



The development and implementation of mineral safeguarding policies at national and local levels in the United Kingdom



C.E. Wrighton, E.J. Bee*, J.M. Mankelaw

British Geological Survey, Environmental Science Centre, Keyworth, Nottingham NG12 5GG, UK

ARTICLE INFO

Article history:

Received 28 April 2014
Received in revised form
28 May 2014
Accepted 28 May 2014

Keywords:

Mineral
Resources
Safeguarding
Sterilisation
Supply

JEL classification:

Q3
Q38
L70
L780

ABSTRACT

Mineral extraction makes an essential contribution to national development and prosperity. However, unlike many other land uses, the location of sites where mineral extraction can take place is limited. The underlying geology dictates where mineral resources occur and other factors, such as economics, environmental considerations, surface land use or technology can limit access. To ensure a continued, steady and adequate supply of the raw materials needed by society, it is important that mineral resources are not needlessly sterilised by new, non-mineral related, development. Although this principle has been part of the UK planning process since the Town and Country Planning Act was introduced in 1947, the mechanisms and policies in place to support it were, until recently, largely ineffective. A more robust mechanism was, therefore, required.

In recent years, mineral policy has been revised by the UK government and a process known as 'mineral safeguarding' has been introduced and applied through the UK planning system within the devolved jurisdictions. Efforts undertaken so far focus on the safeguarding of onshore construction minerals, industrial minerals and coal largely because of the importance of their indigenous production. However, more recently the concept of mineral safeguarding is being applied to offshore aggregates. This paper describes how mineral safeguarding has been implemented in the UK. A number of case studies highlight different aspects of the mineral safeguarding process which, when applied and enforced, enables mineral resources to be appropriately considered within the land use planning process.

© 2014 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/3.0/>).

Background

Mineral supply in the UK

Minerals are used for construction; in manufacturing, transport, and electricity generation; and in agriculture to increase the productivity of soil (Highley et al., 2004). Between 2002 and 2008 there was a major surge in global demand for raw materials that was driven particularly by emerging economies, such as China, where economic growth was high (EC, 2011). Despite the recent financial downturn experienced by many countries, demand for raw materials, such as mineral resources, is set to increase as attempts are made to push the growth of manufactured goods production and boost economies (Tiess, 2010, 2011). The indigenous supply of mineral resources is, therefore, likely to 'predominate into the foreseeable future' (Brown et al., 2011).

For its small size the UK is fortunate in being well endowed with a great variety of mineral resources, particularly energy, construction and industrial minerals (Fig. 1). The extraction and

use of these resources make a vital contribution to the economy (UKMF, 2009). Bulk minerals, such as aggregates, tend to be indigenously produced and serve local markets. In contrast, indigenously produced industrial minerals such as kaolin, fluorspar and ball clay command higher values than aggregate minerals and are, therefore, traded internationally more easily (Bloodworth et al., 2004). Whilst the UK contributes to meeting its energy needs via domestic production of energy minerals, it is heavily reliant on imports of, in particular, natural gas and coal (BGS, 2011a, 2011b). In addition, the UK is a major importer of refined and semi-refined metals as domestic production is currently limited to small volumes of gold, silver and lead ore (BGS, 2010).

Planning policy for minerals within the UK is, therefore, concerned with maintaining a steady and adequate supply of those minerals which can be indigenously produced and which support UK economic growth, without unacceptable adverse impacts on the natural and historic environment or human health.

Mineral sterilisation

The construction sector is a key enabler of growth right across the UK economy, creating about 2.9 million jobs (circa 10% of the UK workforce) and contributing around £90 billion (6.7% of the

* Corresponding author. Tel.: +44 115 9363044.

E-mail address: eb@bgs.ac.uk (E.J. Bee).

total) to the UK economy each year (GOV.UK, 2013). Ensuring a steady and adequate supply of raw materials is, therefore, important for economic growth. Maintaining this supply can be particularly difficult for mineral resources which are not only finite, but are also confined to specific geological formations and, therefore, geographic locations. Whilst geology restricts their occurrence, other factors, such as economics, environmental considerations, surface land use or technology can limit access. Non-mineral related surface development such as a reservoir, hospital, housing estate or power station, for example, can cause the ‘sterilisation’ of a mineral resource as the development could inhibit the working of the underlying mineral deposit (at least from the surface) (Fig. 2). Sterilisation may occur as a result of development directly overlying the mineral resource, or due to development that is

located adjacent to the resource in some cases where separation zones or blasting stand-off limits are required.

Efforts to protect mineral resources from unnecessary sterilisation are evident in several different jurisdictions around the world; it is a global issue. For example, in Carroll County, Maryland, Mineral Resource Overlay (MRO) zones are imposed on other zoning districts where mining is seen as a compatible activity (e.g. agriculture) and there are known economic mineral resources present (Dunn et al., 1980). Land within the MRO includes areas currently owned by a mineral extraction company or already in use for that purpose and areas for which the underlying mineral is economically viable for recovery, but not necessarily owned by a quarry company. Mineral resources within the MRO are protected from pre-emptive development (New Windsor Mayor and Council, 2007).

Baker and Hendy (2005) evaluated planning frameworks for construction aggregate resources in all Australian States and the Northern Territory (Table 1). They found that the identification and protection of resources was, generally, not well integrated into the planning framework. Where comprehensive resource inventories and well-developed planning and protection policies are present, such as in South Australia, a mechanism exists ‘to ensure that appropriate advice is obtained on development proposals that might sterilise mining activity’ (Baker and Hendy, 2005).

Wagner et al. (2006) provide information on different approaches to mineral planning policies and practices in Europe. They identified that protecting access to mineral resources was “not adequately addressed by most policies” highlighting examples in the Scandinavian Countries, Denmark, Belgium, some Federal States of Germany, some Provinces of Austria and some Regions in France as exceptions. In Austria, for example, a Mineral Resources Plan (Weber, 2012) has been developed which identifies ‘Mineral Protection Zones’ for land use planning purposes. These Mineral Protection Zones were derived through two phases: (1) the systematic identification and evaluation of mineral deposits with regard to their ‘protection-worthiness’; and (2) the elimination of protection conflicts caused by the mineral

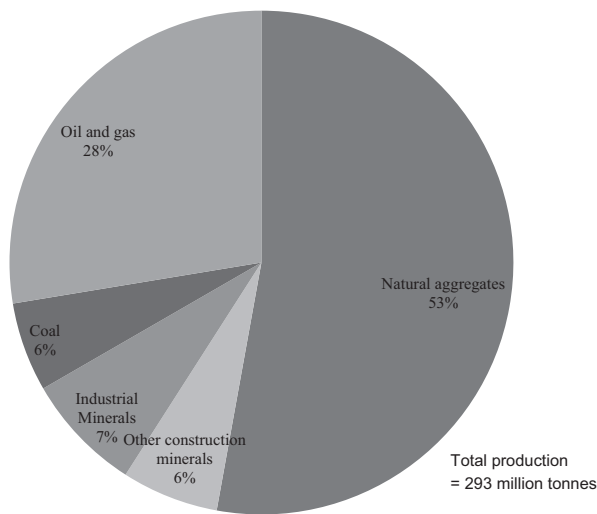


Fig. 1. Mineral production in the United Kingdom in 2012 (onshore and offshore). Source: BGS (in press).

