are produced by county authorities (structure plans), district councils (local plans) and, in unitary authorities, a unitary development plan that combines elements of both. National parks also produce their own plans. The eight regional notes are:

- Regional Planning Guidance 1: North East
(<http://go-ne.gov.uk/rpg/>)
- Regional Planning Guidance 6: East Anglia to 2016
(http://www.go-east.gov.uk/Publications/Regional_Planning_Guidance/)
- Regional Planning Guidance 8: East Midlands
(<http://www.go-em.gov.uk/planning/rpg.php?x=0>)
- Regional Planning Guidance 9: South East
(<http://www.go-se.gov.uk/key%20business/planning/downloads/final%20rpg9%20report.pdf>)
- Regional Planning Guidance 10: South West
(http://www.gosw.gov.uk/A-Z_of_GOSW_Activities/Planning/Regional_Planning_Guidance/index.cfm)
- Regional Planning Guidance 11: West Midlands
(<http://www.go-wm.gov.uk/rpg/>)

⁴ Also see www.odpm.gov.uk/stellent/groups/odpm_control/documents/contentservertemplate/odpm_index.hcst?n=2263&l=2 for further information.

⁵ See www.odpm.gov.uk/stellent/groups/odpm_control/documents/contentservertemplate/odpm_index.hcst?n=2289&l=2

⁶ See www.odpm.gov.uk/stellent/groups/odpm_control/documents/contentservertemplate/odpm_index.hcst?n=2297&l=2

- Regional Planning Guidance 12: Yorkshire and the Humber (<http://www.goyh.gov.uk/rpg/default.htm>)
- Regional Planning Guidance 13: North West (<http://www.go-nw.gov.uk/planning/rpgprocess.html>)

It is likely that under current plans (2003) that reform of the development plans system will result in the abolition of structure plans, local plans and unitary development plans and their replacement with a new single level of plan that would be known as a Local Development Framework. This may have significant implications for minerals development, but the nature of reforms has not been confirmed at the time of the preparation of this report.

Minerals Planning Guidance notes

Mineral planning guidance deals with the general policy framework, the use of planning conditions to control environmental impacts, polices for environmental protection in sensitive areas such as National Parks, Areas of Natural Beauty (AONB), Sites of Special Scientific Interest (SSSI) and European sites of nature-conservation, designated for example under the 'Habitats Directive', restoration and aftercare of worked out sites, the renovation or modification of existing permissions, the review of conditions at existing mineral sites, the mitigation of various types of environmental impacts and the management of risks from unstable ground created by mineral working and the tipping of mineral waste. In addition, guidance is given on the extraction and supply of specific minerals.

There are fifteen Mineral Planning Guidance (MPG) notes⁷:

- Minerals Planning Guidance 1: General considerations.
- Minerals Planning Guidance 2: Applications, permissions and conditions.
- Minerals Planning Guidance 3: Coal mining and colliery spoil disposal.
- Minerals Planning Guidance 4: Main document. Revocation, modification, discontinuance, prohibition and suspension orders.
- Minerals Planning Guidance 5: Stability in surface mineral workings and tips.
- Minerals Planning Guidance 6: Guidelines for aggregates provision in England.
- Minerals Planning Guidance 7: Reclamation of mineral workings.
- Minerals Planning Guidance 8: Main document. Interim development order permissions (IDOS): statutory provisions and procedures.
- Minerals Planning Guidance 9: Main document. Planning and Compensation Act 1991: interim development order permissions. (IDOS): conditions.
- Minerals Planning Guidance 10: Provision of raw material for the cement industry.
- Minerals Planning Guidance 11: Control of noise at surface mineral workings.
- Minerals Planning Guidance 13: Guidelines for peat provision in England.
- Minerals Planning Guidance 14: Environment Act 1995: review of mineral planning permissions.
- Minerals Planning Guidance 15: Provision of silica sand in England.

The general policy framework for minerals is set out in MPG 1. This includes the following sustainability objectives:

⁷ See www.odpm.gov.uk/stellent/groups/odpm_control/documents/contentservertemplate/odpm_index.hcst?n=2282&l=2 for access to full text of Mineral Planning Guidance notes.

- To conserve minerals as far as possible, whilst ensuring an adequate supply to meet the needs of society for minerals.
- To ensure that the environmental impacts caused by mineral operations and the transport of minerals are kept, as far as possible, to an acceptable minimum.
- To minimise production of waste and to encourage efficient use of materials, appropriate use of high quality materials, and recycling of wastes.
- To encourage sensitive working practices during mineral extraction and to preserve or enhance the overall quality of the environment once extraction has ceased.
- To protect areas of designated landscape or nature conservation from minerals development, other than in exceptional circumstances where it has been demonstrated that the proposed development is in the public interest.
- To prevent the unnecessary sterilisation of mineral resources.

Other MPG notes set out specific guidance relating to sustainability and environmental protection, for example MPG 2 (Applications, Permissions and Conditions), MPG 6 (Guidelines for Aggregates Provision in England) and MPG 7 (The Reclamation of Mineral Workings).

Development plans

In England, two levels of development plan affect minerals:

- **Structure plans** – set out general principles and policies for all forms of development. Structure Plans cover general policies and principles in line with national policies for all forms of development.
- **Local plans** – cover detailed policies for the control on development in the local area. Examples of Local Plans relevant to minerals include Minerals Local Plans or Minerals and Waste Local Plans, which set out detailed policies governing mineral extraction.

Local Authorities prepare development plans. In some cases mineral development plans may be produced on a joint basis between two or more authorities (e.g. a county with a unitary authority or a National Park). However, as noted above, a review of the planning system in England is currently being undertaken. Unitary development plans cover both these functions for further information on relevant authorities).

The key elements of a Minerals Local Plan, or of the mineral policies of a unitary development plan, are:

- To balance through its policies the essential need for minerals against protection of the environment and local amenity.
- To make an appropriate provision for the supply of minerals and provide an effective framework within which the minerals industry may make planning applications.
- To set policies for the control of mineral working and associated development.
- To identify areas of possible future mineral working.
- To prevent unnecessary sterilisation of resources by the use of safeguarding policies, including defining mineral consultation areas where appropriate.

Minerals Local Plans usually indicate areas in which mineral extraction might be acceptable (see below) and where proposals will normally be resisted or considered inappropriate. The idea behind a plan-led system is that conflict resolution and investments in development have a firmer foundation and ad-hoc planning control is minimised (Cullingworth & Nadin, 2002). To that end, applications that fall in line with the local development plan (and that are acceptable in other respects) will normally be permitted, unless material considerations indicate otherwise.

This increases the degree of certainty with respect to proposals for extraction for both the minerals industry and affected local residents.

There are three ways in which MPAs decide where future mineral extraction might be acceptable. These are outlined in Annex A of MPG1, namely specific sites, preferred areas and areas of search:

- **Specific sites** – these are where the ‘MPA is aware that certain sites have viable mineral resources, that the landowners are willing to allow mineral development and that any planning applications which come forward are likely to be acceptable in planning terms’ (MPG1, 1996). These are often planned extensions to existing mineral sites. Specific sites offer certainty to the planning applicant, the landowner and the general public that mineral extraction will take place.
- **Preferred areas** – these are generally ‘*areas of known resources where planning permission might reasonably be anticipated by industry*’ (MPG1, 1996) so long as any detailed issues at each site are properly addressed in a planning application (i.e. there are not unacceptable negative impacts). They are generally much larger than specific sites and less well defined, although viable reserves are known to exist. Occasionally there may be little difference between specific sites and preferred areas. The ability of an MPA to identify preferred areas ‘*requires comprehensive information on the nature and distribution of mineral resources, the characteristics of areas where minerals occur, the likely implications of working these resources both for the environment and for the quality of life of nearby residents, and the likely levels of demand for the mineral*’ (Highley et al, 2002). The identification of preferred areas therefore depends largely on subjective decisions about where extraction is likely to be more acceptable.
- **Areas of search** – these are areas likely to contain some sites which are acceptable for minerals extraction but they will also contain sites that will not be acceptable for minerals extraction due to economic or environmental reasons. They exist as a buffer should there be a shortfall in the supply of minerals because applications for minerals extraction in specific sites or sites in preferred areas did not come forward. Planning permissions may also be granted in areas of search to meet any additional need that could not be met through the plan's specific sites or preferred areas.

