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Llywodraeth Cymru
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Aggregates Safeguarding Maps of Wales

Minerals and Waste

Mineral Resources and Policy Team

Geology and Landscape Wales

Commissioned Report CR/12/039



BRITISH GEOLOGICAL SURVEY

MINERALS RESOURCES AND POLICY TEAM

COMMISSIONED REPORT CR/12/039

Aggregates Safeguarding Maps of Wales

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Map

1:100 000 scale, Aggregate Safeguarding Maps of Wales

Front cover

Top left – Vaynor Quarry.
Top right – slate waste.
Bottom left – Penrhyn Quarry.
Bottom right – Argoed Quarry.

Bibliographical reference

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Foreword

This is a short descriptive summary to accompany the six 1:100 000 scale aggregates safeguarding maps which have been published as part of the Mineral Maps of Wales project, co-funded by the Welsh Government administered Aggregates Levy Sustainability Fund for Wales and the British Geological Survey Mineral Resources and Policy Team.

As mineral resources are finite and are not evenly distributed, knowledge about their whereabouts is essential for making effective and sustainable planning decisions that consider the needs of future generations. Access to mineral resources can be prevented or restricted (sterilised) by non-mineral development and the process of ‘mineral safeguarding’ ensures that this does not occur unnecessarily when planning applications are determined. An effective safeguarding system requires the adoption of ‘mineral safeguarding areas’ and the adoption of suitable policies through which development is managed in these areas.

The aggregates safeguarding maps have been compiled to assist Mineral Planning Authorities (MPAs) in the delineation of aggregates safeguarding areas in Local Development Plans. The formulation of associated policies through which aggregates safeguarding areas take effect were beyond the remit of this study.

The Mineral Maps of Wales Project has been overseen by a Steering Group consisting of members from the Welsh Government, Mineral Planning Authorities, industry and environmental agencies.

Acknowledgements

The authors would like to thank the steering group for their advice and support (listed in Appendix 1), together with the attendees of a consultation event which was held to inform the project in the early stages (listed in Appendix 2). Dr D. Elis-Gruffydd is thanked for providing the technical Welsh translation included on the maps.

A large number of individuals in the British Geological Survey have contributed to the project. The authors would particularly like to thank Joseph Mankelow and Andrew Bloodworth for reviewing the maps and this report, and administrators and facilitators from the British Geological Survey for their contributions to the consultation event.

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1 Introduction

Minerals are essential for the development of a modern economy, but mineral resources are finite and can only be worked where they occur. As their extraction is subject to a number of constraints, it is essential that society uses minerals in the most efficient and sustainable manner. Identifying the distribution of known mineral resources in Wales, identifying areas where other forms of development might prohibit or restrict access to them, and adopting development plan policies that aid management of development in those areas, allows minerals to be considered with other land-use information when applications for development are determined. This process is commonly known as ‘mineral safeguarding’.

The British Geological Survey (BGS) has undertaken a commission through its Mineral Resources and Policy team, led from the BGS Cardiff office, to prepare for the Welsh Government a safeguarding map for aggregate minerals which covers the whole of the Principality of Wales. This work was completed in 2012 and the series of six digitally generated maps at a scale of 1:100 000 are now available to download from the BGS www.MineralsUK.com website. These maps cover the areas of the 25 Unitary and Mineral Planning Authorities (MPAs) of Wales.

Wales contains a wide range of minerals, many of which have been exploited since historical times. There are still significant energy resources in the coalfields of South and North-east Wales, limestones and sandstones across Wales with a range of aggregate and industrial uses and significant deposits of sand, gravel and clay. These resources are important national assets and adequate and steady supplies are needed to maintain current and future economic development. The publication of the aggregates safeguarding maps should enable MPAs to delineate aggregates safeguarding areas (ASAs) in their development plans and adopt suitable policies for managing development in these areas so that unnecessary sterilisation of identified resources does not take place.

2 What is a mineral resource

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 and quantity that there are reasonable prospects for eventual economic extraction.