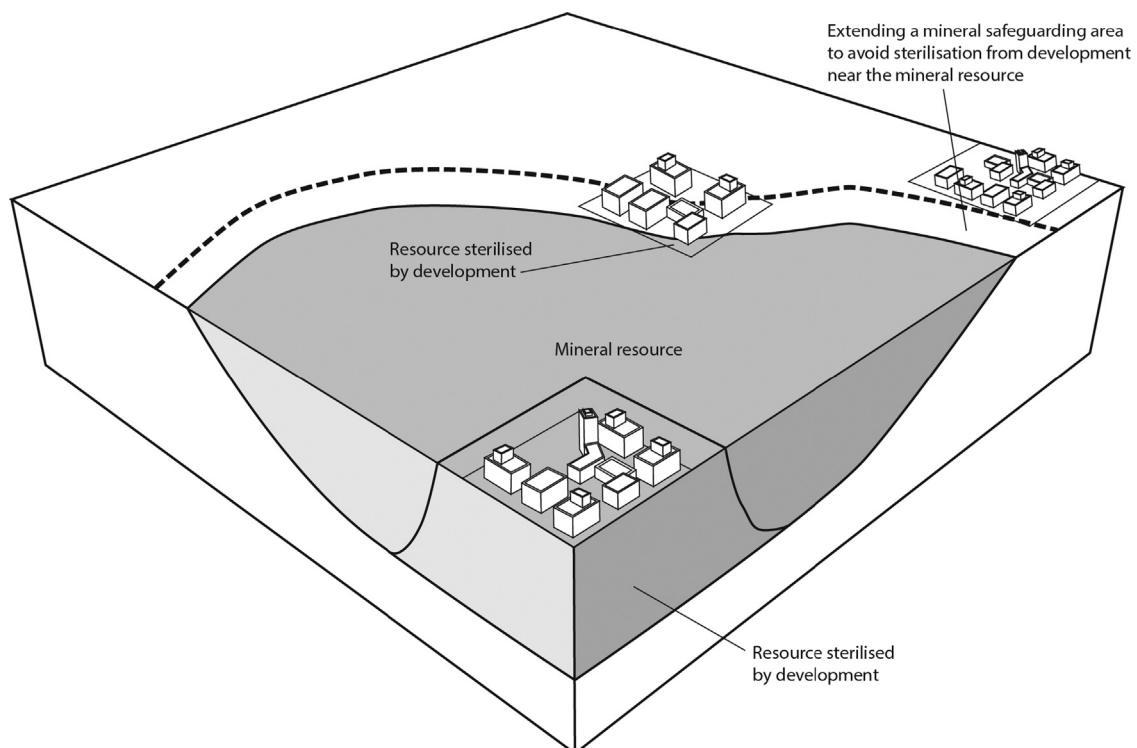


Fig. 2. The sterilisation of near surface mineral resource by surface development.

Table 1

Summary of construction aggregate protection in the States and Territories of Australia (Baker and Hendy, 2005).

State/ Territory	Inventory?	Policy integration
Queensland	Significant resource areas identified as Key Resource Areas (KRAs).	In draft planning policies, these are protected from development that is incompatible with extraction.
New South Wales	An inventory and maps have been compiled.	The plan aims to ensure that consideration is given to the impact of encroaching development on the potential for mineral extraction.
Victoria	Sites for possible future extraction are identified on maps for the Melbourne supply area. There is no inventory for the remainder of the State.	The Extractive Industries Development Act 1995 ensures that any proposed land uses which reduce the availability of stone resources are considered according to Government policies. Overlays of the Melbourne sites for planning schemes are being developed.
Tasmania	Stone resource inventory has been compiled.	No obligation for local authorities to protect the resources.
Northern Territory	Aggregate deposits are mapped out in the Darwin region.	Although a whole of Government approach to the protection of Extractive Industry Interest Areas is proposed, it is not yet mandatory.
South Australia	Resources are inventoried across the state at various scales.	Regulations ensure that appropriate advice is obtained on development that might sterilise mining activity.
Western Australia	Priority Resource Locations (PRLs) are identified.	PRLs are identified where regionally significant resources should be preserved and not constrained by incompatible development.

zones with other factors protected by law (e.g. residential areas, national parks, etc.).

In the UK, the issue of mineral sterilisation is magnified because of its high population density. The ever present needs of society for (among other things) housing, employment, food, raw materials, goods and services, waste disposal and leisure and recreation causes competition for land and the potential for conflict if land use development requirements are not managed. A growing population¹ (ONS, 2013), coupled with a rise in the number of people living alone² (ONS, 2012) is likely to further intensify conflicts over land use.

These conflicting demands are also inextricably linked i.e. as the demand for more housing etc. increases, the demand for mineral extraction to provide the raw materials needed to build houses etc. increases. These raw materials are often bulky, and therefore, importing them becomes prohibitively expensive over long distances meaning that indigenous supply is necessary. With such competition, and without (until relatively recently) a mechanism within the planning system to enable mineral resources to be considered alongside other planning applications for development, sterilisation of minerals from surface development has already taken place.

The UK planning system

Land use planning in the UK is concerned with the determination of land uses according to objectives that are set out in legislation or in a document that has accepted legal standing (e.g. the National Planning Policy Framework in England, see DCLG, 2012). The broad objective of the UK system is to regulate market forces and introduce observance of public interest in decision making (Cullingworth and Nadin, 2006). Land use planning should also contribute to the achievement of sustainable development, a widely accepted United Nations definition of which is ‘*development that meets the needs of the present without compromising the ability of future generations to meet their own needs*’ (DCLG, 2012). Since the introduction of planning legislation in 1909, local planning authorities have had direct power to administer land use control. The role of central government has been to supervise and co-ordinate the way in which these powers and responsibilities are delivered. The planning system is, therefore, essentially organised through two

levels; central government and local government, in the form of local planning authorities (Moore, 2010). In England, unlike the other UK jurisdictions, there is a mixture of single tier (unitary) and two tier local planning authorities (HMRC, Anon). In two tier authorities, the upper tier (usually the county or shire) is responsible for mineral planning. It is essential that the two-tiers have procedures in place to ensure that the lower tier (the district, borough or city council) consults over, amongst other things, mineral matters when making local land use planning decisions.

The central government role in planning is undertaken by the UK Parliament (for England), the Scottish Parliament, the National Assembly for Wales and the Northern Ireland Assembly. This is a result of a transferral of planning powers from the UK Parliament after referendums took place in Scotland and Wales in 1997, and in both parts of Ireland in 1998. Since then, these parliaments and assemblies have had devolved responsibility, to varying degrees, for the production of legislation on planning (Directgov, 2011). The legislation issued by these bodies determines policy and guidance at a national level. The policies and guidance are subsequently implemented by local planning authorities, through documents which set out a plan for development for the authority area and help guide decisions on planning applications.

Local documents that are statutory are known collectively as the ‘*Development Plan*’, and take account of national policies issued by the government. They provide a locally specific set of policies by which development is managed. Those wishing to undertake development on land, other than that for which it is currently used, are required in most cases to submit a planning application to the local planning authority. All decisions on planning applications are made by the local planning authority based on the Development Plan unless there are other overriding planning considerations that relate directly to the use and development of the land (ODPM, 2005a, 2005b). Key planning documents for England, Scotland, Wales and Northern Ireland are shown in Fig. 3.