All of these exist within what is termed the ‘**landbank**’, which is a reserve of land with outline permission (but not necessarily specific planning permission) for quarrying aggregates. The landbank is usually expressed in terms of the theoretical amount of mineral that can be recovered from the permitted area. A landbank can also be defined in terms of longevity of supply on the basis of assumptions about annual production rates. However, the landbank classification does not take into account the geographical location of permitted reserves within the specified area, variations in availability of particular qualities of materials or the planning status of permitted reserves.

Mineral development control

This involves MPAs taking decisions on planning applications submitted by prospective mineral developers based on the policies set out in the development plans. If permission is granted, MPAs monitor and enforce the conditions of the application. Planning conditions may include mitigating environmental impacts, restoration and aftercare, date for terminating extraction and post-closure management of the restored site. If an application is refused the applicant may choose to appeal to the relevant Secretary of State and a public inquiry usually takes place. The Secretary of State, rather than the MPA, may call in some cases for decision.

Mineral permissions

Mineral permissions can last for many years. All modern planning permissions have operating and restoration conditions attached so that the operator meets environmental standards. Operating conditions are imposed to control the environmental impacts of mineral working, and restoration and aftercare conditions are imposed to ensure that land worked for minerals is suitable for a beneficial after-use. However, most old permissions have inadequate operating and restoration conditions and recent legislation requires that mineral permissions be periodically reviewed and updated every 15 years to ensure conditions remain up to date.

Mineral resource information

Efficient and effective functioning of the planning system depends on good, readily accessible information on the extent, quality and, if possible, quantity of mineral resources and their relationship to national planning designations, which might represent constraints on the extraction of minerals. This information is important for the production of mineral local plans, both in the context of identifying areas of future mineral working and the longer-term objective of protecting important mineral resources against sterilisation. The British Geological Survey is producing a series of mineral resource maps with an associated Geographical Information System to assist this process. The Geological Survey of Northern Ireland is currently preparing a pilot Mineral Resource Information Map for the Planning Service of Northern Ireland.

Ownership and private property rights

Ownership of minerals may or may not rest with the landowner. Ownership of minerals rights is therefore complex. State ownership is limited to energy minerals. Private property rights are intrinsically linked to planning legislation, as often it is the owner of the land who applies for planning permission to work the land for minerals.

The Main Authorities in Minerals Development and Control

As noted above, mineral planning is essentially plan-led in a hierarchal manner from the national level to the local level. The main authorities at each level and their roles are described below.

NATIONAL

The Office of the Deputy Prime Minister (ODPM) is responsible for developing national planning policy guidance. The Department for Trade and Industry (DTI) and the Department for the Environment, Farming and Rural Affairs (DEFRA) contribute to views on Regional Planning Guidance, Development Plans and planning applications.

REGIONAL

England is divided into eight planning regions. Each region has a regional development agency and a regional planning body. These prepare regional planning guidance with full public participation. The traditional system of planning for aggregates in England and Wales has combined a series of central government demand forecasts with mechanisms for apportioning projected total demand between the regions. This, and the geographical imbalances between supply and demand have resulted in an important role for Regional Aggregates Working Parties (RAWPs) in regional aggregates planning. There are 10 RAWPs in England and Wales and each contributes to the preparation of guidelines for the provision of aggregates in England and Wales and is also a key forum for discussions on the apportionment of regional figures between its constituent local MPAs. The RAWPs draw their membership from minerals planning officers, industry representatives, the Environment Agency, central government and other interested

parties. Each RAWP will meet several times a year for the purpose of collating and monitoring aggregates output of the RAWP's specific region.

LOCAL

County Councils or Unitary Authorities governs planning at the local level. County Councils are chiefly concerned with rural areas and also have a lower tier of District Councils. Decisions made by these bodies may have implications for minerals development. Unitary Authorities⁸ operate chiefly in urban areas and unlike County Councils do not have a second tier, although again their decisions may have implications for minerals development. County Councils, Unitary Authorities and National Parks⁹ are responsible for minerals and waste planning and are known as Mineral Planning Authorities (MPAs). The planning responsibilities of MPAs are roughly divided into two areas:

- The formulation of policies and plans to guide future development (development plans). Each MPA is also responsible for making sufficient provision in its plan to meet the anticipated need over the period of its Minerals Local Plan and to maintain continuity of supply. This may be achieved by delineating specific sites, preferred areas or areas of search either individually or in combination.
- Regulating individual developments that are proposed through deciding planning applications and enforcing planning consents ('development control').

NATIONAL LEVEL STRATEGIES, LEGISLATION AND DESIGNATIONS RELEVANT TO AGGREGATES

Relevant National Sustainability Strategies

General government strategies that have some relevance to the extractive industry are outlined here. The general sustainable development document, *A Better Quality of Life – A Strategy for Sustainable Development for the United Kingdom* (DETR, 1999), is the main document. Specific strategies related to the construction industry, which is a major consumer of outputs from the minerals sector are outlined in *Building a Better Quality of life – A strategy for sustainable construction* (DETR, 2000). Strategies related to mine and quarry wastes are outlined in the *Statutory Waste Strategy for England and Wales* (DETR, 2000).

Introduction to relevant environmental legislation

Many aspects of UK environmental regulation that are complementary to the planning system are relevant to minerals extraction, for example legislation relating to the control of emissions to air and water, control of nuisance and noise, and waste management and disposal. However, of greater relevance to this project is legislation that gives rise to some type of designation that has potential significance for the mineral planning process. The designation can be related either to the land or something present on that land. Such legislation includes:

- National Parks and Access to the Countryside Act (1949 and subsequent amendments).
- Ancient Monuments and Archaeological Areas Act (1979).

⁸ The unitary authorities in England include the London Boroughs and the Metropolitan Councils within Tyne and Wear, West Midlands, Merseyside, Greater Manchester, West Yorkshire and South Yorkshire, as well as a number of others around major towns in other parts of the country.

⁹ National Parks overlap geographically with the other authorities, but responsibilities are not duplicated with respect to their roles as MPAs.

- Wildlife and Countryside Act (1981).
- Town and Country Planning Act (1990).
- Planning (Listed Buildings and Conservation Areas) Act (1990).
- Water Resources Act (1991).
- Environment Act (1995).
- Hedgerow Regulations (1997).
- Countryside and Rights of Way Act (2000).

These are briefly reviewed below with a summary of the designations supported by each piece of legislation.

Two further pieces of legislation that are particularly significant for crushed rock and sand and gravel production are also considered:

- Landfill Tax (1996).
- Aggregates Levy (2002).

Finally, a number of Policy Planning Guidance notes contain provisions that may directly and indirectly affect the mineral planning process. For example, Planning Policy Guidance Note 7 outlines how designated landscapes are protected. Relevant Planning Policy Guidance Notes include:

- Planning Policy Guidance Note 2 Green Belts.
- Planning Policy Guidance Note 7 The Countryside - Environmental Quality and Economic and Social Development.
- Planning Policy Guidance Note 9 Nature Conservation.

