REGIONAL TECHNICAL STATEMENT

Version for Public Consultation

North Wales Regional Aggregates Working Party

DRAFT N WALES RTS – CONTENTS

Appendices

Executive Summary

The Regional Technical Statement (RTS) is a requirement of the Minerals Aggregates Technical Advice Note (MTAN1) which was issued by the Welsh Assembly Government in March 2004. MTAN1 sets an overarching objective which seeks to ensure a sustainably managed supply of aggregates (which are essential for construction), striking the best between environmental, economic and social costs. The RTS will provide a strategic basis for LDPs in the region in line with the objectives set out below.

In accordance with this objective, the RTS will therefore seek to:

- Maximise the use of secondary and recycled materials and mineral wastes.
- Safeguard land-based minerals which may be needed in the long term.
- Acknowledge that where the principles of sustainable development can be achieved, the extension of existing aggregate quarries is likely to be appropriate.
- Where there is a need for new areas of aggregates supply, these should come from locations of low environmental constraint and take into account transport implications.
- Maintain supply of marine aggregate consistent with the requirements of good environmental practice.

(The terms used above are defined in the main report – see Section 3)

Consultation with stakeholders, including the public has been undertaken at a level commensurate with the status of the documents.

It has been produced by the North Wales Aggregates Working Party (NWaRAWP), with the assistance of the mineral planning authorities (MPAs), the quarry industry, various other bodies / agencies, and coordinated by the National Stone Centre.

The main purpose of the statement is to set out the strategy for the provision of the aggregates in the North Wales region for the period until 2021. As appropriate, MPAs in North Wales will then include allocations for future aggregates provision in their area, as part of the LDP process. (NB. The National Park Authority is not required to maintain such landbanks).

The RTS will be endorsed by the North Wales RAWP and each constituent MPA to inform the preparation of LDPs so that there is consistency and a sound regional strategy for sustainable mineral planning (MTAN1 paras 30 and 50). The strategic nature of the RTS means that it is not the intention to put forward specific sites. This is a matter for the MPAs via their respective LDPs, but within this regional framework. However in order to achieve transparency and robust scrutiny, where the RTS points to a general provision to meet an anticipated shortfall, this process has been the subject of strategic analysis by way of an environmental capacity assessment based on the IMAECA system[1]. At this broad level and given the detailed MPA analysis to follow, it was not considered appropriate or required that Strategic Environmental Assessment (SEA) and Health Impact Assessment (HIA) should be conducted.

It is important to note that the essentially strategic nature of this analysis means that more detailed matters which may be material as to whether Local Development Plans need to make resource allocations, should be considered during LDP preparation. Such matters may include:-

- The technical capability of one type of material to interchange for another.
- The relative environmental cost of substitution of one type of material by another
- The relative environmental effects of changing patterns of supply
- Whether adequate production capacity can be maintained to meet the required supply

In order to keep the RTS up-to-date, it will be reviewed every 5 years and monitored annually by the NWaRAWP.

Secondary Aggregates

Secondary and recycled aggregates usage in North Wales in 2005 was estimated to be 1.8 Mt or 16.8% of total aggregates production in the region. The MTAN1 target for Wales is 25% by 2009; South Wales has already achieved this level. There is a reasonable prospect of N Wales also reaching this proportion by 2009 if waste slate utilisation continues to increase as planned.

It is calculated that Construction Demolition & Excavation Wastes (CD&EW) amounted to 1 Mt in 2005, a figure which should be treated with caution. Increasing amounts of slate waste account for almost all the remainder of this sector and, if logistics and capital investment in facilities can be resolved, could increase considerably to double the present level within the short to medium term. Waste slate in the region represents one of the largest resources in the UK of secondary aggregate. There also are some issues relating to the suitability of slate waste for all types of aggregates and the quarrying of virgin slate for aggregates. There is little prospect of increasing other types of secondary materials, but a slightly higher production of CD&EW may be possible with the shift to smaller scale, but viable processing plants.

It is likely that the degree of usage of CD&EW in North West England (and particularly Merseyside) will have a more profound effect on N Wales, than improved levels of use of CD&EW in N Wales itself.

The improvement of data collection particularly for CD&EW and road planings is a key issue.

Marine

In contrast to South Wales and North West England, the direct dependence of this region upon marine dredged aggregates is extremely low (c 45,000 tpa). However it is probable that

[1] Implementing the Methodology for Assessing the Environmental Capacity for Primary Aggregates. (Welsh Assembly Government) February 2005.

substantial amounts landed in Merseyside are in fact won from the N Wales coastal waters, which in turn, offsets the pressure on landwon resources in N Wales.

Apart from conservation, fisheries and coastal protection, there are some important issues concerning safeguarding of landing wharves and key resources from prejudicial development such as wind farms.

Primary Aggregates

North Wales is endowed with extensive deposits of a variety of materials suitable for aggregates, particularly igneous rock and limestone. They are to be found in most areas of the region. Deposits of sand and gravel are more limited and are mainly concentrated in parts of Gwynedd, Flintshire and in particular, Wrexham.

The location of operations and permitted reserves has been largely defined by historical circumstance and communications, particularly along the N Wales coast routes. Production has been relatively stable for a number of years and, with South Wales falls, within the MTAN1 anticipated range.

Inter-regional Dependency

Exports at 40-50% - largely to N West England, accounted for a higher proportion (though not tonnage) of output than that for any other region. This included 71% of the Flintshire limestone production. However most of this would have been delivered within a 50km radius, i.e. effectively a normal “local” market.

The western part of the region is also largely self sufficient but with little outflow to other areas. Imports into the region are relatively low.

In respect of exports, MTAN1 does not attempt to place a bar, but seeks a “level playing field” vis a vis the environmental capacity of the supply sources.

The other areas contributing aggregates to the North West (in some instances, in greater volumes than North Wales) in the main, source from or through areas (or adjacent to areas) having equal or greater environmental statutory designations (although no environmental capacity studies have been undertaken in those areas).