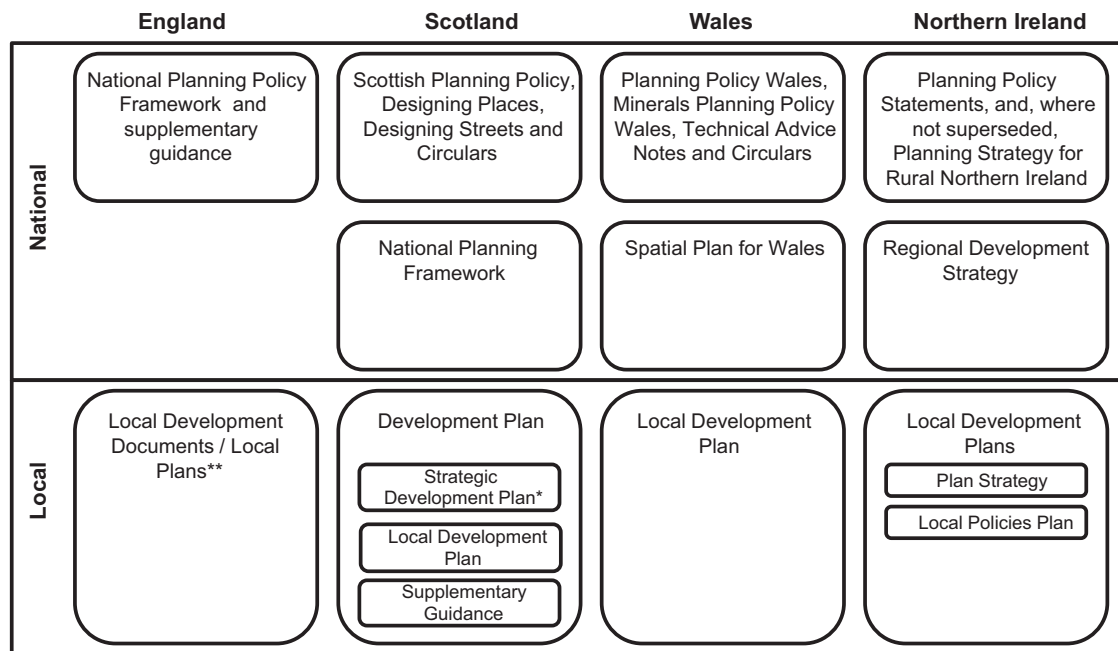
The consideration of minerals is slightly different to the majority of other planning factors that are taken into account in the land use planning system. Minerals are finite and of limited lateral extent so they can only be extracted in places where they naturally occur. These locations, therefore, need to be considered when planning for mineral development, but also for non-mineral development in order to preserve, or ‘safeguard’, potential future sources of supply.

Mineral safeguarding in the UK planning system

The protection of mineral resources from unnecessary sterilisation by other forms of development, regardless of whether or not

¹ The population of the UK was estimated to be 63.7 million in mid-2012, representing a growth of 419,900 (0.7%) in the year to 30 June 2012 (ONS, 2013). This is projected to increase to 73.2 million by mid-2035 (ONS, 2011).

² Of the 26.4 million households in the UK in 2012, 29% consisted of only one person (ONS, 2012).



* Largest city regions only

** These may be separate documents or combined in one plan.

Fig. 3. Key planning documents in the UK based on Cullingworth and Nadin (2006), using information from DCLG (2012), The Town and Country Planning (Local Planning) (England) Regulations (2012), The Scottish Government (2010), The National Assembly for Wales (2011a, 2011b), and DOENI (2004, 2011).

the mineral beneath will ever be extracted, has been included in the planning process in the UK since the 1947 Town and Country Planning Act. The principle has become increasingly more relevant in recent years, as sustainable development issues have become more prominent in the planning process. While the planning processes supported protection of mineral resources in principle, and many local mineral plans included a specific policy to safeguard minerals from unnecessary sterilisation, there have been many cases where mineral resources have been overlooked and have become needlessly sterilised by non-mineral development. This has been attributed to a combination of factors including (McEvoy et al., 2007):

- lack of mechanisms for the protection of mineral resources (i.e. translating the policy into practice);
- poor levels of consultation between planning authorities;
- absence of relevant policies in local plan documents.

Whatever the cause, the process was clearly inefficient and the need for stronger policy and a more effective mechanism to give more clarity to the process was required. Planning authorities generally knew what needed to be done but not how to do it.

In 2006, the UK government published new policy and guidance on 'planning and minerals' and a process known as '*mineral safeguarding*' was incorporated into the land use planning system to prevent unnecessary sterilisation of mineral resources by other forms of development. There has been some divergence in the way that mineral safeguarding is approached in the UK as a consequence of the devolvement of planning policy formulation to the assemblies and parliaments, however, the principle, i.e. to reduce the unnecessary sterilisation of mineral resources, remains the same.

In England, Wales and Scotland, the requirement for mineral safeguarding is addressed through overarching policies set at a national level. Local mineral safeguarding policies are subsequently formulated and adopted by local planning authorities in their Development Plan. Areas of land where these policies apply are generally referred to as '*Mineral Safeguarding Areas*' (MSAs) and

the local safeguarding policies provide detailed instructions about how land use development within such areas is to be managed. Although MSAs do not carry a presumption that the mineral will be extracted, they do highlight where further planning considerations relating to minerals are necessary.

Northern Ireland currently does not have policies specifically concerned with the safeguarding of mineral resources³ (DOENI, 2011), although policy Min 5 in '*Planning Strategy for Rural Northern Ireland*' (DOENI, 1993) concerns the protection of valuable mineral reserves.⁴ However, interest among minerals stakeholders in having more information about the location and quality of mineral resources resulted in the government of Northern Ireland commissioning safeguarding maps to gather the baseline information required to implement a safeguarding mechanism similar to other areas of the UK (DRDNI, 2011; QPANI, 2011). National policies for mineral safeguarding in the UK are detailed in Table 2.

In England, best practice advice has been formulated to assist planning authorities implement mineral safeguarding. It identifies seven steps for the effective implementation of mineral safeguarding (Fig. 4) (Wrighton et al., 2011). These steps are:

- Steps 1–3 provide a methodology for the identification of mineral resources, the definition of MSAs signposts to useful sources of information to assist the process.
- Step 4 centres on how matters related to MSAs should be linked into development plan policies.
- Steps 5–7 address how development management policies and mechanisms should be included to ensure that mineral resources are taken into account appropriately in planning decisions.

³ A mineral resource is a concentration or occurrence of material of intrinsic economic interest in or on the Earth's crust in such form, quality or quantity that there are reasonable prospects for eventual economic extraction.

⁴ A mineral reserve is that part of a mineral resource which can be economically extracted. In the UK this also means that a valid planning permission for extraction exists.

Table 2
National policies on mineral safeguarding in the UK.

	National policy document	Policy
England	National Planning Policy Framework [Section 13, para. 143]. Department for Communities and Local Government (2012) .	'In preparing Local Plans, local planning authorities should: <ul style="list-style-type: none"> ● Define Minerals Safeguarding Areas and adopt appropriate policies in order that known locations of specific minerals resources of local and national importance are not needlessly sterilised by non-mineral development, whilst not creating a presumption that resources defined will be worked; and defined Minerals Consultation Areas based on these Mineral Safeguarding Areas;' ● 'Set out policies to encourage prior extraction of minerals, where practical and environmentally feasible, if it is necessary for non-mineral development to take place;'
Wales	Minerals Planning Policy Wales [para. 13]. The National Assembly for Wales (2000) .	'It is important that access to mineral deposits which society may need is safeguarded. This does not necessarily indicate an acceptance of working, but that the location and quality of the mineral is known, and that the environmental constraints associated with extraction have been considered. Areas to be safeguarded should be identified on proposals maps and policies should protect potential mineral resources from other types of permanent development which would either sterilise them or hinder extraction, or which may hinder extraction in the future as technology changes. The potential for extraction of mineral resources prior to undertaking other forms of development must be considered.'
Scotland	Scottish Planning Policy [para. 226]. Scottish Government (2010) .	'Planning authorities should have regard to the availability, quality, accessibility and requirement for mineral resources in their area when preparing development plans. Authorities should liaise with operators and neighbouring planning authorities and use verifiable sources of information to identify appropriate search areas. These search areas, or where appropriate specific sites, should be identified and safeguarded in development plans and the criteria to be satisfied by development proposals set out. The same safeguarding principles should apply to land allocated for development which is underlain by minerals and where prior extraction of the mineral would be beneficial.....'
Northern Ireland	At present, Northern Ireland does not have safeguarding policies that are concerned with the safeguarding of mineral resources (DOENI, 2011). Policy Min 5 Mineral Reserves in 'Planning Strategy for Rural Northern Ireland' (DOENI, 1993) concerns the protection of mineral reserves.	'Surface development which would prejudice future exploitation of valuable mineral reserves will not be permitted. Where there are mineral reserves, e.g., lignite (brown coal) which are considered to be of particular value to the economy and those reserves have been proven to acceptable standards, surface development which would prejudice their exploitation will not be permitted. Policy Areas in respect of such minerals will, where appropriate, be defined in development plans.'