Generally, a mineral resource is known to exist within the boundaries outlined by geological mapping. This may be supplemented by more detailed geological data. The Mineral Resource Map of Wales developed by the BGS in 2010 (Humpage and Bide 2010), and the complementary six 1:100 000 scale maps show the surface extent of mineral resources. These are mostly inferred from available geological information and they generally have not been evaluated by drilling or by other sampling methods on any systematic basis. The mineral resources defined on the maps show the areas within which potentially workable minerals may occur. What may be of economic interest can change over time, and is dependent upon a number of factors, such as mineral markets and extraction technology.

The Mineral Resource Map of Wales thus shows all minerals which geologically have resource potential in Wales, irrespective of extent of the deposit and proximity to markets or other economic factors. These published resource maps provide the basic information in order to begin the process of delineating mineral safeguarding areas.

3 How the aggregates safeguarding maps have been produced

The production of the national aggregates safeguarding map was overseen by the same steering group that advised the National Minerals Map of Wales. This steering group comprised members from the Welsh Government, Mineral Planning Authorities, industry and environmental agencies. The latter stages of the project were also informed by consultation with wider stakeholders, who had the chance to view and comment on a draft safeguarding map for the pilot area of Pembrokeshire (County Council and National Park Authority MPA areas) before the safeguarding methodology was finalised and applied to the rest of Wales.

The final methodology for producing ASAs can be divided into four distinct steps:

- Step 1: Selection of the mineral resources suitable for natural aggregate that should be safeguarded, from the Minerals Map of Wales dataset.
- Step 2: Categorisation of aggregate resources into nationally, regionally and locally important minerals.
- Step 3: Application of a safeguarding margin to the aggregate resources dataset.
- Step 4: Removal of safeguarding areas in urban areas.

3.1 STEP 1: SELECTION OF THE AGGREGATE MINERAL RESOURCES THAT SHOULD BE SAFEGUARDED, FROM THE MINERALS MAP OF WALES DATASET

As the commission for the study included the identification of ASAs only, no other mineral resources are included in the Aggregates Safeguarding Map of Wales. However, the methodology that has been applied may be useful for the delineation of other mineral safeguarding areas.

All data for mineral resources that have the potential for use as aggregate were selected from the National Minerals Map of Wales dataset. This included minerals such as high purity limestone and silica sand, although it is likely that, in the interests of ensuring the prudent use of natural resources, these would be extracted and utilised for higher value, industrial end uses. The aggregate resources that are safeguarded are, therefore:

- Sand and gravel
- Limestone (including high purity limestone)
- Sandstone (including high purity, quartzitic sandstone)
- Igneous rock
- Slate

3.2 STEP 2: CATEGORISATION OF AGGREGATE RESOURCES INTO NATIONALLY, REGIONALLY AND LOCALLY IMPORTANT MINERALS

Aggregate is generally a high volume, low value product, so is not usually transported far from the source of extraction. There are exceptions to this, however, as in some areas there may be a shortage of a mineral resource as a function of the geological setting of the area. This has implications for the relative importance of different minerals in a locality. For example, because there is a shortage of resources suitable for high specification aggregates in parts of the UK, the marketable distance of such aggregate may be greater than just providing a local supply. Also,

where there are limited resources of a particular type (such as higher grade mudstones), lower grade resources (such as lower grade mudstones) may be of greater importance to that locality than in other localities.

In order to indicate the relative importance that can be attributed to particular mineral resources in policy and practice, tiered aggregates safeguarding categories have been prepared. The benefit of having safeguarding categories is that they can inform the drafting of mineral safeguarding policies and will give some idea of the relative importance of specific mineral resource to the locality, region and nation when assessing other planning factors. Currently, national safeguarding policy in Minerals Planning Policy Wales (MPPW) does not include directions on how to use a categorised system. However, publication of the information should allow MPAs to progress in identifying safeguarding areas in Development Plans and develop appropriate protective policies.

Category One resources are those resources that have a national importance in Wales (and in some cases in the UK) and have been defined using the information provided in the two Regional Technical Statements (RTSs) produced by the Aggregates Working Parties for North and for South Wales and national policies and guidance in MPPW and Minerals Technical Advice Note 1: Aggregates (MTAN1). This category includes those minerals that are specifically referenced in policy as being of limited occurrence and therefore particularly susceptible to sterilisation in the region, and those particularly economically important due to their high quality and / or limited occurrence across the UK. Table 1 summarises the policies and justification for the categorisation of these resources.