Resources, Reserves and Environmental Capacity

In terms of environmental capacity as measured in the IMAECA study, the main limestone areas in the east are generally heavily constrained. The situation is similar in Anglesey but much more variable in the remainder of the region, including the National Park.

There is a need to safeguard resources to protect them against prejudicial development, particularly in the case of sand/gravel, limestone and selective igneous rock outcrops. There is also a need for special treatment of resources of limestone suitable for industrial/non-aggregates purposes.

Production and reserves in the Snowdonia National Park have ceased, as they have largely in the AONBs in the west. The most intensive working is in Flintshire/Denbighshire, part of which lies within the Clwydian Hills AONB.

Future Demand

Demand is likely to rise relatively slowly (c 1-2%) and in total (i.e. with S Wales) appears unlikely to breach the 27 Mt upper level of the range anticipated by MTAN1. However the impact of demand upon primary aggregates is likely to be strongly influenced by factors in North West England e.g. the levels of recycling there, marine aggregates landings as well as basic demand (the economy currently appears to be growing more swiftly). Within the region, the degree of substitution by waste slate aggregate of primary material is a significant consideration.

Transport

The region forwards more material by sea (mainly to south eastern England), than any other region; sea is now also employed for slate waste and rail has also used to transport aggregates. Based on first principles and the extent and nature of the markets currently served, it would appear likely that increased use of rail or water would lead to a rise in exports (and hence production) from the region, rather than a diversion from road transport. This requires further consideration.

Apportionment

The apportionment of primary aggregates first required the likely demand trends on the region to be estimated (which proved to be within the range anticipated by MTAN1) and the amounts expected to be met by secondary/recycled and by marine aggregates to be deducted. As noted, the level of imports was assumed to continue at a relatively modest level. Apportionment of primary aggregates was then carried out based on two approaches – Method A using traditional methods (i.e. applying past sales); the Method B using population as a proxy for the distribution of demand.

By this means it was anticipated that the need for primary aggregates cumulatively would be between 111 and 123 Mt over the period 2007-2021, the points on the range being dependant upon the methods used. This compares with permitted reserves of 260 Mt in the region recorded for 2005 within active/inactive but not dormant sites. However, permitted reserves and demand are not always closely matched.

The final section of the main report analyses the situation in each of the seven MPAs in terms of their ability to meet anticipated requirements (using the two methods noted above). Gwynedd has sufficient permitted rock reserves if permissions to quarry slate are included, but it is noted that releases of other rocks may be required if market specifications cannot be matched from the totality of rock reserves there.

The apportionments are triggered by the need to make provisions to supply rock for 15 years and sand/gravel for 12 years (each of these includes the 5 year review period for the RTS). In most other MPAs, the levels of permitted rock reserves are even theoretically sufficient to maintain present levels of production for 20 years, i.e. the threshold point beyond which MTAN1 considers that the release of further reserves should not generally be made. However, all MPAs are expected to take into account local circumstances

The demand previously sourced within Snowdonia National Park is now effectively met by the neighbouring MPA areas (including Powys in South Wales). The situation in the AONBs, particularly in Flintshire/Denbighshire is rather more complicated and deserves further investigation.

Concerning sand and gravel, there is a need for allocations in Anglesey and Gwynedd and for the situation to be kept under close review in the eastern part of the region. In Denbighshire, the need for a relatively modest provision of sand and gravel has been identified. In the case of Wrexham a balance needs to be struck between sand/gravel and any future contribution from crushed rock.

1. INTRODUCTION

(i) Background

1.1 The North Wales Regional Technical Statement has been prepared by the North Wales Regional Aggregates Working Party (RAWP) in accordance with the provisions of the Minerals Planning Policy (Wales) Minerals Technical Advice Note (Wales) 1: Aggregates (MTAN1) issued by the Welsh Assembly Government in March 2004.

The North Wales RAWP

The area covered by the NWaRAWP includes Anglesey, Gwynedd, Snowdonia National Park, Conwy, Denbighshire, Flintshire and Wrexham.

The remainder of Wales is covered by the South Wales RAWP which is preparing the counterpart document for that area.

1.2 It is the aim of the RAWP to coordinate aggregates planning across the region by providing a sound technical base of information for policy decision-makers and those involved in the planning process, including Welsh Assembly Government, MPAs, government agencies, communities and the industry. Specifically, its role is set out in MTAN1 (at Annex A) and can be summarised as:

- Monitoring the production and distribution of primary and secondary aggregates, including exports and imports.
- Collecting details on primary aggregates reserves (including dormant sites) at regional and MPA levels.
- Monitoring the generation and usage of all alternative materials which have potential for aggregates, consider ways in which the usage might be increased to replace primary aggregates and the means by which data might be improved.
- Monitoring UDPs (Unitary Development Plan) and LDPs (Local Development Plan), and future construction development, and identifying areas where shortfalls of supply might arise.
- Assessing environmental capacity to meet demand for aggregates at MPA level.
- Assessing the likelihood of dormant sites being reactivated.

Reporting Procedure

1.3 The NWaRAWP comprises mineral officers from the constituent authorities, and representatives of the Welsh Assembly Government, Environment Agency Wales (EAW), Countryside Council for Wales (CCW), the aggregates industry and the recycling industry. A list of members and their affiliations is given at Appendix 1.

1.4 In preparing the RTS, the NWaRAWP has been aided by its RTS Sub-Group and in turn assisted by input from a large number of stakeholders, the cooperation of which is gratefully acknowledged. The drafting has been undertaken largely by the National Stone Centre on behalf of the NWaRAWP.

In the context of the RTS, the NWaRAWP advises a steering Members' Group which consists of nominees from each of the seven mineral planning authorities (i.e. MPA Councillors and nominated members from the National Park), in the region

A preliminary meeting of the Members' Group was held in [November 2005], to initiate the process and consider the findings of the research report on Environmental Capacity [Appendix 2] [Subsequent meetings have been held to consider documents from other stages in the RTS process].