These are examined in more detail below, as part of the process of supporting the proposed environmental and cultural assets.

National Parks and Access to the Countryside Act (1949 and subsequent amendments)

In 1949, the National Parks and Access to the Countryside Act provided for public access to some 50,000 hectares of open country by agreement or order. The Act provided legislation and protection of areas designated as National Parks. The act has had a great deal of amendment since then, with the latest in 1995 in the Environment Act and the Countryside and Rights of Way Act (CroW) (2000). For example, the Environment Act of 1995 established independent national park authorities, and the CroW Act defined which sections of the 1949 Act now also apply to Areas of Natural Beauty (AONBs) as well as National Parks. Development is controlled in national parks through the town and country planning system and as such the national park authorities have control over all the planning functions. There are two basic aims of national parks: *'to conserve and enhance the natural beauty, wildlife and cultural heritage of the areas'* and *'promote opportunities for the understanding and enjoyment of the special qualities of those areas by the public'* (PPG7, 1997). There are currently seven national parks in England covering 9936 square kilometres and eight percent of the total land area (Cullingworth & Nadin, 2002).

In addition to providing for the creation of National Parks, AONBs are also designated under this Act. There are 37 AONBs in England covering 20,510 km² (or 16% of the total land area) (Cullingworth & Nadin, 2002). They are designated solely on the basis of their natural beauty and – following the enactment of the CroW Act – are largely the equivalent of National Parks.

Nature reserves were declared under the National Parks and Access to the Countryside Act 1949, which was the first legislation to enable habitat protection and encourage public access to the countryside. The Wildlife and Countryside Act 1981 amended the statutory protection of nature

reserves and thus introduced National Nature Reserves (NNRs) (Thorburn, 1996), which are, as their name suggests, sites of national importance and must be of national interest for English Nature to designate them. They include some of the most important natural and semi-natural habitats nationally. In order to designate the site English Nature must have control over it which it achieves by buying the land, leasing the land or entering into a management agreement with the owner under the National Parks and Access to the Countryside Act 1949. Byelaws for the protection of the site can be made with confirmation from the Secretary of State. There are 383 NNRs in the UK covering 2198 square kilometres (Cullingworth & Nadin, 2002).

Ancient Monuments and Archaeological Areas Act (1979)

This is the principal legislation for the protection of archaeological remains (alongside the Town and Country Planning Act 1990). The 1979 Act provides protection for archaeological sites or monuments that have been designated as being of national importance. These are known as Scheduled Ancient Monuments, of which there are 17,759 in England (Cullingworth & Nadin, 2002).

Wildlife and Countryside Act (1981)

The Wildlife and Countryside Act 1981 (as amended) is the principle mechanism for the legislative protection of wildlife in Great Britain. The Act came in to force in 1981, when it repealed existing wildlife legislation such as:

- Protection of Birds Acts 1954 to 1967.
- Conservation of Wild Creatures and Wild Plants Act 1975.

The Act covers the provisions made in these previous acts and provides additional provision for species and countryside protection, for example:

- Amends the law relating to nature conservation, the countryside, National Parks and the designation of protected areas.
- Amends the law relating to public rights of way; and for connected purposes.

This legislation is the means by which the Convention on the Conservation of European Wildlife and Natural Habitats (the ‘Bern Convention’) and the European Union Directives on the Conservation of Wild Birds (79/409/EEC) and Natural Habitats and Wild Fauna and Flora (92/43/FFC) are implemented in Great Britain.

Marine Nature Reserves (which are similar to NNRs, but apply to coastal areas) are designated under the Wildlife and Countryside Act 1981 in order to conserve marine flora and fauna or geological or physiographical features. English Nature can make byelaws to protect the sites. Currently there are only 3 sites in the UK covering 194 km² of coast (Cullingworth & Nadin, 2002).

Sites of Special Scientific Interest (SSSIs) were introduced under the National Parks and Access to the Countryside Act 1949. However, in 1982 much of this was changed and strengthened under the Wildlife and Countryside Act (Part 2). SSSIs are intended to represent sample British habitats, with the aim of ‘*maintaining the present diversity of wild animals and plants in Great Britain*’ (Bell & McGillivray, 2000). There are 6,545 SSSIs in the UK covering a total area of 22,682 km² (Cullingworth & Nadin, 2002). Most SSSIs are privately owned or occupied. Owners and occupiers have a duty to notify English Nature of any change or development they wish to undertake – not doing so is an offence for which the maximum penalty is £2500. Under the Environment Act 1995 the Environment Agency (EA) also has a duty to notify English Nature of any operation, regardless of whether it will be potentially damaging to the SSSI, to be carried out on the land or on land in the vicinity of the SSSI which may affect it.

Geological Sites of Scientific Importance (GSSIs) are sites designated for their fossils, minerals or some other geologically important feature. They are identified in the Geological Conservation Review (GCR) as Earth Heritage Sites and most are protected by their designations as SSSIs. In England, more than 1,300 GCR sites have been safeguarded through designation as SSSIs. The results of the review have also helped instigate the development of a network of Regionally Important Geological Sites (RIGS).

Limestone pavements are also designated under the Wildlife and Countryside Act 1981. They are designated for their '*great natural beauty and scientific interest*' (Cullingworth and Nadin, 2002). There are only 2,000 hectares of designated limestone pavements in England and Wales (Cullingworth & Nadin, 2002). Whilst limestone pavement orders are issued by Local Authorities they are protected nationally (by the 1981 Act).

Town and Country Planning Act (1990)

The Town and Country Planning Act (1990) is an extremely far-reaching and broad piece of legislation that encompasses (among others) planning authorities, development plans, control over development, compensation, rights of owners and enforcement. An analysis of this Act is beyond the scope of this section, but for further information, the full text can be found at the following site: www.legislation.hmso.gov.uk/acts/acts1990/Ukpga_19900008_en_1.htm

Planning (Listed Buildings and Conservation Areas) Act (1990)

Listed buildings are buildings with an architectural or historic interest. Currently there are nearly half a million listed buildings in England (Cullingworth & Nadin, 2002). The list is compiled by central government and Local Planning Authorities must take them into consideration in planning decisions. This means there are considerable differences in the level of protection afforded to Listed Buildings as the protection varies from county to county.

Legislation concerning Conservation Areas is contained within Part 2 of the Planning (Listed Buildings and Conservation Areas) Act 1990. The Town and Country Planning Act (1990) makes special provisions for trees located within Conservation Areas. Conservation Areas, which are concerned with areas as opposed to individual sites or buildings, are of relevance to the mineral planning process. Local planning Authorities can designate areas as Conservation Areas based on special architectural or historic interest, the character of which it is desirable to preserve or enhance (Cullingworth & Nadin, 2002). If an area has been designated as a Conservation Area planning decisions are scrutinised more thoroughly. Currently there are over 9,000 such areas designated in the UK (Cullingworth & Nadin, 2002). There is, however, much criticism as to the value of these sites due to the varied process by which they are designated.

Water Resources Act (1991)

The Water Resources Act (1991) covers protection of water against pollution and other water resource management. It is an offence to discharge trade effluent or other poisonous or polluting material or solid waste into a controlled water unless a discharge consent has been obtained from the Environment Agency. The Act also provides the Environment Agency with the means to manage water resources through the licensing of abstractions. It is an offence to pollute groundwaters under the Water Resources Act 1991. In addition to being regulated under the Water Resources Act, water quality is also regulated by several EC Directives, which require member states to set Water Quality Objectives (WQOs). The Environment Agency is the consulting body and regulator for all matters related to water and discharges to it.