There is no equivalent advice for Wales or Scotland; however, the principles and issues that are encountered are similar.

The implementation of an effective mineral safeguarding process

Identifying mineral resources and delineating MSAs

The advice provided in England, through [Wrighton et al. \(2011\)](#), and previously by [McEvoy et al. \(2007\)](#), identifies that the first and essential precursor to adopting an effective safeguarding process, is to gather the best available geological and mineral resource information. In the UK, the British Geological Survey (BGS) holds a wealth of geological knowledge, information and data that can be used to determine mineral resources. This information has been used to compile a series of mineral resource maps, and underpinning digital data ([Fig. 5](#)), for each of the devolved governments ([BGS, 2006](#); [Hanniss et al., 2008](#); [Humpage and Bide, 2010](#); [DOENI, 2012](#)). A primary objective of these maps was to produce baseline spatial data on the distribution of mineral resources in a consistent format that can be updated, revised and customised to suit planning needs, including for use in the preparation of mineral Development Plan Documents.

The surface extents of mineral resources as delineated on mineral resource maps can be used as a basis for developing MSAs. The approach taken to define MSAs has differed depending on the policies and practice implemented within the devolved jurisdictions.

For example, in Wales, the Welsh Government defined the MSAs but not the local level policies. Specifically, they commissioned the production of both a minerals map of Wales, detailing the location of all mineral resources within the principality, and a national safeguarding map showing which aggregate mineral resources should be safeguarded through the adoption of a robust safeguarding mechanism. The formulation of the policies to accompany the MSAs for inclusion in the development plan, however, is undertaken at local planning authority level.

In Scotland and England, responsibility for both defining MSAs and the associated policies lies with local planning authorities. In England, local planning authorities are encouraged to follow best practice advice ([Wrighton et al., 2011](#)). Considerations in the advice relate to (i) modifications to the mineral resource maps that result from gaining more in-depth geological data from industry, (ii) the extension of the mineral resource area boundaries (which show the surface extent of the mineral resource) to reflect economic resource that lies beneath surface deposits of earth (overburden) and/ or where the geological formation has a shallow dip and (iii) the extension of boundaries to protect the 'edges' of the resource area if development is permitted adjacent to it ([Fig. 6](#)).

Adopting suitable policies to manage development in MSAs

The inclusion of policies in relevant land use planning documents detailing how mineral safeguarding will be put into practice is fundamental to an effective safeguarding system. Essentially,

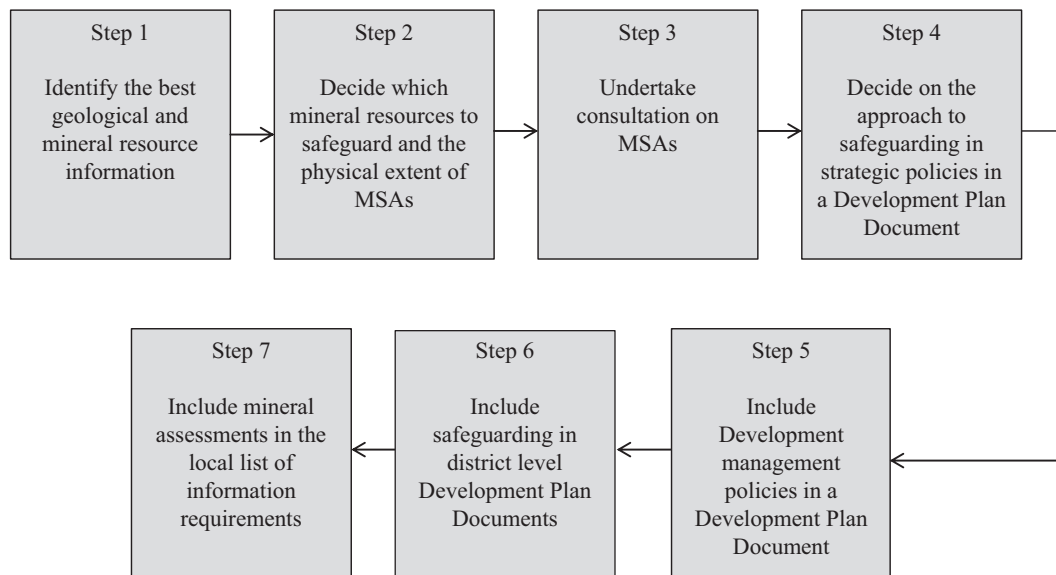


Fig. 4. Seven step methodology for mineral Safeguarding.

Source: Wrighton et al. (2011).

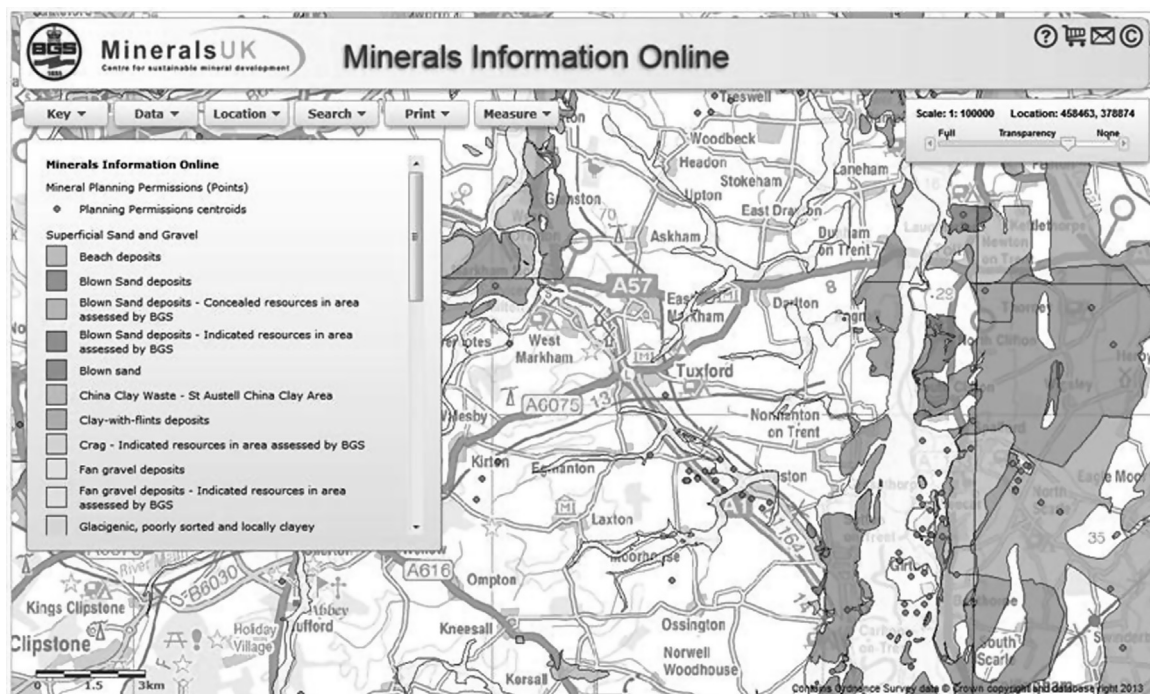


Fig. 5. Image taken from <http://www.bgs.ac.uk/mineralsuk/> showing the location of superficial sand and gravel deposits (BGS © NERC). Image uses topographic data from the Ordnance Survey © Crown Copyright and database right 2014.