Several meetings of the RTS Sub Group were then held during 2005-7 to consider progress on the RTS. The minutes of from 2006 meetings are available from the by emailing the NWaRAWP Secretary (see Appendix 1 for details).

This system ensures a close and continuing involvement of the MPAs (at officer and member level) the Assembly and other key stakeholders which have a statutory and non-statutory interest in the process. Chapter 2 sets out the relationship with higher and lower tier decision-making and policies. The UDPs and LDPs are of course subject to the full range of consultative processes and are also subject to intervention by Welsh Assembly Government through default powers (MTAN1 paras 50 and A3).

Details of the consultation procedures [will be] set out in Section [5].

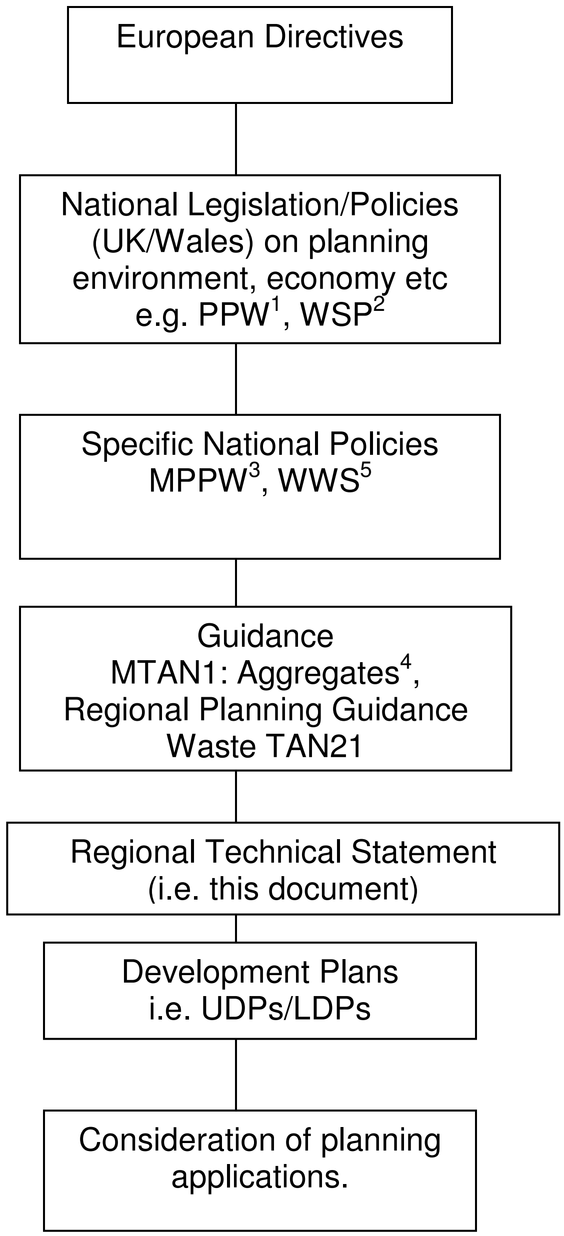
A brief review of the North Wales Region, its character and economy is given in Appendix [2]

Finally a broad statistical analysis such as that now presented is not capable of reflecting important subtleties in the market, for example the availability of large quantities of Pre Carboniferous sandstone without significant environmental constraints may be of limited value to a major market say 100 km distant without rail connections. Different types of aggregate source are not necessarily interchangeable, or, if they are used as an alternative, they may have higher intrinsic environmental costs (see Primary Aggregates – End Uses).

2. VISIONS, AIMS AND OBJECTIVES

The planning system hierarchy is shown below:

Table 1: Main Policy Framework



[1] Planning Policy Wales (2002)
[2] Wales Spatial Plan – (2004)
[3] Minerals Planning Policy Wales (2000)
[4] Minerals Technical Advice Note 1: Aggregates 2004
[5] Wales Waste Strategy (Wise about waste) (2002)

The higher level policy settings are summarised as follows:

2.1 The concept of sustainable development is enshrined in the Government of Wales Act 1998. Planning Policy Wales (PPW) refers specifically to the Assembly's duty to ensure that in the exercise of all its functions, it has regard to the principle that there should be equality of opportunity for all people and that it promotes sustainable development. To achieve this vision, sustainable mineral planning must seek to address a number of specific aims and objectives which have been identified in the Wales Spatial Plan (WSP) as follows:

(i) respecting distinctiveness
(ii) valuing our environment
(iii) building sustainable communities
(iv) increasing and spreading prosperity
(v) achieving sustainable accessibility and
(vi) embracing the future

At first sight, the relationship between quarrying and some of these objectives might appear to present considerable challenges. However there are direct linkages which are summarised in Appendix [3].

Minerals Policies

2.2 It was recognised that the special nature of minerals planning required specific policies. These are contained in Minerals Planning Policy Wales (MPPW) (2000). These relate to all mineral working and set the framework for such general matters as the system for identifying and planning future areas of working, protection of sensitive areas, measures to reduce environmental impact and in respect of post-working arrangements and efficient use of materials. Broad references are made to aggregates, the detail being reserved for MTAN1. However, conservation of resources, the production of alternatives to primary aggregates, special treatment for quarrying road surfacing materials, safeguarding of potential rail depot/wharves and recycling sites the need to identify and safeguard mineral resources (to avoid pre-emptive development which could sterilise or hinder extraction) and the significant role of marine aggregates are all referred to.

Aggregates Policies

2.3 The core objectives of the RTS are set out in MPPW: Minerals Technical Advice Note (Wales) 1: Aggregates (MTAN1) (Annex A3). These are: -

- To provide a regional assessment of the environmental capacity of each MPA area to contribute to an adequate supply of primary aggregates.
- To provide a strategy for the provision of aggregates in the region in accord with the regional assessment, with allocation of future aggregates provision for each MPA area to provide a strategic basis future development plans.
- To assess the current and future imports / exports of aggregates.
- To assess the current and future contribution of marine aggregates.