Groundwater Source Protection Zones (GSPZ) are zones defined by the Environment Agency (EA, 2002b) around abstraction wells. Three zones are defined based on estimated groundwater travel times. These are Zone 1 (50 days), Zone 2 (400 days) and Zone 3 (the whole catchment). In addition there are Zones of Special Interest. These zones highlight areas where known local

conditions mean pollution could occur on the groundwater source even though the area is outside the catchment.

Environment Act (1995)

The Environment Act of 1995 was an attempt to simplify and streamline existing legislation. It saw the creation of the Environment Agency, a government body designed to replace the National Rivers Authority and Her Majesty's Pollution Inspectorate. It also saw the creation of new bodies to oversee each individual National Park. The Act also contained some legislation on contaminated land. In summary, the main provisions of the Environment Act (1995) are as follows:

- The creation of Environment Agency.
- The new contaminated land regime.
- Protection of the aquatic environment.
- Air quality management.
- Producer responsibility.

Hedgerow Regulations (1997)

Hedgerows are an important part of the landscape in England. 'Important' hedgerows are protected under the Environment Act (1995), which prohibits the removal, damage or destruction of 'important' hedgerows. The 1997 Hedgerows Regulations provide protection for important hedgerows. To be classified as an important hedgerow certain criteria have to be met, which in reality narrows the protection of qualifying hedgerows. The protection for hedgerows is relatively basic. An owner must notify the local planning authority before removing any hedgerow and consent can only be refused if it is deemed an important hedgerow. This means that very few hedgerows are actually protected.

Countryside and Rights of Way (CroW) Act (2000)

In February 1998 the Government issued a consultation paper, Access to the Open Countryside in England and Wales, which invited views on how best to secure more and better access to open countryside. The paper sought views on both statutory and voluntary approaches to achieving greater access, and estimated that the total extent of mountain, moor, heath, down and registered common land was some 1.2 to 1.8 million hectares or around 10% of the land area of England and Wales. In the light of the results of consultation and of a study of the costs and benefits of different approaches for securing greater public access, the Government decided to legislate to create a new statutory right of area access as part of a wider package to improve public access to the countryside. The resulting CroW Act is intended to give greater freedom for people to explore open countryside. It contains provisions to introduce a new statutory right of access for open-air recreation to mountain, moor, heath, down and registered common land. It also includes a power to extend the right to coastal land by order, and enables landowners voluntarily to dedicate irrevocably any land to public access.

Aggregates Levy

This was introduced in April 2002 at £1.60 per tonne of primary aggregate. The objective of the levy is to address, by taxation, the environmental costs associated with quarrying, reduce the demand for primary materials and to increase demand for recycled materials (which along with secondary aggregates are noted subject to this levy). It applies to sand, gravel and crushed rock subject to commercial exploitation in the UK, including aggregate dredged from the seabed within UK territorial waters. To protect international competitiveness the tax is also levied on

imports but exports are relieved. The levy is not a revenue raising tax and about 90% is returned to employers generally through a small reduction in National Insurance Contributions. The remaining 10% is transferred to a new Sustainability Fund (totalling £35 million a year) to fund work to reduce the environmental impacts of aggregates extraction.

Landfill Tax

On 1 October 1996 a tax on waste disposal in landfill sites was introduced into the UK. The purpose of the tax is to encourage business and consumers to produce less waste, to dispose of less waste in landfill sites, and to recover value from more of the waste that is produced, for example through recycling. The rate of £2 a tonne is applied to inactive or inert wastes (i.e. those which do not give rise to gases and which have no potential for polluting groundwater) such as some minerals waste. Exemptions include inert wastes used in restoring mineral and landfill sites.

Planning Policy Guidance Note 2 Green Belts

Planning Policy Guidance Note 2 provides a map of approved Green Belts in England. It also states that *'the essential characteristics of Green Belts is their permanence. Their protection must be maintained as far as can be seen ahead'*. In planning terms Green Belts are protected nationally and there is a *'general presumption against inappropriate development within them'* (PPG2, 2002) so it is significant as to whether a development will be within or outside of the belt. However, there are many developments that are not considered to be inappropriate such as mineral extraction as long as the site is well restored. Therefore, Green Belts are not of high national importance, but are of national importance so will be assigned a significance value of three if a positive answer is given.

Planning Policy Guidance Note 7 The Countryside - Environmental Quality and Economic and Social Development

Agricultural land has been classified into Grades by MAFF (now part of DEFRA) in the Agricultural Land Classification (ALC). Planning Policy Guidance (PPG) Note 7 The Countryside - Environmental Quality and Economic and Social Development states that Grades 1, 2 and 3a are considered *'the best and most versatile agricultural land'* (BMV). PPG7 also states, *'land in these grades is the most flexible, productive and efficient in response to inputs. It is best suited to adapting to the changing needs of the agricultural industry in both the short term and the long term national interest...local planning authorities should give considerable weight to protecting such land against development'* treated as a nationally significant asset because it is an important non-renewable natural resource. PPG7 states that *'agricultural land in grades 3b, 4 and 5 is of moderate or poor quality and is less significant in terms of the national agricultural interest...little weight in agricultural terms should be given to the loss of this land'* (PPG7, 1997)

The published provisional ALC maps do not show a breakdown of Grade 3 into its component subgrades, 3a and 3b. This is because these provisional ALC maps were produced in the late 1960s/early 1970, prior a requirement for grade 3 land to be subdivided. In general, therefore, subgrades of Grade 3 have only been identified more recently as a result of more detailed local surveys in areas of specific land use planning pressures, often on a site-specific basis. Thus the published provisional maps do not identify the extent of BMV land. Nevertheless they remain a useful source of land quality information at a strategic level.

In order to overcome this limitation, DEFRA have developed a predictive methodology to identify where BMV land is likely to be most extensive. Three categories of land were identified:

- **High likelihood of BMV land** - Land where >60% of the area is likely to comprise BMV land.
- **Moderate likelihood of BMV land** - Land where 20-60% of the area is likely to comprise BMV land
- **Low likelihood of BMV land** - Land where <20% of the area is likely to comprise BMV land

These predictive maps do not supersede the provisional ALC data, but form a companion dataset at a similar level of detail i.e. strategic uses at 1:250,000 scale. However it is important to appreciate that this mapped BMV data is a prediction of the likely extent of BMV land within a mapping unit and is designed to be no more specific than this in locational terms.

Planning Policy Guidance Note 9 Nature Conservation

There are international, European, national and local designations in England that are for nature conservation purposes. Guidance is provided in Planning Policy Guidance (PPG) Note 9 Nature Conservation (2002) in which it states *‘local planning authorities should have regard to the relative significance of international, national, local and informal designations in considering the weight attached to nature conservation issues..... nature conservation objectives should be taken into account in all planning activities which affect rural and coastal land use, and in urban areas where there is wildlife of local importance’*. Nature conservation should be considered from the regional strategic level of Structure Plans, which should make provision for policies on nature conservation, down to the more detailed Local Plans. However, protection of international designations takes priority over other designations in order that no international agreements are broken. Nature conservation can be a material consideration in the planning process. However, planning permission cannot be refused on the basis of nature conservation, particularly if planning conditions can be imposed that will prevent any damage to the nature conservation area. Also if there are ‘overriding’ factors such as economic benefit or benefit to human health the nature conservation site can be deemed less significant.