these policies should set out how to manage the planning application process for non-mineral development proposed within an MSA. Development management is undertaken in accordance with planning policies (including mineral safeguarding policies) contained in the development plan of an area unless other planning considerations relating to the use and development of the land are overriding (ODPM, 2005a, 2005b). Policies set out in a local planning document can be used to communicate how MSAs will be defined in the development plan. In England, in areas of two-tiered authorities (e.g. Staffordshire County Council, and its districts), mineral planning is conducted at the upper tier (County level). Communication arrangements between the two tiers,

therefore, needs to be set out through policies which detail how development applications within MSAs will be determined and when the lower tier must consult the higher tier to ensure mineral matters are considered. For example, a policy which includes exemption criteria for those planning applications which pose little threat of sterilising a mineral resource, or one which details when there is a requirement for the developer to undertake a site specific mineral assessment, can significantly reduce the need for the lower tier to consult the upper tier. Where development within an MSA is necessary, consideration should also be given to the viability of extracting the mineral before development proceeds (Wrighton et al., 2011). Each of these examples can help

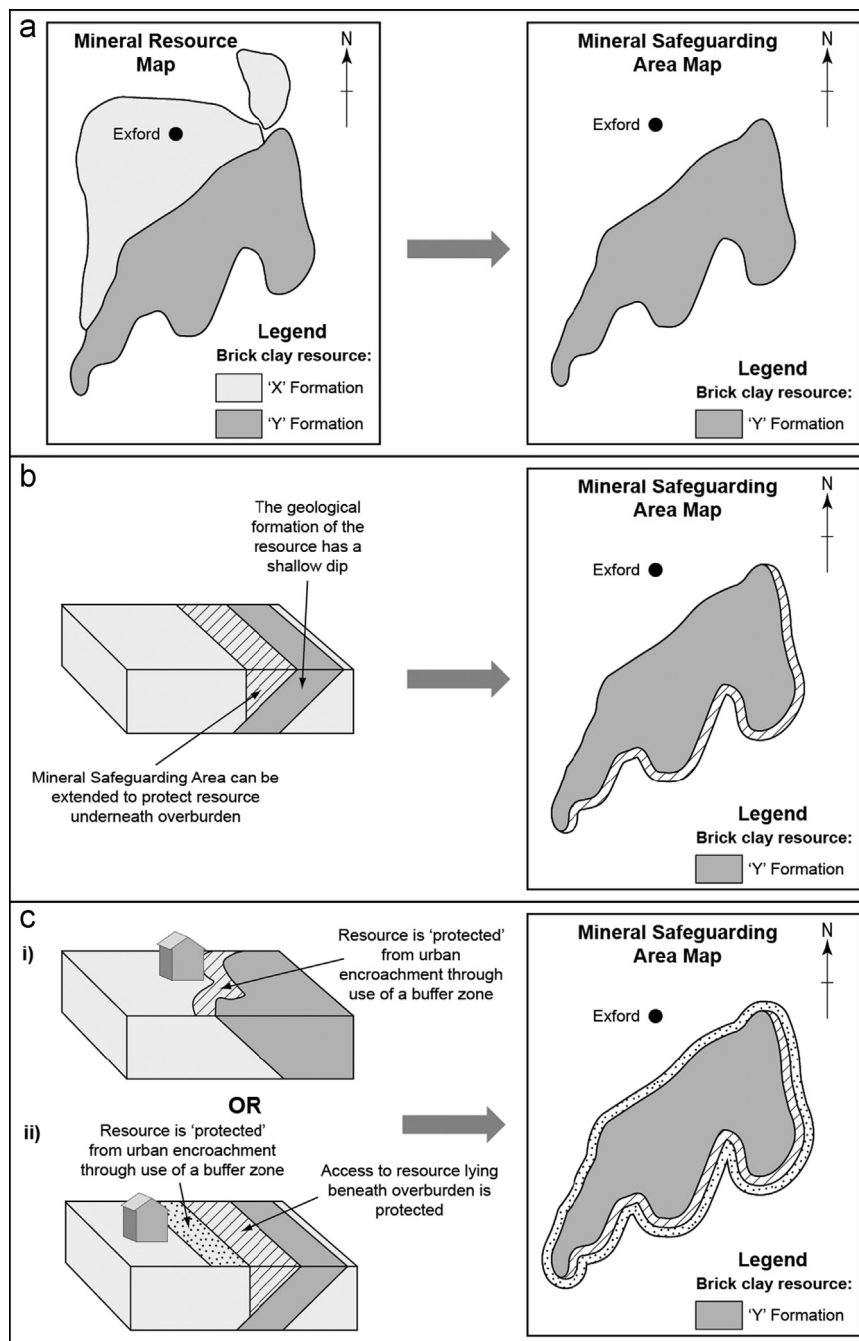


Fig. 6. Considerations for modifications to the mineral resource data after consultation with industry: (a) mineral resource maps may be modified after consultation with industry who may have more in-depth geological data about geological formations; (b) mineral resource areas (which show surface extent of the mineral resource) may be extended to reflect economic resource lying beneath surface deposits (overburden); and (c) mineral resource areas may be extended to protect the 'edges' of the resource if development is permitted adjacent to it.

ensure an effective mineral safeguarding system and are described in more detail below.

UK experience in applying the principles of mineral safeguarding

Planning policy exemption criteria contained to reduce onerous burden on local planning authorities

A common concern expressed by local planning authorities responsible for implementing mineral safeguarding is that the safeguarding process is onerous due to the increased administrative

burden of assessing many planning applications on mineral sterilisation grounds (Wrighton et al., 2011). However, exemption criteria can be used to limit the number of planning applications requiring assessment. These criteria set out instances where planning applications do not have to consider the mineral resource beneath (i.e. where the sterilisation effect on a mineral resource may be negligible). An example of a set of exemption criteria that may be incorporated into planning policy are:

1. applications for householder development;
2. applications for alterations and extensions to existing buildings and for change of use of existing development, unless intensifying activity on site;

3. applications for advertisement consent;
4. applications for reserved matters including subsequent applications after outline consent has been granted;
5. prior notifications (telecoms, forestry, agriculture, demolition);
6. Certificates of Lawfulness of Existing Use or Development (CLEUD) and Certificates of Lawfulness of Proposed Use or Development (CLOPUD);
7. applications for works to trees;
8. applications for temporary planning permission;
9. applications that are in accordance with the development plan where the plan took account of the prevention of unnecessary mineral sterilisation and determined that prior extraction should not be considered when development applications in a mineral safeguarding area came forward;
10. development types already specified in a Development Plan Document (DPD) as exempt from the need for consideration on safeguarding grounds (Wrighton et al., 2011, para. 5.2.7).

The effect of applying such policies can significantly reduce the number of planning applications that would need to be reviewed on mineral safeguarding grounds. This can be demonstrated through an analysis of planning applications from 2007 within two authorities in Nottinghamshire: Bassetlaw District Council (where all applications for the whole year were considered) and Nottingham City Council (where just those applications in June 2007 were considered), shown in Tables 3 and 4 respectively. Applying exemption criteria 1–8 from the list above to Bassetlaw District Council in North Nottinghamshire would reduce the number of planning applications needing to be considered on the grounds of mineral resource sterilisation by 36% (from 33 to 21). Within Nottingham City, where planning applications are generally greater because of its urban nature, the number of planning applications would reduce by 88% (from 181 to 21). In addition, it is unlikely that all of the remaining planning applications would be located on a mineral resource, thus further reducing the number of planning applications that would need to be considered on mineral safeguarding grounds.

Weighing the impact of proposed non-mineral related land use - mineral assessment requirements

When planning applications are made that propose non-mineral development within a MSA, and are not exempt from consideration, a request from the local planning authority that a site-specific mineral assessment be provided is a useful way to ascertain the

Table 3
Planning applications for development in Bassetlaw District Council in Nottinghamshire (whole of 2007).

Number of planning applications received	Number of planning applications exempt if criteria 1–8 are applied	Resulting number of planning applications that would need consideration on mineral safeguarding grounds
33	12	21

Table 4
Development applications Nottingham City Council (month of June, 2007).