- To advise the Assembly on the potential in each region for increasing the use of alternative materials to replace primary aggregates.

The RTS is to be monitored annually by the RAWP and subject to a thorough review and redrafting every five years.

Local Planning Authorities in Wales, including MPAs are required to produce Local Development Plans (LDPs). Under a new system introduced by the Planning and Compulsory Purchase Act 2004, they will replace the existing Unitary Development Plans (UDPs).

3. KEY BACKGROUND AND ISSUES

Introduction

3.1 This section examines the significant issues presented in planning the future provision of aggregates in North Wales. Each issue is preceded by a resumé of the factual and policy background. Reference is given to supporting research and guidance forming the evidence base. Additional information is carried in the Appendices.

3.2 Fundamental to consideration of issues is an understanding of the main types of aggregate. Total consumption is made up of a range of contributing materials, each of which have particular environmental connotations or user limitations. Some of these aspects are summarised in Table 2. In most instances, there are also varying environment implications within sectors. The main commodities include:

- Primary aggregates – i.e. natural materials extracted from quarries or dredged from rivers and the sea – including rock, sand and gravel.
- Secondary materials/recycled aggregates (sometimes known collectively as 'alternative materials') – i.e. i) by-products of other industrial process – including, metallurgical slags, pulverised fuel ash (p.f.a) from electricity generating stations, furnace bottom ash (f.b.a), used foundry sand and ii) material from the demolition of buildings and structures or recycled from roads, runways, rail ballast etc or produced from excavations related to construction (collectively known as "Construction Demolition and Excavation Waste – CD&EW), iii) other recycled goods e.g. glass, ceramics.
- Mineral wastes – discarded material from non-aggregate mineral working e.g. slate waste, china clay waste, colliery wastes (minewaste/minestone).

3.3 Historically, providing a supply of hard rock/sand and gravel for aggregate use to cater for the demands of the construction and other industries, has been founded on a "plan, predict and provide" basis. This approach is deemed by many to be out of kilter with the principles of sustainability now enshrined not only in all aspects of mineral planning, but in respect of all government policies and actions. The Assembly considers that there are more relevant ways of determining how to meet society's vital need for construction materials without compromising the environment.

3.4 MTAN1 (2004)(para 20) assumed that the current production of aggregates in Wales was typically 23 Mt per annum and that this would not increase significantly over the following five years. This was based on 2001 survey information and made appropriate adjustments for exports, imports and all types of aggregates. Taking into account the expected economic growth in Wales, it was not anticipated that demand for aggregates would exceed 23-27 million tonnes per annum by 2010. Nonetheless, this is a broad range and later sections of the RTS give a more detailed analysis of demand as it applies to particular commodities and set in the light of more recent data. The North Wales share of this consumption was estimated to be c9 Mtpa[1].

3.5 MTAN1 states that although there should be an adequate supply of aggregates, natural resources should be conserved and the use of waste or by-products (i.e. "alternative aggregates") maximised in line with sustainable objectives. Hence, the approach is to increase the proportionate use of alternative aggregates, so that primary (virgin) rock resources can be conserved for future generations.

3.6 Efficiency (or intensity) of use is another key objective which requires that the grade of aggregate used best fits the end-use, that wastage on site is minimised and that building design takes into account the efficient use of materials. In particular, high grade material should not be used for low specification end-uses such as fill. This for example could have implications in cases for establishing borrow pits in association with major construction schemes, or for production excessive amounts of virtually un-saleable fine materials (crushed rock fines – CRF) during the processing of certain rocks e.g. sandstone for high specification aggregates. This will ensure that valuable finite resources are not wasted in the short or longer term. Controlling this aspect of production is however, difficult and relies heavily upon a responsible approach by industry, as planning conditions cannot generally control the end-use of minerals.

3.7 It is also important to note here that a significant proportion (30-40%) of all aggregates consumed are utilised in repair and maintenance work, thus effectively sustaining the existing built environment and infrastructure. Reference has already been made to the safeguarding of resources. If there is a prospect of surface including even other mineral development, sterilising such materials, consideration should be given to prior or co-extraction (with other minerals) and may in some cases be one of the most environmentally efficient areas of securing supplies of aggregates.

3.8 In a similar vein, the use of particular aggregate materials may have important relationships for other non-aggregate materials which may in turn have very important environmental implications. These may for example be related to alternative, more energy efficient uses of such materials as blast furnace slag as a cement replacement, or may infringe on extremely limited resources e.g. high purity limestone, better suited to industrial uses. These aspects are considered further in a later Section [Industrial (Non Aggregate) Uses] and in Appendix [18 on Cement].

3.9 Generally, in the interests of promoting sustainability, the lowest acceptable quality materials with the widest availability, should be used in preference for those materials which meet more stringent specifications. Not all end-uses of aggregate materials are interchangeable. Furthermore, whereas some end-uses can be interchanged, they may have limitations in their applicability or have additional environmental or monetary costs. The following matrix (Table 2) indicates in very general terms, the key interrelationships and limitations. It should be noted that in some cases (particularly where marked with "?"), the use of some secondary and recycled

[1] National Collation Report 2001; Survey of Arisings and Use of Construction and Demolition Waste in England and Wales in 2001 (Symonds) 2002.

materials may be physically possible if required by a client, but the stocks of primary material and the scheduling of production plant means that these materials are seldom used.

