



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.

Full report

A free download of the full report can be obtained from www.mineralsUK.com. Look under legislation in the planning section. You will need to fill out a short registration form to make a download. Make a note of your user ID and password for any document downloads you may wish to make in the future.

The research is ongoing and the Project Leader welcomes any comments or feedback that you may have. Contact details are below.

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