Introduction to significant non-statutory designations

There are a large number of non-statutory designations, often drawn up by local authorities. While these areas are afforded some degree of protection by their designation, this is not at the same level as statutory designations, which will normally have precedence. For many non-statutory designations there is no national or regional consistency, with designations differing according to the priorities of different local authorities. These priorities may often be unclear and poorly explained to relevant stakeholders. An excellent example is seen in the wide range of landscape designations in common use, which includes:

- Special Landscape.
- Special Landscape Area.
- Area of Landscape Value/Merit/Significance.
- Great/Particular Landscape Value.
- Outstanding Landscape Area/Quality.
- Local Landscape Area.
- High Landscape Value.
- Historic Landscape.
- Landscape Conservation Area.
- Landscape Protection/Merit/Feature/Significance.

However, there are a number of more consistent non-statutory designations and the most significant of these are reviewed below.

Local Nature Reserves

Local Nature Reserves are, as their name suggests, sites of local importance as opposed to national importance. There are 718 sites in the UK with a total area of 435 km² (Cullingworth & Nadin, 2002). They are non-statutory designations made by local authorities (e.g. borough, county, district and regional councils, and special planning boards) under the National Parks and Access to the Countryside Act (1949). Most are privately owned subject to a management agreement, but some are owned by voluntary organisations such as the RSPB and County Wildlife Trusts who manage their own sites. These reserves are declared in conjunction with the conservation organisations to reflect areas of locally important nature conservation or amenity value and to give access to the public.

Sites of important nature conservation (SINC)

These include County Wildlife Sites and sites of local importance, for instance in urban areas where the site may provide the only local access to nature conservation. These sites are voluntary in their nature. They are afforded no statutory protection, though, as with other nature conservation sub-components, it is likely that they will be a material consideration in planning decisions.

Community forests, community woodlands and Ancient Woodlands

Community forests are non-statutory designations that aim to '*promote the creation, regeneration and multipurpose use of well-wooded landscapes around major towns and cities*' (Bell & McGillivray, 2000). Community Woodlands are similar but are being created near centres of population. The only control is that development proposals must respect the woodland setting; other than this, development control relies on the private rights of the Forestry Commission. There are 12 community forests in England together with the National Forest in the Midlands. Ancient Woodland is land that has had continuous woodland cover since at least 1600 AD. There are two types of ancient woodland. The first type is ancient semi-natural woodland. This is woodland that has retained the native tree and shrub cover. This type has not been planted, although it may have been managed by coppicing or felling and allowed to regenerate naturally. The second type is Ancient Replanted Woodland. These woodlands are where the original native tree cover has been felled and replaced by planting, usually with conifers and usually this century. There are over 22,000 ancient woodland sites in England (EN, 2002).

Historic parks and gardens

There are just over 1,300 historic parks and gardens in England (Cullingworth & Nadin, 2002). Historic Parks and Gardens are sites that are regarded as an essential part of the nation's heritage, but they are not afforded any statutory protection (Morris & Therivel, 2001). There are no duties on local authorities to maintain these parks and according to Cullingworth & Nadin (2002) '*there seem to be no clear responsibilities in relation to parks*'.

Tranquil areas

The Council for the Protection of Rural England (CPRE) has produced tranquil area maps of England that show areas that they consider to be tranquil. According to the CPRE '*tranquil areas are places which are sufficiently far away from the visual or noise intrusion of development or traffic to be considered unspoilt by urban influences*' (CPRE, 2002). They believe that the tranquillity of rural areas should be protected. Though this is not something that

would necessarily be considered in a planning application it is a useful component to consider. If a development site contains tranquil areas as designated by the CPRE it will be assigned a significance value of four. This is to reflect the high national importance that the CPRE imply should be attached to this component.

Heritage Coasts

In coastal areas the non-statutory designation of Heritage Coast is designed to protect the landscape and provide for managed recreation. There are 45 areas in England and Wales protecting nearly 1,500 km of coast (Cullingworth & Nadin, 2002). The majority (37 out of 45 areas) are in AONBs or National Parks, and therefore are accorded the protection of that designation, and indeed Heritage Coasts are designed for the dual purposes of conservation and recreation just as National Parks are.

Regionally Important Geological/Geomorphological Sites (RIGS)

A national network of Regionally Important Geological/Geomorphological Sites (RIGS) exists in England. Regional groups are made up of professional and amateur geologists and geomorphologists (Oliver, 1999). There are over 50 local RIGS groups in the UK. RIGS may be sites that *'do not meet the criteria of GSSIs, but are nevertheless of significance in a local context'* (Carson, 1998). RIGS are not afforded statutory protection but can be viewed as a material consideration by local authorities.

EU DIRECTIVES RELEVANT TO AGGREGATES

There are a number of EU Directives that are directly or indirectly relevant to mineral extraction. These include:

- Directive 75/442/EEC (91/11/EC) – Framework Directive on Waste Management.
- Directive 78/659/EEC – Freshwater Fish.
- Directive 79/409/EEC – Wild Birds Directive
- Directive 80/68/EC – Groundwater.
- Directive 85/337 – Assessment of the Effects of Certain Public and Private Projects on the Environment.
- Directive 92/43/EEC – on the Conservation of Natural Habitats and of Wild Fauna and Flora (the 'Habitats Directive').
- Directive 96/81/EC – Integrated Pollution Prevention and Control (IPPC).
- Directive 96/82/EC – Control and Management of Major Accident Hazards (Seveso II).
- Directive 99/31/EC – Landfill of Waste.
- Directive 2000/60/EC – Water Framework Directive.
- Directive 2001/42/EC – Assessment of the Effects of Certain Plans and Programmes on the Environment

The European Commission also has plans to propose a new Directive focussing on the management of "extractive industry" wastes, which would consider site-specificity as well as significant differences between various sub-sectors of the extractive industry. In the wake of recent mining-related environmental incidents, the European Commission also intends to amend the Seveso II Directive to include the mineral processing of ores and, in particular, tailings ponds or dams used in connection with such mineral processing of ores. In neither case is it clear that

crushed rock or sand and gravel operations will be included, but this will be subject to a review of the final text should these or related Directives be agreed.

In the context of this project, five specific Directives (relating to Environmental Impact Assessments, Strategic Environmental Assessments, landfill of waste, bird protection and habitat conservation) are particularly relevant and are considered in more detail in the following sections.

EIA Directive

Council Directive of 27 June 1985 on the Assessment of the Effects of Certain Public and Private Projects on the Environment (Directive 85/337)

Environmental Impact Assessment (EIA) legislation was formally introduced in the UK in 1988 through the adoption of EU Directive 85/337¹⁰. This was amended by Directive EC/97/110, which came into force in March 1999. EIA is a regulated process by which information about the environmental effects of projects covered by EIA legislation is collected and analysed for consideration by the relevant planning authority. Under EU Directive 85/337/EEC (as amended by Directive EC/97/110), EIA should be applied to two separate lists of projects:

- Projects listed in Annex 1 to the Directive – these are projects for which an EIA is mandatory (for the minerals industry this means any quarry or open cast mining where the surface area of the site exceeds 25 hectares).
- Projects listed in Annex 2 to the Directive for which an EIA is required if significant environmental effects are likely. Eighty-three types of project are listed in Annex 2, including ‘*Extraction of minerals other than metalliferous and energy-producing minerals, such as marble, sand, gravel, shale, salt, phosphates and potash*’ and ‘*Extraction of minerals other than metalliferous and energy-producing minerals by opencast mining*’. In effect, any quarry or open cast mining where either the project is of more than local importance in terms of its size, or the project is in a particularly sensitive location, or where the project is thought likely to give rise to particularly complex or adverse effects is likely to require an EIA (Glasson et al, 2001). If the local planning authority decides a development is not an Annex 2 project it must provide a public statement as to how and why it came to this decision.