Table 2 A Matrix of Aggregate Materials and Capabilities

	Roadstone		Concreting		Asphalt/ Building sand	Rail Ballast	Construction fill etc (f)	Armour/ Gabion Stone	Industrial use	Building stone
Primary	**Coated**	**Dry**	**Coarse**	**Fine**						
Limestone/dolomite	√	√	√	√	-	(a)	√	√	√	√
Sandstone (c)	√	√	(b)	(b)	-	(g)	√	√	-	√
Igneous Rock	√	√	√	√	√ (g)	√	√	√	(e)	√
Land won sand/gravel	-	-	-	√	√	-	√	-	(d)	-
Marine sand	-	-	-	√	√	-	√ (f)	-	-	-
Slate (m)	-	√	√	√	-	-	√	√	√	√
Secondary/Recycled										
Blast Furnace slag	√	√	-	-	-	-	√	-	√(j,k)	-
Steel Slag	√	√	-	-	-	-	√	-	-	-
P.f.a	-	? (l)	-	?	?	-	√	-	√ (j)	-
F.b.a	-	-	?	-	-	-	√	-	-	-
CD&EW	-	-	?	-	?	-	√	-	-	-
Slate	-	√	√	√	-	-	√	√	√	√
Colliery Spoil	-	-	-	-	-	-	√	-	-	-
China clay sand	-	-	-	√(h)	-	-	-	-	-	-

(Key on next page)

NB not all types shown are used or processed in North Wales.

Footnotes to table 2

a) Normally UK limestone and dolomite is unsuitable for rail ballast but one major quarry in S Wales produces rail ballast from an abnormally hard dolomite.
b) Whereas sandstone can be used for concrete aggregate, most of the Carboniferous sandstones in N. Wales demand high volumes of cement (expensive and energy intensive) and water; they are highly abrasive and therefore cost more to process and also often give rise to more waste fines than limestone.
c) Sandstones vary considerably in their physical properties which govern their suitability as aggregates. The softer post Carboniferous (i.e. Permo-Triassic) sandstones are generally far too soft and unconsolidated to be used as aggregates except where ground to produce a sand. This has been the case in the recent past; they have also been utilised as building stones.
d) Natural sand has a number of industrial uses but is not employed as such to any significant extent in N Wales.
e) Igneous rock is occasionally used for industrial purposes e.g. insulation wool but as far as is known, this does not apply to material produced in N Wales.
f) Almost any aggregate material can and has been used for construction fill materials. However the relatively low price commanded by this end-use and the availability of a wide choice of materials, means that some of the more highly valued aggregates are not generally used for this purpose unless for example arising as a by-product of producing higher grade aggregates. Some sea dredged sand is used in beach replenishment. In such cases the specifications can actually be particularly demanding.
g) Not used in North Wales now for this purpose but some older sandstones may be suitable.
h) It requires more cement and water than marine or land won sand.
i) Igneous rock fines can be blended with building sand to produce 'sand' suitable for asphalt.
j) Especially for cement replacement.
k) Also at some sites for fertilizer and glassmaking.
l) Small amounts are used in foam mix asphalt.
m) i.e. virgin slate quarried, not from tips
?) signifies limited potential usage often in specific circumstances

SECONDARY AND RECYCLED AGGREGATES

Key Background

3.10 Compared with primary aggregates, the secondary and recycled aggregates sector of the industry is smaller, but by comparison generally more complex and fragmented. Serious research into usage and potential of all related streams of such materials began in the late 1960s and continues today. However although some materials such as slag had been used as aggregates from about 1905, despite numerous attempts (in contrast to rock, sand and gravel where annual data has been collected since 1895), the statistical evidence base for secondary and recycled aggregates is generally poor, thus making the monitoring of targets even at national (i.e. Wales) level[1,2] challenging. Below national level, the situation becomes even more problematic.

A brief resumé of the main components is given below. The main categories of secondary and recycled materials have been summarised in the previous section.

General Policy Setting

3.11 The hierarchy of supply which is perceived to optimise high environmental values places alternative aggregates (secondary and recycled materials) at the top of the list. That is to say their use should in principle be maximised and they should be utilised in preference to primary aggregates. Thus MTAN1 (para 157) sets a broad objective – to increase the proportion of aggregates production in Wales from secondary and recycled sources to at least 25% of the total aggregates supply with 5 years (i.e. by 2009). However it goes on to imply that the main channel for achieving this level will be a significant increase in the uptake of slate waste, predominately sourced from North (West) Wales. MTAN1 (para 34) also criticised the relatively low utilisation of construction, demolition and excavation waste (CD&EW) arisings in Wales, not only compared to some other European Counties, but in contrast to levels in England[1,2]. (Although according to QPA, the production of all aggregates derived from secondary and recycled materials in the UK is now the highest in Europe) On this basis, it (MTAN1 para 157) sets "a more realistic target" for recycling CD&EW as aggregates of at least 40% by 2005. It also points out that this is not at the level advised by the European Commission[2].

General Issues

3.12 Unfortunately, in North Wales, knowledge of volumes of alternatives, their arisings, stocks, locations and usage is often highly uncertain. They are also perceived by many to have significant limitations in terms of usage. Despite the lack of quantitative detail, it is inevitable that the greatest volumes of CD&EW arisings and usage are in the urban areas (and believed to be growing). Even there the levels of conversion to aggregates are believed to be lower than

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[1] Survey of Arisings and Use of Construction and Demolition Waste in England and Wales in 2001 ODPM (Symonds) 2002.

[2] Improving the Information Base on Secondary Minerals/ C& D Waste for Use as Aggregates in Wales, Arup Jan 2004

those in comparable settings elsewhere in Britain. It should be noted that under the European Waste Directive, materials designated as "waste" have to be treated at specific sites and by methods which comply with regulations. This process can inhibit the reuse of such materials for construction aggregates. The controlling body, the Environment Agency, working with the Waste Resource Action Programme (WRAP), has now (Aug 2007) established protocols to facilitate a more straightforward means of using such materials (type by type) for construction purposes.

By far the most evident and largest source of secondary and recycled aggregates in the region is that of slate waste. This is mainly located in the western part of the area. However it may not currently be the largest current contributor to aggregates supply in this sector, which is likely to be CD&EW.