Category Two resources have been selected as those resources that are considered to be of more than local importance and may have some regional significance, but are of less importance nationally than those identified for Category One. High purity, quartzitic sandstone (silica sand) falls into this category for the reason that it is a lower quality aggregate due to its hardness. Table 2 summarises the policies and justification for the categorisation of these resources.

Category Three resources are not shown on the map face, but are provided in an accompanying GIS. This category represents those resources that may be important for supply locally in some areas, but not in others as better quality materials may be available for use. One example of this is in Ceredigion where low grade mudstones are worked, but in other areas similar deposits are not worked due to the availability of suitable alternatives. The mineral resources that qualify for these categories were selected by BGS and technical experts in the steering group as detailed knowledge of the local industry is necessary to make these judgements. Table 2 includes the justification for the categorisation of these resources.

Table 1: Advice, policies, and justification for Category 1 resources

Category 1 resource	Advice and policy (Regional Technical Statements, Mineral Planning Policy Wales and Minerals Technical Advice Note 1)	Justification and approach to safeguarding
Sand and Gravel resources (blown sand, glaciofluvial and river terrace sand and gravel deposits).	<p><i>'Sand and gravel...</i></p> <p><i>The current pattern of land-based extraction of sand and gravel is unlikely to change...However resources must be safeguarded for possible use by future generations...</i></p> <p><i>...In South Wales there is a unique dependence on marine aggregates to provide sand and gravel...</i></p> <p><i>...There remains uncertainty about future aggregates dredging continuing to supply the South Wales construction market...</i></p> <p><i>...While it is recognised, therefore, that land based extraction is not considered appropriate at the present time, those resources must be safeguarded for potential use by future generations in development plans now in view of their relatively limited regional availability.'</i> (para 32, MTAN1).</p>	The policy reflects the importance of safeguarding and the limited extent of sand and gravel resources across Wales. If marine sources cannot continue to supply the construction market, access to land based resources will become vital. However, the quality of sand and gravel resources can vary, and only the higher quality resources are identified as Category 1 resources.
Sandstone, igneous and limestone resources suitable for High Specification Aggregate (HSA).	<p><i>'Most exports are of high specification aggregates (HSA) to England in the form of Pennant Sandstone as well as ancient rocks (grits and igneous rocks) on the Welsh border. As South Wales is an important source of these materials at a UK level, special provision is made for this trade in MTANI.'</i> (page 9, South Wales RTS).</p> <p><i>'MTANI acknowledges (para 42) that (mainly in the case of South Wales) special consideration may need to be given to provision of some aggregates such as high PSV roadstone (HSA), which are in short supply in many parts of the UK, but that for most materials, the proximity principle should apply'</i> (page 47, South Wales RTS; page 42 North Wales RTS).</p> <p><i>'Finally, MTAN 1 (para 42) indicates that "the Pennant Sandstone outcrop of South Wales has been identified as one of the main prospects for development and the UK importance of the resource should be</i></p>	<p><i>Sandstone, igneous and limestone resources</i></p> <p>All sandstone, igneous and limestone resources that are suitable for use as HSA are shown as Category 1 resources. This is due to the policies identified in this table which indicate the relative scarcity of low skid resistant roadstone at a national level. Although North Wales does not have the same reputation for HSA products as South Wales, studies have shown that there are quarries in the region that are within the highest quality grouping (page 36, North Wales RTS).</p> <p><i>High purity limestone</i></p> <p>It is clear from the RTS's that the importance of high purity limestone is given great weight, but it should be noted that this is focussed around non-aggregate uses. MPPW indicates that in most quarries, high purity limestone is extracted jointly with</p>