Number of planning applications received	Number of planning applications exempt if criteria 1–8 are applied	Resulting number of planning applications that would need consideration on mineral safeguarding grounds
181	160	21

effect of the proposed development on the mineral resource beneath or adjacent to the site of the development (Wrighton et al., 2011). An example where this type of arrangement has been tested is the Felindre to Tirley gas pipeline application (Fig. 7).

The Felindre to Tirley Natural Gas Pipeline Environmental Statement Non-technical Summary (RSK ESNR Group, 2006) states that ‘the route avoids areas of existing mineral extraction and has been routed to minimise the length within the former South Wales coalfield’. However, ‘five sites safeguarded for future sand and gravel extraction within Local and Unitary Development Plans lie within the route corridor. Three of these sites are within the City and County of Swansea Council area and two are within the Brecon Beacons National Park.....Despite careful routeing, the pipeline crosses three of these five mineral resource areas’ (RSK ESNR Environmental Ltd, 2006).

A site specific assessment of the mineral resource and impact of the proposal in terms of sterilisation of the resource was necessary as part of the development application due to Policy R4 in the City and County of Swansea Unitary Development Plan. This policy required ‘development proposals that would affect the working of known potential minerals resources, identified on the proposals map to be accompanied by a full assessment of the potential mineral resource and the impact of the proposal in terms of sterilising the resource’ (City and County of Swansea Unitary Development Plan, 2008). The assessment concluded that in each location, ‘the silt content of the deposits was very high, the deposits were relatively thin and they were, in much of the area, covered with significant thickness of unsuitable material which would be necessary to remove and stockpile to allow aggregate extraction to take place’. None of the three areas were deemed to be ‘be viable under present circumstances’ (RSK ESNR Environmental Ltd, 2006).

The principle demonstrated here is that policy mechanisms enabled mineral resources to be considered in the planning process, leading to a more informed decision about the effects of the proposed development on the mineral resource. Application of mineral safeguarding policy resulted in the requirement for an in-depth assessment of the mineral resource present at each site. Following this assessment the mineral resource was deemed unviable under present circumstances.

Prior extraction policies

The requirement to consider the feasibility for prior extraction of any mineral present at a site proposed for development has existed in land use policy for many years and, as a result, has been incorporated into the mineral safeguarding process. Where a planning application proposes development on a site within a MSA, and a site specific mineral assessment has concluded that the quality and quantity of the mineral present means that it is economically viable to extract without detriment to the subsequent development, then prior extraction should be undertaken. Although logical as a concept, there are few examples which demonstrate this has taken place, despite key reports and land use planning policies which encourage this practice. This is, in part, due to the practical difficulties involved in matching the timing of development with extraction and problems achieving restoration to a satisfactory standard (Pendock, 1984). There are, therefore, a number of factors which need to be taken into account when considering prior extraction:

- The wishes of the land owner who may only want to relinquish the land for surface development.
- The interests of other stakeholders in the subsequent development, who may not want delay.
- The economic practicability and logistics of working the deposit including environmental acceptability.

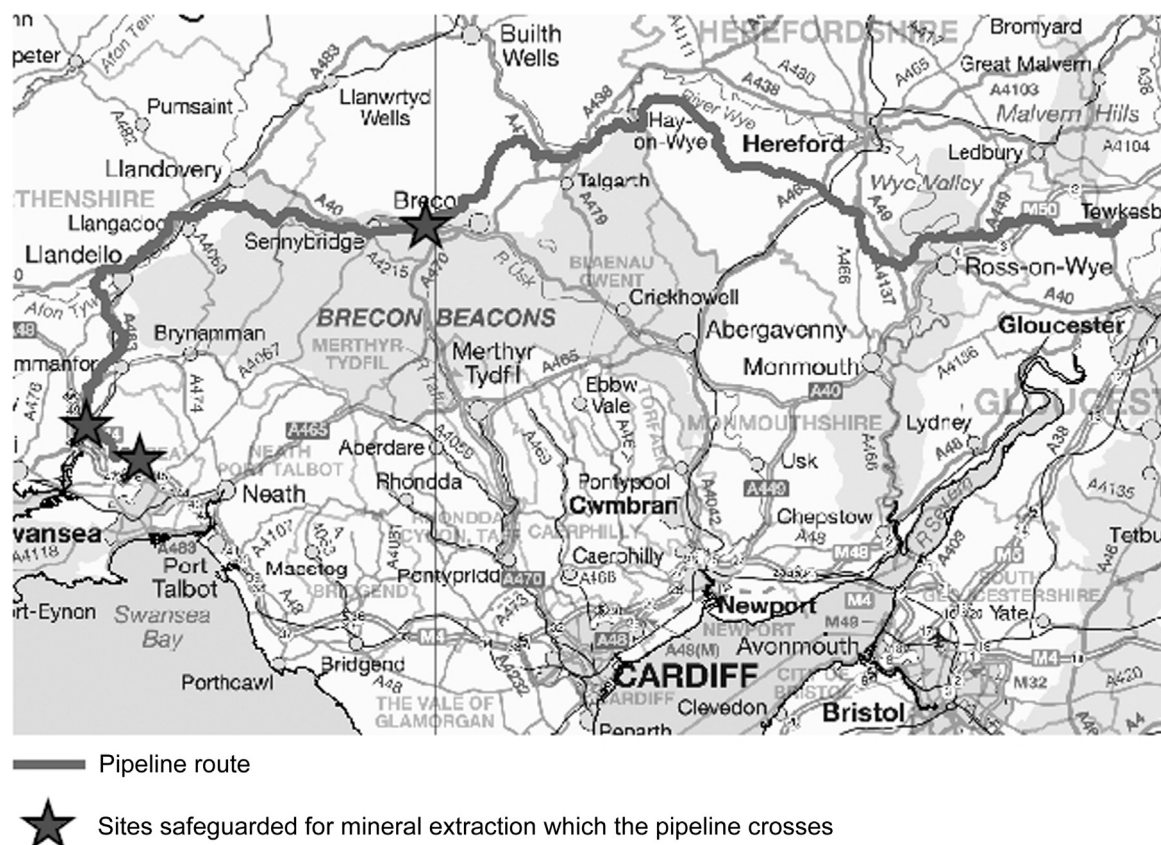


Fig. 7. Felindre to Tirley gas pipeline route showing the 3 locations where sand and gravel resource has, according to the RSK report, been safeguarded within Local and Unitary Development Plans for future sand and gravel extraction. Image uses topographic data from the Ordnance Survey © Crown Copyright and database right 2014. Source: RSK ESNR Environmental Ltd (2006).

- Restoration of the site that leaves the land in a suitable condition for further development within the timescale necessary (Pendock, 1984).

Despite these considerations, there are some examples of operations in the UK that demonstrate the feasibility of prior extraction. Surface coal is an example of a mineral that can be extracted in a short timescale prior to development taking place. In 2006 a planning application for non-mineral development was permitted for 188 residential units, a basement car park with 191 spaces, and a ground floor shop and café at a 0.85 ha site in Barnsley town centre (Barnsley Metropolitan Borough Council, 2005). Prior to the principal development of the land, over a timescale of four weeks, 1600 t of coal were extracted as part of the site preparation works. The process of extracting shallow coal in this way often resembles normal site preparation activities and is unlike what most would associate with mineral extraction activity (Bust, 2011).

Sand is another mineral that may be extracted prior to development taking place. One example is located on the outskirts of Exeter, in an area underlain by Dawlish sandstone. An application to build a business park was submitted in 1990 in an area adjacent to Bishop's Court quarry (Exeter City Council, 1990). The application site was located within a Mineral Consultation Area (MCA)⁵ and Exeter City Council was therefore required to consult Devon

County Council over the mineral matter. Devon County Council stipulated a condition that the underlying sand should be extracted and stored prior to the business park being developed. An application to extract the sand was, therefore, submitted and 0.5 million tonnes of sand were stockpiled, predominantly in a void at an adjacent quarry (Exeter City Council, 1998, 1999). Over the years the majority of the stockpiled sand has subsequently been utilised. However, a portion of the sand is no longer viable for use as its character and processing potential has changed as a result of being stockpiled.