3.13 In the past, the role of metallurgical slag as an aggregate source e.g. at Shotton and Brymbo has been important in the region, although it has now ceased with the closure of the producer works and following derelict land clearance. P.f.a was also produced.

However it may be possible to use imported secondary materials (e.g. china clay from Cornwall – see Interregional Dependency), but location, logistics and economics are critical factors and the high volume of available materials in the region itself, makes this most unlikely.

Table 3 Summary of Secondary and Recycled Aggregates Usage 2005: North Wales
M tonnes

	2001	2003	2005
Construction, Demolition and Excavation Waste (CD&EW) (a)	0.460	0.654	0.910
Clay (b)	??	??	??
Road Planings (e)	0.020	0.060	0.060
Slate (c)	0.275	0.587	0.549
Colliery Minestone (f)	??	??	??
Port and Harbour Navigational Dredgings (a,d)	??	??	??
Total Secondary and Recycled Aggregates	**0.755**	**1.301**	**1.559**

Sources:

a) 2005 Calculations based on Faber Maunsell Survey for 2005 (adjusted to eliminate "soil")[1] – see table 4.
b) Reported by NWaRAWP in some years but no recent data .
c) Assumed to be all recycled slate waste but in some years, c20% was won as virgin slate, i.e. technically a primary aggregate. NWaRAWP Surveys.
d) Includes North Wales but mainly assumed to be mainly South Wales.
e) Total Wales figure was 70,000t; this is a partial figure for all Wales; it North Wales RAWP Survey 2003, but only includes local highway authority material, and not Transport Wales.
f) Understood to be nil but not reported; colliery spoil is however used not as an aggregate but in the production of cement at Padeswood Works.
?? Not known

[1] Survey of the Arisings and Use of Aggregates from Construction and Demolition Waste, Excavation Waste, Quarry Waste and Dredging Waste in Wales in 2005. Faber Maunsell for Welsh Assembly Government (Final Report 2007).

3.14 In addition, the Faber Maunsell report[1] recorded 9.33 Mt of "quarry waste" used as aggregates in Wales in 2005. However, this covers "quarry fines, scalpings" as well as "waste and other waste streams". The first two categories are already covered in the routine RAWP and AMRI surveys of Primary Aggregates (i.e. within the groups, but not exclusively, "other construction uses inc. fill "and" undifferentiated uses. These amounted to 3.85 Mt and 1.486 Mt respectively in 2005).

The various types of secondary and recycled aggregates in North Wales summarised above are reviewed in turn below (more detail is given in MTAN1 and in Appendices 4 and 18). They can be divided into three broad categories: i) CD&EW, ii) other industrial materials, iii) mine and quarry wastes.

i) Construction, Demolition and Excavation Wastes (CD&EW)

3.15 This includes crushed or other material suitable for use as aggregates, recovered from construction projects, demolition of buildings and structures, wholesale removal of roads, aircraft runways, docks etc. It may be crushed on site (and reused on-site, or sold off-site) or taken to a depot/static site and processed for reuse.

Notwithstanding some severe limitations in the data (see Appendix 4), the results of surveys are shown below:

Table 4 Arisings and usage of CD&EW as aggregates 1999 – 2005

M tonnes	**1999**	**2001 (a%)**	**2003 (a%)**	**2005**
Total Arisings				
N. Wales	nsa	1.56 (135)	1.46 (100)	nsa
S. Wales	nsa	3.46 (90)	4.54 (100)	nsa
Wales Total	3.29	5.02 (74)	6.01 (100)	9.89
Total recycled as aggregate				nsa
N. Wales	na	0.46 (135)	0.64 (45)	1.0(c)
S, Wales	na	1.09 (90)	1.74 (43)	3.0(c)
Wales Total	na	1.55 (74)	2.38 (b)	3.97 (b)

a) Bands ± around estimate shown, at 90% confidence level shown in brackets.
b) Aggregates figures for 2003 and 2005 include soil. When this was separately recorded in 2001 it amounted to 5% of total arisings; the same proportions are applied here to 2003 and 2005.
c) Estimated rounded figures – see Appendix 4 for calculation method.
nsa - not separately available

As implied in table 4 considerable cautions have to be attached to the CD&EW figures for 2001 and 2003. Data for 2005 were only published at an all Wales Level and for North and South

Wales respectively had to be estimated based on those previous two surveys and populations (see Appendix 4). They can then only be used as an indicative trend which fortunately showed a growing uptake.

In 2007 the Environment Agency carried out a survey of CD&EW arisings, usage and issues. This is due to be reported in late 2007 and should hopefully improve the data base.

Initially, the bulk of the North Wales CD&EW arisings occur in N.E Wales where the greatest concentration of population and redevelopment is taking place. However there is a particular difficulty in collecting data in such areas as companies operating recycling plant for short periods in the area are often based over the border in N.W England and consequently may not report N Wales processing separately.

Furthermore it has also been pointed out that within the CD&EW sector, the extent to which such materials are recycled in N W England particularly in the redevelopment of Merseyside and Greater Manchester or reconstruction of the motorway network, is likely to have a profound competing impact upon the demand for primary aggregates produced in N Wales. The N West RAWP has recently commissioned a detailed study of CD&EW in their region.

As the industry has developed, smaller more efficient crushers are now available which have enabled even comparatively small demolition sites to be serviced, especially in rural areas.

There is a widely held view that the combined financial pressures exacted by the Landfill Tax in particular, the Aggregate Levy and fuel costs, have motivated the construction materials industry to apply CD&EW to the maximum extent. This is despite the costs of recycling being generally greater than those for the production of primary aggregates. On this basis, it is usually contended that there is little real scope to further increase the percentage of arisings used but there is potential for better beneficiation of CD&EW to produce higher grade product.

Other Industrial Materials

3.16 These include various industrial by-products as well as rail ballast, asphalt planings and miscellaneous materials such as recycled glass, ceramics, foundry sand, rubber and plastic (see Appendix 4 for more details).