Category 1 resource	Advice and policy (Regional Technical Statements, Mineral Planning Policy Wales and Minerals Technical Advice Note 1)	Justification and approach to safeguarding
	<p><i>recognised by relevant planning authorities”</i>” (page 57, South Wales RTS).</p> <p><i>“However, certain aggregates have limited availability geologically, such as high quality aggregates for road construction that have the ability to provide particular levels of surface skidding resistance and durability. These are relatively plentiful in Wales but unavailable in some parts of the UK. The Pennant Sandstone outcrop in South Wales has been identified as one of the main prospects for development and the UK importance of the resource should be recognised by relevant planning authorities. Such material is a special case that may well justify transportation over long distances because of the national need for the provision of the specific type of material with limited availability.”</i> (para 42, MTAN1).</p> <p><i>‘The issue of safeguarding deposits [of limestone suitable for non aggregate uses] is of even greater significance than in the case of aggregates...</i></p> <p><i>...Bearing in mind the paucity of high quality limestone resources, locally and nationally, and the environmental/economic necessity to use stone of the highest chemical purity, it is advised that the resources should be carefully assessed and rigorously safeguarded in LDPs...’</i> (page 57, South Wales RTS; page 48 North Wales RTS).</p> <p><i>‘In most quarries, high purity limestone is extracted jointly with limestone for aggregate use and it can be difficult to differentiate between the material produced for the two different markets until after processing has been completed’</i> (para 81, MPPW).</p>	<p>limestone for aggregate use and it can be difficult to differentiate between the material produced for the two different markets until after processing has been completed. The distinction that can be made from the National Minerals Map of Wales resources dataset is maintained on the aggregates safeguarding map face by stippling the high purity limestone. It is likely that these resources should in the future be used for industrial and not aggregate purposes and differentiation on the aggregate safeguarding map allows the distinction to be drawn.</p>

Table 2: Justification for Category 2 and 3 resources

Category 2 resource	Justification
Sand and Gravel resources (glacigenic, poorly sorted and locally clayey sand and gravel deposits).	The MTAN1 policy specified in Table 1 of this document reflects the importance of safeguarding and the limited extent of sand and gravel resources across Wales. If marine sources cannot continue to supply the construction market, access to land based resources will become vital. However, the quality of sand and gravel resources can vary, and only the higher quality resources are identified as Category 1. Due to the limited availability, even the lower quality resources are of importance and may be of more than local importance, so have been identified as Category 2 resources.
Sandstone resources other than those suitable for HSA.	<p>‘Other sandstone resources’ occur throughout Wales and have the potential to be used for low grade general aggregate purposes. There is extensive evidence of these resources being worked in the past, and relatively small sandstone bodies are currently in production, supplying low grade bulk and decorative aggregate which may be of more than local importance, so have been identified as Category 2 aggregate resources.</p> <p>With regards to silica sand / rock, MPPW states that it tends to be used for low grade general aggregate purposes. The RTS’s state that this resource is not worked at all at present although the North Wales RTS does state that it should be safeguarded.</p>
Igneous resources other than those suitable for HSA.	There are extensive tracts of these resources, particularly in North-west Wales, many of which have been worked in the past for general low grade aggregate purposes. Igneous rocks are highly variable (chemical composition, coarseness etc) and even lower quality resources may be of more than local importance, or meet certain end-user requirements, so have been identified as Category 2 aggregate resources
Limestone resources other than those suitable for HSA.	‘Other limestone resources’ are located across Wales and some, such as Silurian age reef limestone complexes in the Welsh borderlands continue to be important sources of aggregate. As the production is of more than local importance, these resources have been identified as Category 2 aggregate resources.
Slate.	Slate covers extensive tracts in the National Minerals Map of Wales. On the safeguarding map, high grade slate is shown as a Category 2 resource, as it is used for aggregate in many areas, but low grade mudstones are not shown. As the low grade mudstones are worked in some areas, such as Ceredigion, the GIS retains the spatial information so that safeguarding areas may be applied by MPAs if deemed appropriate as a Category 3 aggregate safeguarding area.

3.3 STEP 3: APPLICATION OF A SAFEGUARDING MARGIN TO THE AGGREGATE RESOURCES DATASET

There are several factors which need to be considered in order that the full extent of the mineral resource is protected from unnecessary sterilisation. These can be grouped into the broad headings of data considerations and amenity considerations.

- *Data considerations*

The resource area boundaries as presented in the National Minerals Map of Wales are derived from BGS DigMap50 (nominally 1:50 000 scale) data. Polygon boundaries at this scale are simplified from data collected during geological surveying, often undertaken within Wales at the 1:10 000 or 1:25 000 scale. Additional data from a variety of county or regional reports from public bodies and commercial organisations was also considered and the data incorporated. As a consequence, any mapped polygon boundary has a degree of uncertainty attached.