If a development is an Annex 1 project then an Environmental Impact Statement (EIS) must accompany the planning application, containing:

- A description of the development (size, design and scale).
- Data necessary to assess main environmental effects.
- A description of likely direct and indirect effects on human beings, flora, fauna, soil, water, air, climate, landscape, material assets and cultural heritage.
- A description of measures to avoid, reduce or remedy any adverse effects.
- An outline of the main alternatives studied by the developer.
- A non-technical summary of the above information.

SEA Directive

Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on the Assessment of the Effects of Certain Plans and Programmes on the Environment

¹⁰ See europa.eu.int/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&lg=EN&numdoc=31985L0337&model=guichett for full Directive text.

Strategic Environmental Assessment is the process of appraisal through which environmental protection and sustainable development may be considered, and factored into national and local decisions regarding government and other plans and programmes. Directive 2001/42/EC¹¹, otherwise known as the Strategic Environmental Assessment (SEA) Directive came into effect on 27 June 2001 and Member States must comply with the directive by 21st July 2004. Therefore, from this time, SEA will be required under European law. The SEA Directive is based on the principles of EIA, but at a larger scale (i.e. the environmental assessment of plans and programmes during their preparation and prior to their implementation rather than at the level of individual projects). Plans and programmes can refer to any plans and programmes that are subject to preparation, and/or adoption by an authority at national, regional or local level. More specifically SEA will include plans and programmes prepared for town and country planning, or for projects listed as Annex 1 or 2 in the EIA Directive. This means SEA will be directly relevant to minerals development at all levels. Authorities which prepare and/or adopt a plan or programme that is subject to the directive will have to prepare a report on its probable significant environmental effects, consult environmental authorities and the public, and take the results into account before the plan is implemented. It is hoped that SEA will contribute to more transparent planning and sustainable development by involving the public and integrating environmental considerations at a strategic level. Further information on this Directive, and the relationship between SEA and Sustainability Appraisals (which some authorities are already undertaking) can be found in the Section 2.

Landfill Directive

*Directive 99/31/EC – Landfill of Waste*¹²

The chief aim of this Directive is to minimise landfill and more closely regulate the types of waste disposed of at landfill sites. The relevance of this measure is that some inert minerals materials are currently disposed of to landfill, whereas they could be recycled as alternatives to newly extracted material. However, it should be recognised that daily cover and restoration fill will still be required at landfills and that some inert mineral materials will be required for these purposes.

Wild Birds and Habitats Directives

*Directive 79/409/EEC – Wild Birds Directive*¹³ and *Directive 92/43/EEC – Habitats Directive*¹⁴

This Wild Birds Directive relates to the conservation of all species of naturally occurring birds in the wild state in the European territory of the Member States to which the Treaty applies. It covers the protection, management and control of these species and lays down rules for their exploitation. The Habitats Directive contributes towards ensuring biodiversity through the conservation of natural habitats and of wild fauna and flora in the European territory of the Member States to which the Treaty applies.

Special Areas of Conservation (SACs) are designated under the EC Habitats Directive and Special Protection Areas (SPAs) are designated under the EC Wild Birds Directive. The European network of SPAs and SACs are known as the Natura 2000 Network (Cullingworth & Nadin, 2002). The aim of the network is that it will protect habitats of threatened species of wildlife. Member states must take appropriate steps to avoid significant deterioration of natural

¹¹ See europa.eu.int/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&lg=EN&numdoc=32001L0042&model=guichett for the full Directive text.

¹² See europa.eu.int/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&lg=EN&numdoc=31999L0031&model=guichett for the full Directive text.

¹³ See europa.eu.int/comm/environment/nature/en.pdf for full Directive text.

¹⁴ See www.ecnc.nl/doc/europe/legislat/habidire.html for full Directive text.

habitats and restrict development that is likely to have a significant affect on a SPA or SAC. Eventually all SPAs and SACs will be notified as SSSIs so that English Nature will have to be consulted during any planning application.

INTERNATIONAL CONVENTIONS AND DESIGNATIONS RELEVANT TO AGGREGATES

World Heritage Convention (1972)¹⁵

The objective of the World Heritage Convention (or the Convention Concerning the Protection of World Cultural and Natural Heritage as it is formally known) is to identify and conserve the world's cultural and natural heritage. Its main instrument is the World Heritage List, which contains sites of outstanding cultural and natural values. An overview of the process for nominating sites is available at whc.unesco.org/nwhc/pages/doc/dc_f8.htm and a detailed review of the implementation of the Convention (including the designation process and the criteria applied) at whc.unesco.org/nwhc/pages/doc/dc_f10.htm. The United Nations Educational, Scientific and Cultural Organization (UNESCO) houses the Convention's Secretariat, while IUCN– The World Conservation Union, the International Council of Monuments and Sites (ICOMOS) and the International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) act as the advisory bodies for, respectively, natural properties, cultural properties and the study of the preservation and restoration of cultural property. The Convention text was influenced by the call for a “World Heritage Trust” in a 1965 conference and proposals developed by IUCN in 1968 and subsequently presented to the 1972 United Nations Conference on Human Environment. The Convention was adopted by the 1972 General Conference of UNESCO and now counts more than 150 member nations.

There are currently ten sites within England that the government has pledged to protect under the UNESCO World Heritage Convention (Cullingworth & Nadin, 2002). There is no specific legislation related to World Heritage Sites and protection lies in the importance given to them in the planning process. Planning Policy Guidance (PPG) Note 15 Planning and the Historic Environment states *‘Local planning policies should...place great weight on the need to protect them (World Heritage Sites) for the benefit of future generations as well as our own’* (PPG15, 2002).

Ramsar Convention (1971)¹⁶

The Ramsar Convention – formally known as the Convention on Wetlands of International Importance especially as Waterfowl Habitat – provides a framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. Ramsar covers all aspects of wetland conservation and “wise use” of wetlands, recognizing that wetlands are extremely important ecosystems for biodiversity conservation. The criteria used to identify wetlands that may be of international importance can be found at www.ramsar.org/key_criteria.htm. The Convention defines wetlands as “areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed 6 m”. To date, the Ramsar Convention remains the only global convention dealing with a particular type of habitat. The Convention – which originated at a 1962 conference on waterfowl conservation – was adopted in Ramsar, Iran, in 1971. As of 2003, there were 138 Contracting Parties to the Convention, with 1,308 sites, amounting to 110 million hectares (271.8 million acres) designated in the Ramsar List of Wetlands of International

¹⁵ See whc.unesco.org for further details on the World Heritage Convention.

¹⁶ See www.ramsar.org for further details on the Ramsar Convention.

Importance. The Secretary of State designates Ramsar sites under international obligation. Under the agreement, signatory states must protect wetlands that are of international importance, particularly waterfowl habitats.

Appendix 2 The Analysis of potential assets

The table below summarises the methodological approach taken to consistently assess and analyse the assets identified in Section 4. Details of the analysis are given in subsequent pages.