The best practice advice on mineral safeguarding (Wrighton et al., 2011) suggests that details on the viability for prior extraction could accompany planning applications for development within a MSA. The case studies above demonstrate that prior extraction can be feasible, but it needs to be weighed carefully in any planning application for development. Where development is necessary and if prior extraction is possible, it is a method of minimising the impact of mineral sterilisation and also, by lowering the ground level, reducing the subsequent visual and noise impact of the final development.

Conclusions

The planning process in the UK has supported protection of mineral resources in principle since the 1947 Town and Country Planning Act. However, the mechanisms and policies in place to support this principle were deemed to be largely ineffective. Consequently, there have been many cases where mineral resources have been overlooked when considering planning applications for development and have become needlessly sterilised. There was a

⁵ The NPPF and its precursor, Mineral Policy Statement 1 (DCLG, 2006), includes the requirement for the designation of MCAs based on MSAs. These are a mechanism to ensure that the district level planning authority consults with the wider county level planning authority (who are responsible for mineral planning) in two tier authority areas.

clear need for stronger policy, more effective mechanisms and a more detailed and accessible mineral information base to better enable the process. In recent years, the policies and processes pertaining to mineral safeguarding have, therefore, been revisited and revised in a renewed endeavour to develop a robust mineral safeguarding mechanism.

Although the key principles largely remain the same, devolution has led to a divergence in the way that mineral safeguarding has been approached by the various regional parliaments and assemblies in the UK. Mineral safeguarding is generally addressed through policies set out at a national level, with more detailed policies formulated and adopted at the local level which provide detailed instructions about how development within mineral safeguarding areas is to be managed. MSAs are defined at either a national (as with Wales) or local planning level (as in England and Scotland) and their extent based on available mineral resource information and through consultation with stakeholders. Associated mineral safeguarding policies may include:

- *criteria by which planning applications are exempt from consultation on minerals grounds.* This helps to reduce the volume of planning applications for decision makers to consider.
- *the requirement to provide a mineral resource assessment in the planning application when the proposed development occurs in a MSA.* This supporting information may help planning officers determine the impact a proposed development could have on the mineral resource.
- *an assessment of feasibility for prior extraction if non-mineral development is necessary.*

These processes, when combined, should ensure that the need for access to the mineral resource is balanced against the need of the development and potential for the unnecessary sterilisation of mineral resources is minimised. Mineral Safeguarding Areas and associated policies are now being implemented by local planning authorities. It will take time to ascertain whether the safeguarding mechanism achieves the desired result.

Acknowledgements

This paper is published by permission of the Executive Director, British Geological Survey. Advice and assistance from various colleagues at BGS are gratefully acknowledged, in particular Ms. Fiona McEvoy and Mr. Andrew Bloodworth. The research on mineral safeguarding which led to this paper was co-funded by the UK Natural Environment Research Council (NERC) Research Programme, the Aggregates Levy Sustainability Fund and the Welsh Government.

References

- Baker, D., Hendy, B., 2005. Planning for Sustainable Construction Aggregate Resource in Australia. In: Sidwell, Anthony Charles (Ed.), Proceedings of the Queensland University of Technology Research Week International Conference, 4–5 July 2005. Queensland University of Technology, Brisbane, Queensland. Available online at: <http://eprints.qut.edu.au/25674/1/c25674.pdf> (accessed 11.03.14).
- Barnsley Metropolitan Borough Council, 2005. Details for Planning Application B/04/1468/BA. [Online]. <http://applications.barnsley.gov.uk/PlanningExplorer/> (accessed 11.03.14).
- Bloodworth, A.J., Bate, R., Highley, D.E., Child, R.A., 2004. Industrial Minerals: Issues for Planning. British Geological Survey Commissioned Report. CR/04/076N.
- British Geological Survey (BGS), 2014. Minerals Produced in the United Kingdom in 2012. United Kingdom Minerals Yearbook 2013 (in press).
- British Geological Survey (BGS), 2011a. Mineral Planning Factsheet: Coal [Online]. <http://www.bgs.ac.uk/mineralsuk/planning/mineralPlanningFactsheets.html> (accessed 11.03.14).
- British Geological Survey (BGS), 2011b. Mineral Planning Factsheet: Onshore Oil and Gas [Online]. <http://www.bgs.ac.uk/mineralsuk/planning/mineralPlanningFactsheets.html> (accessed 11.03.14).
- British Geological Survey (BGS), 2010. Mineral Planning Factsheet: Metals. [Online]. <http://www.bgs.ac.uk/mineralsuk/planning/mineralPlanningFactsheets.html> (accessed 11.03.14).
- British Geological Survey (BGS), 2006. Mineral Resource Maps in England and parts of South Wales [Online]. <http://www.bgs.ac.uk/mineralsuk/planning/resource.html#MRM> (accessed 11.03.14).
- Brown, T., McEvoy, F., Ward, J., 2011. Aggregates in England – Economic Contribution and Environmental Cost of Indigenous Supply. *Resour. Policy* 36, 295–303.
- Bust, R., 2011. Extract coal before building work. *Miner. Plan.* 137, 8.
- City and County of Swansea Unitary Development Plan, 2008. Resources and Waste Management (Chapter 4). [Online]. <http://www.swansea.gov.uk/media/pdf/jj/o/Chapter4.pdf> (accessed 11.03.14).
- Cullingworth, B., Nadin, V., 2006. *Town and Country Planning in the UK*, 14th ed. Routledge, Oxon p. 588.
- Department for Communities and Local Government (DCLG), 2012. National Planning Policy Framework (NPPF). isbn:978-1-40983413-7. Available online at: <http://www.communities.gov.uk/documents/planningandbuilding/pdf/2116950.pdf> (accessed 11.03.14).
- Department for Communities and Local Government (DCLG), 2006. Minerals Policy Statement 1: Planning and Minerals.
- Department for Regional Development Northern Ireland (DRDNI), 2011. Regional Development Strategy Consultation. [Online]. <http://www.drndi.gov.uk/qpani-2.pdf> (accessed 11.03.14).
- Department of Environment Northern Ireland (DOENI), 2012. Minerals Map of Northern Ireland. [Online]. http://www.planningni.gov.uk/index/advce/advce_apply/advce_special_studies/_minerals_map.htm (accessed 11.03.14).
- Department of the Environment Northern Ireland (DOENI), 2011. Planning Act (Northern Ireland) 2011 Explanatory Notes. [Online]. <http://www.legislation.gov.uk/nia/2011/25/notes/data.pdf> (accessed 11.03.14).
- Department of the Environment Northern Ireland (DOENI), Planning Portal, 2004. Information Leaflet 7: The Hierarchy of Planning Documents and Their Role in Making a Planning Decision. [Online]. http://www.planningni.gov.uk/index/advce/advce_leaflets/leaflet07.htm (accessed 11.03.14).
- Department of the Environment Northern Ireland (DOENI), 1993. A planning strategy for Rural Northern Ireland. [Online]. http://www.planningni.gov.uk/index/policy/policy_publications/rural_strategy.htm (accessed 11.03.14).
- Directgov, 2011. Devolved Government in the UK. [Online]. http://webarchive.nationalarchives.gov.uk/20121015000000/http://www.direct.gov.uk/en/GovernmentCitizensandRights/UKGovernment/DevolvedGovernment/DG_073306.
- Dunn, J.R., Cueman, E.R., Preston, C.M., 1980. Zoning for Mineral in Carroll County, Maryland. In: Proceedings of the Fourteenth Annual Forum on the Geology of Industrial Minerals. N. Y. State Mus. Bull. 436, 3–5.
- European Commission (EC), 2011. Communication from the Commission to the European Parliament, The Council, The European Economic and Social Committee and the Committee of the Regions. Tackling the challenges in commodity markets and on raw materials. [Online]. http://ec.europa.eu/enterprise/policies/raw-materials/files/docs/communication_en.pdf (accessed 11.03.14).
- Exeter City Council, 1999. Details for Planning Application 90/0924/03. [Online]. <http://pub.exeter.gov.uk/scripts/acolnet/planning/AcolnetCGI.gov?ACTION=UNWRAP&RIPNAME=Root.PgeResultDetail&TheSystemkey=30767> (accessed 11.03.14).
- Exeter City Council, 1998. Details for Planning Application 90/0924/02. [Online]. <http://pub.exeter.gov.uk/scripts/acolnet/planning/AcolnetCGI.gov?ACTION=UNWRAP&RIPNAME=Root.PgeResultDetail&TheSystemkey=22759> (accessed 11.03.14).
- Exeter City Council, 1990. Details for Planning Application 90/0924/01. [Online]. <http://pub.exeter.gov.uk/scripts/acolnet/planning/AcolnetCGI.gov?ACTION=UNWRAP&RIPNAME=Root.PgeResultDetail&TheSystemkey=15514> (accessed 11.03.14).
- GOV.UK, 2013. Construction Sector Infographic: Why the Sector is Important to the UK Economy. [Online]. <https://www.gov.uk/government/publications/construction-2025-strategy> (accessed 11.03.14).
- Hannis, S. Bee, E.J., Bloodworth, A., Chetwyn, C., 2008. A Guide to Minerals Information in the Central Belt of Scotland. Scottish Government, 16 pp. (OR/08/011). Available online at: <http://www.scotland.gov.uk/Resource/Doc/224888/0060853.pdf> (accessed 11.03.14).
- Highley, D. E., Chapman, G. R., Bonel, K.A., 2004. Economic Importance of Minerals to the UK. British Geological Survey Commissioned Report, CR/04/070N. 32 pp. Available online at: <http://www.bgs.ac.uk/mineralsuk/planning/economy.html> (accessed 11.03.14).
- HM Revenue & Customs (HMRC), Anon. CTM40860 – Particular bodies: local authorities: definition [Online]. <http://www.hmrc.gov.uk/manuals/ctmanual/ctm40860.htm> (accessed 11.03.14).
- Humpage, A.J., Bide, T.P., 2010. The Mineral Resource Maps of Wales. British Geological Survey Open Report, OR/10/032. 49 pp. Available online at: <http://nora.nerc.ac.uk/11045/> (accessed 11.03.14).
- McEvoy, F.M., Cowley, J., Hobden, K., Bee, E., Hannis, S., 2007. A Guide to Mineral Safeguarding in England. British Geological Survey Open Report. OR/07/035. 36 pp. Available online at: <http://nora.nerc.ac.uk/7508/> (accessed 11.03.14).
- Moore, V., 2010. *Planning Law*. Oxford University Press, Oxford p. 689.
- New Windsor Mayor and Council, 2007. New Windsor Community Comprehensive Plan. [Online]. <http://ccggovernment.carr.org/ccg/compplan/nw2007/plan.pdf> (accessed 11.03.14).
- Office of the Deputy Prime Minister (ODPM), 2005a. Planning Policy Statement 1: Delivering Sustainable Development. Available online at: <http://webarchive.nationalarchives.gov.uk/20120919132719/http://www.communities.gov.uk/documents/planningandbuilding/pdf/planningpolycystatement1.pdf> (accessed 11.03.14).