Furthermore, as the resource maps show only the surface extent of the mineral resource as derived from the geological mapping, extensive resource may also be available and potentially viable under either superficial deposits or bedrock overburden, further extending the resource polygon from that as mapped.

- *Amenity considerations*

In addition to sterilising mineral that is immediately beneath the site, development has potential also to sterilise mineral that is adjacent to it. This is because any subsequent application for working of that mineral after an adjacent development has been established would need to take into account the amenity of the inhabitants and any nuisance as a result of the operations.

MPPW (paragraph 40) recognises the conflict between mineral workings and other land uses due to noise, dust and vibration, suggesting 'buffer zones' as an option around permitted and proposed mineral workings. In this zone, development proposals should be resisted for both extraction and sensitive development in order to reduce conflicts of land use. MTAN1 uses the term 'separation distances' and states that they should be a minimum of 100 metres for those resources that do not require blasting and 200 metres for hard rock resources, unless there are clear and justifiable reasons given.

Consistent with the separation distances in MTAN1, safeguarding areas for the national aggregate safeguarding map have been extended beyond that of the mapped mineral resource, generating a "***safeguarding margin***". This minimises the risk of sterilisation of mineral on the 'edges' of the mapped resource due to amenity considerations, and also makes allowance for any inaccuracy of mapped geological boundaries and resources that extend beneath overburden (Figure 1). All superficial aggregate resources were extended by 100 metres, and all bedrock resources extended by 200 metres to create ASAs.

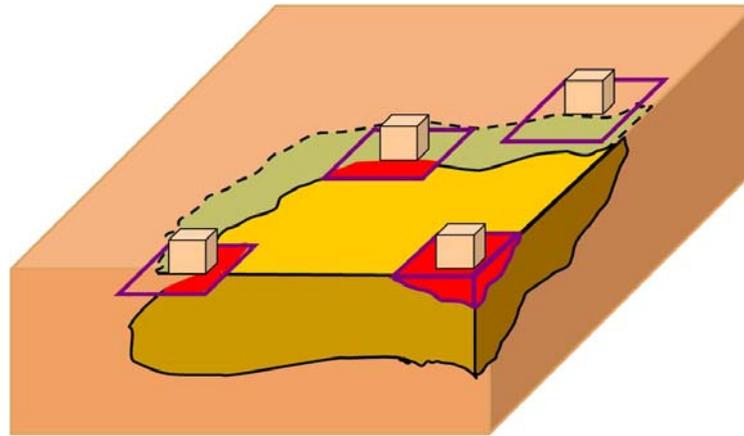


Figure 1: Diagram showing how development in close proximity can sterilise (red) part of a mineral resource (shown in yellow) whereas application of a 'safeguarding margin' (pale green) provides for protection of the resource in its entirety.

3.4 STEP 4: REMOVAL OF SAFEGUARDING AREAS IN URBAN AREAS

Increased population densities and concentration of services in urban areas tend to create high volumes of development applications to planning authorities. Some of these applications (such as those from householders) are unlikely to cause significant mineral sterilisation. Without suitable policies to manage development, there is a risk that identifying safeguarding areas beneath urban areas will create strain on MPA resources. In some areas, policies for prior extraction in re-development sites are already in place to deal with mineral resource sustainability issues within urban areas. An Ordnance Survey dataset (VectorMap Local) was chosen to define the urban areas where ASAs are excluded as it was considered appropriate to the scale of the maps and the level of urban detail shown.

Although the VectorMap Local urban boundaries are fit for purpose regarding the maps, it may be appropriate to refine the urban boundaries for local investigation or derived policies at a local scale.

4 Presentation of data in map format

The Aggregate Safeguarding Map of Wales comprises six map sheets presented at a scale of 1: 100 000. The map production techniques used for the safeguarding maps are that superficial deposits (sand and gravel) overlies bedrock, and where there are two coincident bedrock aggregate categories, Category 1 safeguarding areas overlies Category 2 safeguarding areas. Where Category 1 bedrock ASAs underlie superficial deposit ASAs, a solid line shows the boundary (Figure 2).