Designation	Asset	Information availability, format [and source]	Proposed baseline score (1-10)	Logic for proposed baseline score	Suggested score range	Source of protection	Quality of protection process/data (if applicable)	Reliability of protection status (if applicable)	Other comments/reference	Priority for Project
Nature conservation	Ramsar	Available – digital [Ramsar Bureau]	10	Internationally significant	10	Ramsar Convention (1971)	High/High	High	Development normally restricted – weighting should only be adjusted if urgent national interest can be proven	1
	Special Areas of Conservation	Available – digital [European Commission – DEFRA]	10	Internationally significant	10	EC Habitats Directive (1992)	High/High	High	Development normally restricted – weighting should only be adjusted if urgent national interest can be proven	1
	Special Protection Areas	Available – digital [European Commission – DEFRA]	10	Internationally significant	10	EC Wild Birds Directive (1979)	High/High	High	Development normally restricted – weighting should only be adjusted if urgent national interest can be proven	1
	Important Bird Areas	Available – digital [RSPB or BirdLife International]	8	Nationally significant	6-10	EC Wild Birds Directive (1979), Ramsar Convention (1971) and other statutes, but some IBAs have no legal protection	High/High	High	Some IBAs may have international significance, while others may be important but have no legal basis for their protection	1
	Nature Reserves	Available – digital [English Nature]	8	Nationally significant	7-9	English Nature designation and byelaws	High/High	High	Byelaws are made with confirmation of Secretary of State	1
	Marine Nature Reserves	Available – digital [English Nature]	8	Nationally significant	7-9	English Nature designation and byelaws	High/High	High	Byelaws are made with confirmation of Secretary of State	1
	Sites of Special Scientific Interest (SSSI)	Available – digital [English Nature]	8	Nationally significant	5-9	Wildlife and Countryside Act	Variable/Variable	Variable, current status may be unknown for some sites	Although theoretically protected (and sensitive), degradation of many sites has occurred through development. However, government target is that 95% of SSSIs (by area) should be in a favourable condition by 2010	1
	SSSI within 2 km	Available – digital [English Nature]	4	Buffer zone for protection of SSSI	1-6	Notification to English Nature	NA	NA (site itself may not be sensitive)	Actual weighting will depend on proximity and nature of potential risks	1
	Local Nature Reserve	Limited – some digital? [Private owners, NGOs, Wildlife Trusts etc]	4	Locally significant	2-8	Non-statutory under National Parks and Access to the Countryside Act (1949)	Variable/Variable	Variable	Actual weighting may depend on the site quality and owner (e.g. site owned by RSPB may be more sensitive than a privately-owned, poorly managed site)	2

Designation	Asset	Information availability, format [and source]	Proposed baseline score (1-10)	Logic for proposed baseline score	Suggested score range	Source of protection	Quality of protection process/data (if applicable)	Reliability of protection status (if applicable)	Other comments/reference	Priority for Project
	RSPB Reserves	Available – digital	4	Locally significant	2-8	None	High/High	High	Many reserves may also contain additional assets (e.g. wetlands) that are nationally or internationally significant and have statutory protection	1
	Sites of Important Nature Conservation	Limited - some digital? [Varied sources]	2	Locally significant	2-8	Countryside and Rights of Way Act (2000)	NA	NA	Local support and use may significantly increase weighting. Under CroW, public bodies that own, manage or affect SSSIs now have a legal duty of care	2
Landscape Conservation	National Park	Available – digital [Ordnance Survey]			8	Nationally significant	6-10	High	Development controlled through the town and country planning system	1
	Heritage Coast	Available – digital [Countryside Agency]	8	Nationally significant	6-10	Planning Policy Guidance (PPG) 20 – Coastal Planning	High/High	High	Afforded same protection as National Parks	1
	Area of Outstanding Natural Beauty	Available – digital	8	Nationally significant (same status as National Parks)	6-10	National Parks and Access to the Countryside Act (1949); Countryside and Rights of Way Act (2000)	High/High	High	Protection may be limited as many of the powers available are optional rather than statutory. However, under the CroW Act, many of the provisions relating to National Parks have been extended to AONB	1
	Green Belt	Available – digital [ODPM and others]	8	Nationally significant	5-9	Policy Planning Guidance 2	High/High	Variable	Development in Green Belt areas is not ruled out as long as it is 'appropriate', allowing for a reduction in weighting in some cases	1
	Millennium Greens	Available – some digital? [Countryside Agency]	7	Locally significant, but see notes	4-8	No statutory protection, but local community ownership and rights may be significant	NA	High	Site are to be held on trust as permanent resources for the local community – therefore although locally significant, score has been increased to reflect this	2

Designation	Asset	Information availability, format [and source]	Proposed baseline score (1-10)	Logic for proposed baseline score	Suggested score range	Source of protection	Quality of protection process/data (if applicable)	Reliability of protection status (if applicable)	Other comments/reference	Priority for Project
	Ancient woodland	Available – digital? [Ancient Woodland Inventories: Forestry Commission, English Nature, Nature Conservancy Council and successors]	6	Regionally significant	4-8	None (but some are SSSIs and planning guidance offers some control)	Variable/Variable	Variable	Sites less than 2 Ha in size are not noted on the inventory. Status of some larger sites may be unknown	2
	National Forest	Available – digital [National Forest Company]	6	Nationally significant (but see notes)	4-8	None, although areas within may have statutory protection	NA	NA	Total area is to be 200 sq. miles, of which one-third will be wooded. Therefore, while of national significance there is substantial areas that could accommodate sympathetic development. Therefore, score is reduced from 8 to 6	1
	Footpaths, rights of way, access to open spaces	High – digital? [Open Spaces Society]	6	Regionally significant	4-8	Countryside and Rights of Way Act (2000)	Variable/Variable	Variable	Rights of access not yet fully implemented (expected late 2005)	2
	Important hedgerows	Limited – some digital? [Council for Protection of Rural England & many others?]	6	Regionally significant	6-10	Environment Act (1995); Hedgerow Regulations (1997)	Variable/Variable	Variable	'Important' has yet to be properly defined. A number of statutory and non-statutory bodies have rights and responsibilities	2
	Community forest	Available – digital? [Forestry Commission and English Nature?]	4	Locally significant	2-8	Non-statutory, development control arises from rights of the Forestry Commission	Variable/Variable	Variable	Local support and use may significantly increase weighting. Many local plans call for increase in tree cover	2
	Community woodland	Available – digital? [Forestry Commission and English Nature?]	4	Locally significant	2-8	Non-statutory, development control arises from rights of the Forestry Commission	Variable/Variable	Variable	Local support and use may significantly increase weighting. Many local plans call for increase in tree cover	2
	Woodland Trust	Available – digital? [Woodland Trust]	4	Locally significant	2-6	Ownership by Woodland Trust	NA	High	The Woodland Trust is not a statutory consultee on planning applications involving woodland.	2

Designation	Asset	Information availability, format [and source]	Proposed baseline score (1-10)	Logic for proposed baseline score	Suggested score range	Source of protection	Quality of protection process/data (if applicable)	Reliability of protection status (if applicable)	Other comments/reference	Priority for Project
	Tranquil Areas	Available – digital [Council for the Protection of Rural England; Countryside Commission]	4	Local significance	3-5	None	High/High	High	CPRE consider tranquil areas should have a high national significance, but this is not reflected in statutory protection	1
Heritage and Cultural Conservation	World Heritage Sites	Available – digital [World Heritage Centre]	10	Internationally significant	10	World Heritage Convention (1972)	High/High	High	Industrial activity is generally considered inappropriate for World Heritage Sites, and weighting should only be decreased where urgent national interest can be proven	1
	Scheduled Ancient Monuments	Available – digital [English Heritage]	8	Nationally significant	7-8	Ancient Monuments and Archaeological Areas Act (1979); Town and Country Planning Act (1990)	High/High	Variable	Current status of sites may vary from that noted in register	1
	Listed Buildings	Available – digital [English Heritage, National Trust etc]	8	Nationally significant	7-8	Town and Country Planning Act (1990); Planning (Listed Buildings and Conservation Areas) Act (1990)	High/High	Variable	Current status of sites may vary from that noted in register	1
	National Trust Land	Available – digital [National Trust]	8	Nationally significant	8-10	Ownership or guardianship of land etc by National Trust	High/High	High	Most properties/sites are held in perpetuity	1
	Conservation Areas	Available – digital [Environment Agency]	4	Locally significant	4-6	Town and Country Planning Act (1990); Planning (Listed Buildings and Conservation Areas) Act (1990)	Variable/Variable	Variable	Designation process is variable, therefore appropriate values for different areas may be difficult to establish. However, in theory, Conservation Areas might be considered more sensitive than sites with a single listed building	2
	Historic Parks and Gardens	Available – digital? [Register of Historic Parks and Gardens of Special Historic Interest; English Heritage]	4	Locally significant	2-6	None (unless related to on-site buildings and trees)	High/High	High	Local planning authorities are encouraged to consider Historic Parks and Gardens despite the lack of statutory protection	2