- Office of the Deputy Prime Minister (ODPM), 2005b. The Planning System: General Principles. [Online] (<http://www.staffordshire.gov.uk/Resources/Documents/t/ThePlanningSystemGeneralPrinciplesid1143816.pdf>) (accessed 11.03.14).
- Office for National Statistics, 2013. Statistical Bulletin. Annual Mid-year Population Estimates, 2011 and 2012. [Online] (http://www.ons.gov.uk/ons/dcp171778_320900.pdf) (accessed 11.03.14).
- Office for National Statistics, 2012. Statistical Bulletin. Families and Households, 2012. [Online] (http://www.ons.gov.uk/ons/dcp171778_284823.pdf) (accessed 11.03.14).
- Office for National Statistics, (2011). National Population Projections, 2010-Based Statistical Bulletin. [Online] (http://www.ons.gov.uk/ons/dcp171778_235886.pdf) (accessed 31.03.14).
- Pendock, M.J., 1984. Sterilisation and Safeguarding Mineral Deposits in Britain. *Miner. Environ.* 6, 23–41.
- Quarry Products Association Northern Ireland (QPANI), 2011. Northern Ireland key issues [Online]. Available from: (<http://www.qpani.org/keyissuesplanning02.htm>) (accessed 11.03.14).
- RSK ESNR Group, 2006. Felindre to Tirley Natural Gas Pipeline Environmental Statement. Non-Technical Summary [Online] (<http://www.nationalgrid.com/NR/rdonlyres/9775222B-BC21-41A8-9801-FC1A2C349E72/9406/3275FelinTirNTSFinalPDF.pdf>) (accessed 11.03.14).
- RSK ESNR Environmental Ltd, 2006. Felindre to Tirley Natural Gas Pipeline Environmental Statement.
- Scottish Government, 2010. Scottish Planning Policy [Online] (<http://www.scotland.gov.uk/Resource/Doc/300760/0093908.pdf>) (accessed 11.03.14).
- The National Assembly for Wales, 2011a. The Planning Series 1 – National Planning Policy in Wales. Quick Guide. [Online]. (<http://www.assemblywales.org/qg10-0006.pdf>) (accessed 11.03.14).
- The National Assembly for Wales, 2011b. The Planning Series 2 – Local Planning Policy in Wales. Quick Guide. [Online] (<http://www.assemblywales.org/qg10-0005.pdf>) (accessed 11.03.14).
- The National Assembly for Wales, 2000. Minerals Planning Policy Wales (MPPW). isbn:0750425946. Available online at: (<http://wales.gov.uk/docs/desh/policy/120522planningmineralpolicyen.pdf>) (accessed 11.03.14).
- The Town and Country Planning (Local Planning) (England) Regulations 2012 (SI 2012/767). [Online] (<http://www.legislation.gov.uk/uksi/2012/767/contents/made>) (accessed 11.03.14).
- Tiess, G., 2010. Minerals Policy in Europe: Some Recent Developments. *Resour. Policy* 35, 190–198.
- Tiess, G., 2011. *Legal Basics of Mineral Policy in Europe: An Overview of 40 Countries*. Springer, Wien, New York, Germany, isbn:978-3-211-89002-8.
- UKMF 2009 UK Minerals Forum – Shaping the UK Minerals Policy. [Online] (<http://www.bgs.ac.uk/ukmf/downloads/Shaping%20UK%20Minerals%20Policy.pdf>) (accessed 11.03.14).
- Wagner, H., Tiess, G., Solar, S., Nielsen, K., 2006. Minerals Planning Policies in Europe. *RMZ – Mater. Geoenviron.* 52, 607–620. Available online at: (http://www.rmz-mg.com/letniki/rmz52/rmz52_0607-0620.pdf) (accessed 11.03.14).
- Weber, L., 2012. (Der Österreichische Rohstoffplan - Archive für Lagerstättenforschung, 26, 264 S, Geol B-A, Wien) The Austrian Mineral Resource Plan. *Arch. Lagerstättenforsch. Geol. Bundesans. Wien* 26, 264S. isbn:978-3-85316-065-7. Available online at: (<http://www.en.bmwfw.gv.at/Energy/Seiten/TheAustrianMineralResourcesPlan.aspx>) (accessed 11.03.14).
- Wrighton, C.E., McEvoy, F.M., Bust, R., 2011. Mineral Safeguarding in England: Good Practice Advice. British Geological Survey Open Report OR/11/046. 53 pp. Available online at: (<http://nora.nerc.ac.uk/17446/1/OR11046.pdf>) (accessed 11.03.14).