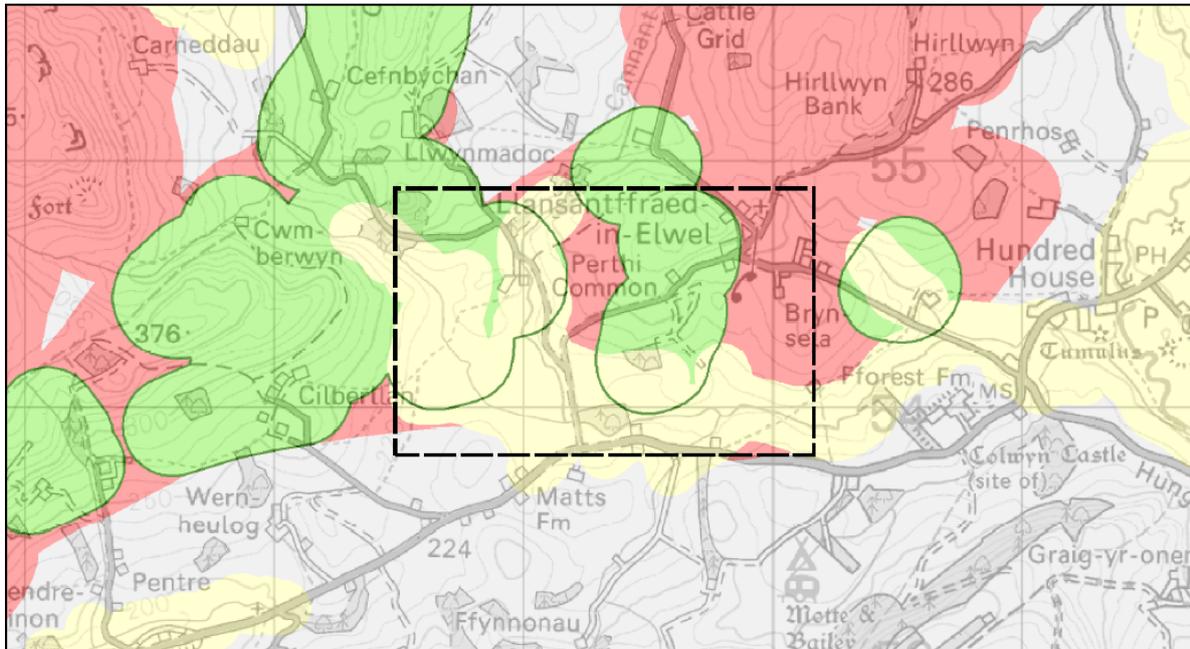


Figure 2: Map extract showing how superficial deposit safeguarding areas (yellow) overlie bedrock, and where there are two coincident bedrock aggregate categories, Category 1 safeguarding areas (green) overlie Category 2 (red). Where Category 1 bedrock safeguarding areas underlie superficial deposits, a solid line depicts the outline of the safeguarding area.

5 Conclusion

The data produced by the National Minerals Map and Aggregate Safeguarding Map of Wales project assists national and local government by depicting the location and extent of mineral resources throughout Wales and highlighting aggregate mineral resources that should be safeguarded. The data provides a comprehensive, relevant and accessible information base, enabling mineral planning authorities in Wales to make the best and most sustainable use of mineral resources. By integrating mineral safeguarding areas into the planning process, unnecessary conflict with other land use and sterilisation of resources can be avoided, and mineral resources for future generations can be secured.

6 Further reading

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Appendix 2 Consultation event delegate list

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Gareth Owen	Countryside Council for Wales
Gary Nancarrow	Flintshire County Council
Graham Dorrington	Ceredigion County Council
Hugh Towns	Carmarthenshire County Council
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Rhian Kendall	British Geological Survey
Richard Shaw	British Geological Survey
Rob Palmer	Tarmac
Roger Bennion	Gwynedd Council
Ruth Amundson	Caerphilly County Borough Council
Ruth Chambers	Campaign for National Parks
Ruth Henderson	Swansea County Council
Steve Bool	SW Regional Aggregates Working Party
Sue Martin	Welsh Government Planning Policy Branch
Tom Bide	British Geological Survey
Wynford Rowlands	Wrexham County Borough Council