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Geological designations	Limestone pavements	High – digital	10	Internationally significant	8-10	Wildlife and Countryside Act (1981) from which Limestone Pavement Orders are derived	High/High	High	Some sites may have existing planning permission for extraction	1
	Regionally Important Geological Sites	Limited – non-digital? [RIGS Network]	4	Locally significant	2-6	None	Variable/Variable	Medium	Local use and recognition may influence weighting. Assessment procedures may not be consistent between sites	2
	Geological Conservation Review Site (GCRS)	Available – digital? [English Nature]	8	Nationally significant	5-9	Wildlife and Countryside Act (GCRSs are designated as SSSIs)	Variable/Variable	Variable, current status may be unknown for some sites	Although theoretically protected (and sensitive), degradation of many sites may have occurred through development. However, government target is that 95% of SSSIs (by area) should be in a favourable condition by 2010	2
Biodiversity	Biodiversity Action Plan area	Available – digital? [DEFRA?]	4	Locally significant	2-8	UK BAP	Variable/Variable	Variable	Biodiversity Action Plans may cover wide areas that include sub-plots of high and low biodiversity. Therefore, the existence of a Biodiversity Action Plan does not imply that the whole area has the same sensitivity	2
Agricultural Land	Land Quality Grade 1	Available – digital [DEFRA]	8	Nationally significant	7-9	Planning Policy Guidance 7	High/High	High	Considered a national resource for future generations	1
	Land Quality Grade 2	Available – digital [DEFRA]	8	Nationally significant	7-9	Planning Policy Guidance 7	High/High	High	Considered a national resource for future generations	1
	Land Quality Grade 3a	Available – digital [DEFRA]	6	Regionally significant	5-7	Planning Policy Guidance 7	High/High	High	Considered a national resource for future generations, but may be difficult to distinguish between Grades 3a and 3b in available information	2

Designation	Asset	Information availability, format [and source]	Proposed baseline score (1-10)	Logic for proposed baseline score	Suggested score range	Source of protection	Quality of protection process/data (if applicable)	Reliability of protection status (if applicable)	Other comments/reference	Priority for Project
Groundwater	Aquifers – major	Available – digital	8	Nationally significant	8-9	EC Directive 80/68/EEC EPA 1990 Town and Country Planning Act 1990 Wat. Res. Act 1991 Water Ind. Act 1991 Environment Act 1995	High/High	High	The GSPZ provide an indication of the potential risk of pollution, rather than an absolute measures, and therefore the value assigned should take this into account	1
	Aquifers – minor	Available – digital	6	Regionally significant	6-8	EC Directive 80/68/EEC EPA 1990 Town and Country Planning Act 1990 Wat. Res. Act 1991 Water Ind. Act 1991 Environment Act 1995	High/High	High	The GSPZ provide an indication of the potential risk of pollution, rather than an absolute measures, and therefore the value assigned should take this into account	1
	Groundwater Source Protection Zone – zones 1 or 2	Available – digital	8	High level of pollution risk	8-9	EC Directive 80/68/EEC EPA 1990 Town and Country Planning Act 1990 Wat. Res. Act 1991 Water Ind. Act 1991 Environment Act 1995	High/High	High	The GSPZ provide an indication of the potential risk of pollution, rather than an absolute measures, and therefore the value assigned should take this into account	1
	Groundwater Source Protection Zone – zone 3	Available – digital	7	Medium level of pollution risk	7-8	EC Directive 80/68/EEC EPA 1990 Town and Country Planning Act 1990 Wat. Res. Act 1991 Water Ind. Act 1991 Environment Act 1995	High/High	High	The GSPZ provide an indication of the potential risk of pollution, rather than an absolute measures, and therefore the value assigned should take this into account	1

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Surface Water	National water quality – grade A and B	Available – digital [DEFRA and Environment Agency]	8	Nationally significant	5-9	Environment Act (1995)	High/High	High	Grading based on chemistry is most relevant to environmental sensitivity	1
	National water quality – grade C and D	Available – digital [DEFRA and Environment Agency]	4	Locally significant	2-7	Environment Act (1995)	High/High	High	Grading based on chemistry is most relevant to environmental sensitivity	1
	Flood zone – high risk	Available – digital [Environment Agency]	8	High significance	7-9	PPG for Development on Floodplains	High/High	High	Local variability and uncertainty makes it difficult to be prescriptive about the level of risk; therefore correctly assessing the site may be problematical	2
	Flood zone – low to medium risk	Available – digital [Environment Agency]	5	Medium significance	4-6	PPG for Development on Floodplains	High/High	High	Local variability and uncertainty makes it difficult to be prescriptive about the level of risk; therefore correctly assessing the site may be problematical	2
	Flood zone – little or no risk	Available – digital [Environment Agency]	1	Minimal significance	1-3	PPG for Development on Floodplains	High/High	High	Local variability and uncertainty makes it difficult to be prescriptive about the level of risk; therefore correctly assessing the site may be problematical	2

KEY:**Priority for project**

1 – High priority (use now if possible)

2 – Medium priority (use in future as data become available)

3 – Low priority (component requires further definition or development and/or data is not yet available in digital format)

Appendix 3 Stakeholders at workshop November 7th 2003

Name	Organisation
John Penny	Aggregate Industries UK Ltd
David Slinger	Derby City Council
Brian Smart	Derbyshire County Council
Roger Caisley	Derbyshire County Council
Mrs Carol Barnet	Derbyshire County Council (for Neil Forrest)
Janine Dickinson	Development Group: Warwickshire County Council
Jasbir Kaur	Development Group: Warwickshire County Council
Steve Marriot	East Midlands Aggregate Working Party
Ian Paterson	English Nature
Michael Smith	GOEM
Alex Bowness	GOEM Rural Affairs Team
Tim Deal	Lafarge Aggregates Ltd/QPA
Adrian Winkley	Lincolnshire County Council
Heather Bingley	Lincolnshire Wildlife Trust
Nigel Weedon	Longcliffe Quarries Ltd & Representative of BAA.
Wayne Allum	Nottinghamshire County Council
Janice Bradley	Nottinghamshire Wildlife Trust
Keith Frost	RMC Aggregates (UK)
Shaun Denny	RMC Aggregates (UK)
Christopher Dobbs	Tarmac Central
David Parker	The Countryside Agency
Roger Bennion	Welsh Assembly
David Diggle	North West Regional Aggregates Working Party
Dennis McBride	Wigan Metropolitan Borough Council
Emma James	TRL Ltd
Mike Bishop	Trent Geoarchaeology Group
Dave Wood	Notts County Council

Total attending = 27