3.17 A number of industrial by-products can be used instead of primary aggregates. Foremost of these are metallurgical slags, but they also include material from power stations (p.f.a/f.b.a) and a wide variety of materials such as glass and ceramic waste. In some cases e.g. asphalt planings and rail ballast, it might appear more logical to group the substances under CD&EW. However, the coverage of CD&EW is already well defined in terms of survey returns, so those items are included in the industrial materials category. Unlike South Wales, no furnace slag has been produced on any significant scale in this region for many years and stock piles have been almost totally depleted. Similarly, the closure of the last coal fired power station has resulted in no further p/a or f.b.a being available in the area.

Relatively small amounts of glass are recycled on Angelesey in asphalt mixes.

There appears to be very little prospect of significant amounts of secondary aggregate being available from this sector unless radical developments such as the building of new coal fired power stations etc take place (see Appendix 4).

However, apart from small amounts of road planings, and occasional quantities of ash, figures for North Wales have not been recorded. In any event the totals are likely to be less than 0.1 Mt in any particular year. Rail ballast recovered from the region is recycled as aggregate in Crewe, Cheshire and is presumably re-used as aggregate in that locality, thereby possibly reducing the amount of additional primary aggregate sent to that area.

iii) Mine and Quarry Wastes

Slate

(Further details are given in Appendix 18)

The largest volume of materials is this category is slate waste to be found at numerous former and a few still operating quarries in the region and predominately in Gwynedd. The quantities estimated (in 2000) to be “stockpiled” are c 730 Mt, of which it is calculated 270 – 370 Mt could readily be processed as aggregates. Indeed this represents one of the greatest resources of secondary/recycled aggregates in the UK.

Quantities of usage have grown significantly in recent years, particularly with the advent of the Landfill Tax and Aggregates Levy (the latter does not apply to slate). The amounts reused as aggregates in N Wales from year to year account for 80 – 95% of the volumes of waste slate recycled in Great Britain as a whole.

Considerable research has been carried out in recent years which suggest that recycled slate can be applied to a wider range of concrete and road aggregate applications as well as the traditional use as bulk foundation fill. Although there still appears to be some market resistance to such uses in such areas, other comsumers have turned to slate as a means of meeting their own policies to utilise more recycled materials. The introduction of the Levy in particular has resulted in slate waste becoming a dominant aggregate source in N W Wales and apparently displacing conventional primary aggregate in significant parts of this area (the evidence is not clear as trends over recent years also reflect a significant decline in major road building). Beyond that, transport costs and logistics infrastructure inhibit further expansion.

Several studies for improving or introducing new rail connections to move material to more distant markets have been carried out. The capital investment required would be considerable but could in part be grant aided. Discussions on the capacity of particular track/routes and the degree to which improvements are necessary were continuing in 2007. Some waste slate material is now being taken by sea (without grant aid for facilities) into Liverpool and Manchester.

Other Mineral Wastes

Small amounts of minerals (mainly clay, shale with lesser amounts of sandstone and occasionally sand) arise adventitously in the working of opencast coal. However the amounts and suitability as primary aggregates substitutes are highly unpredictable and quantities can vary greatly over time.

Almost all former colliery waste tips ("minestone") in the coalfield (mainly in Flintshire/Wrexham) have been either landscaped as part of reclamation scheme or utilised for base fill material. Volumes still available have not been assessed recently but are understood to be small or insignificant.

One notable and longstanding exception has been the use of Llay Main tip to supply the shale component of the feedstock to Padeswood Cement Works, Flintshire. However this is unavailable for aggregate uses.

Policy Compliance – Secondary and Recycled Aggregates Usage

MTAN1 (para 157) sets a target of 25% of all aggregates produced in Wales being derived from secondary and recycled sources by 2009. This projection assumed a considerable uplift in the utilisation of waste slate from N Wales. Even without this, South Wales achieved an estimated level of 26.5% in 2005, i.e. well ahead of schedule.

As indicated in table [3] on the basis of available records, 1.559 MT of secondary and recycled aggregates were produced in N Wales in 2005. This is likely to be an underestimate as data for the use of clay/shale, navigational dredging, glass and colliery minestone, moulding sand and for Transport Wales derived road planings, is not available. At a conservative estimate those could amount to say 0.25 Mt, bringing the regional secondary/recycled aggregate total c 1.85 Mt. In 2005, primary aggregate production was 6.899 MT of which 0.045 Mt was marine sand and gravel.

Table 5 Summary of aggregate production of all types. Wales 2005

	Primary		Secondary/recycled		Marine		Total Production	
	Mt	**%**	**Mt**	**%**	**Mt**	**%**	**Mt**	**%**
South Wales (a)	11.29	67.5	4.43	26.4	1.00	6.0	16.72	100
North Wales	8.90	82.7	1.81	16.8	0.05	0.5	10.7	100
All Wales	20.19	73.5	6.24	22.7	1.05	3.8	27.48	100

NB Percentage head across small differently due to rounding
a) Source: South Wales RTS
b) Sources: AM2005; for secondary/recycled materials see text and tables in this section.

The Secondaries/recycled materials contribution for Wales as a whole shows a shortfall of 0.63 Mt (i.e. 6.87 Mt or 25% minus 6.24 Mt) on the 2009 target. This level of increase may be achievable within the time set, but only with a substantial (i.e. a doubling) uplift in the levels of slate waste recycled.

Secondary and Recycled Materials – Summary Of The Main Issues

3.18 Despite the policy attractions of using a larger proportion of secondary and recycled aggregates, there are no "quick fixes". All the commodities involved present specific issues which have been aired above and can be summarised as follows:

1. **Construction Demolition and Excavation Wastes** – Recent data for N Wales is only based on estimates derived from all-Wales figures which are themselves uncertain. Improved data may be available shortly but not at the time of writing. Most the CD&EW is understood to arise in the eastern part of the region. Further opportunities may arise e.g. should large MOD facilities be decommissioned. However, in the absence of a requirement to make statutory returns of quantities and locations, it is difficult to envisage mechanisms by which data can be improved. The lack of vital data presently inhibits robust attempts at monitoring relevant MTAN1 guidelines.

   With the falling thresholds of tonnages which can be viably recycled, the possibility of improving levels of CD&EW recycling in less urban areas may be significant in terms of local proportions utilised, but not in the overall volumes for the region as a whole. It is likely that in urban areas the scope for increased utilisation is now limited as most available material is being recycled.

   The degree of future CD&EW recycling in NW England, particularly in Merseyside could have a profound effect on the demand for primary aggregates from N Wales.

   One particular issue is the availability of suitable sites for recycling CD&EW wastes. These are understood to be unevenly distributed through the region but without relevant data on arisings, utilisation, capacity and location the position is unclear. This is an area which requires scrutiny by MPAs within the next 5 years. Furthermore, the processing costs for secondary aggregates, particularly to achieve a reasonable standard of product are generally higher than for primary aggregates.

2, **Slate Waste** – N Wales slate waste represents one of the materials with the greatest potential in the UK for recycling as aggregates as questions of suitability for aggregate use appear to have been largely overcome in technical terms, but market resistance may need to be further addressed. However the delivered costs and transport logistics, which are likely to demand substantial capital investment, are still important factors to be resolved if mass volume markets in England are to be served.

3. **Asphalt Planings** – the levels of recycled asphalt planings should form a key indicator of environmental sustainability by Local Highways Authorities and Transport Wales, and should therefore be reported annually.

4. **Industrial and Other Wastes** – At this point , no substantial quantities of other wastes suitable for aggregates can be identified or foreseen. Possible arisings from developments such as new coal fired power stations or other industrial processes should be kept under review.

In summary there is a great need for data improvement in CD&EW and road planings and a requirement to liaise with N West RAWP on the trends in CD&EW usage in their region. The greatest opportunities appear to be presented by the use of slate waste but this sector also faces considerable logistical and financial hurdles.

MARINE AGGREGATES

Key Background

Marine aggregate (mainly sand) only makes a very small direct contribution to aggregates requirements in the region. Greater volumes, in part derived from Welsh Waters, are landed in Merseyside and probably offset any demand for greater quantities of aggregate exports from Wales to North West England. It has not proved possible to ascertain the volumes won from Welsh as opposed to English waters.

The interim results of the IMAGIN study (due to report in December 2008), a joint project with the Irish government, have identified significant resources off the N Wales coast at a very broad brush level of certainty and has advocated more detailed survey work.

There is little prospect of any significant increase in landings in N Wales (as the market is probably too small to justify the large scale capital investment required). The expansion in development of offshore windfarms off the region's coast may constrain areas of potential sand and gravel resourceson account of the significant areas they cover. Commercially viable resources are extremely localised. It is therefore essential that all the potential future uses of the sea bed are assessed as part of the consent process for offshore renewable energy developments.

These matters are considered in a little more detail in Appendix 5.

Table 6 Landings of Marine Sand and Gravel in North Wales 2000 – 2005(a)

	2000	2001	2002	2003	2004	2005
Gwynedd	na	0.044	0.048	0.048	0.052	0.045

Source: Crown Estate
a) Excludes dock, harbour, canal and river navigational dredging
NB these figures are included in the totals of Table 8.
Na not available

Policy Setting

3.19 Although MTAN1 is largely concerned with land-won aggregates, it necessarily refers to the marine contribution within the wider context. Planning authorities also have a role in safeguarding suitable land-based reception facilities for marine aggregates. The jurisdiction of MPAs may also extend into near shore waters, where the foreshore portion of a sand bank lies above the low water mark, but runs contiguously into an offshore area.

Otherwise there is as yet no Welsh Assembly Government spatial or operational policy on marine dredging for North Wales, comparable to IMADP[1] which applies in the South, and where marine sand is a fundamental component of aggregates supply.

[1] Interim Marine Aggregates Dredging Policy: South Wales National Assembly for Wales 2004

Regulations covering marine dredging off the Welsh Coast were issued in September 2007[1] and related guidance is to follow.

Marine Aggregates - Main Issues

3.20 There are likely to be considerable resources of marine sand of a good quality off the coast of N Wales. However, although the level of landings in North Wales is always likely to be small there could be further calls to supply Mersey/Deeside and further offshore, possibly even Ireland.

There are also a range of policy and/or operational factors which may restrict the ability to gain permissions to allow specific deposits to be worked. In some cases there may be environmental (including European notified conservation sites) or coastal process issues to be addressed, but equally there are also important economic factors to consider, notably water depth, tidal regimes, weather exposure, capital investment ,running costs and distance from the principle landing points. Management of such changes will be an issue for action over the next five years. This may include a need to safeguard resources of marine sand and gravel from sterilisation by prejudicial development although this is only exceptionally, an MPA function.

There may also be some issues relating to the need to safeguard areas for potential landing and onshore processing facilities at points with appropriate access to the main markets. The overall balance to be sought between marine "exports" to the North West Region and land-based sand supplies raises wider issues as does the quantification of the volumes actually won from Welsh waters.

[1] Environmental Import Assessment and Natural Habitats (Extraction of Minerals by Dredging) (Wales) Regulations 2007.

PRIMARY AGGREGATES

Introduction

3.21 Primary aggregates are produced directly from naturally occurring materials - rocks, sand and gravel, which (usually after processing) can be used as construction aggregate. Under the definitions used in connection with the Aggregates Levy, they do not include clays or slate (see Fiscal and other Influences). Nevertheless in some cases slate is quarried directly from the ground from permitted reserves and is used for aggregates, in which case it should strictly be regarded as a primary aggregate. This is distinct from slate processed from waste tips which constitutes a secondary/recycled aggregate (see latter section and Appendix 18).

3.22 Perhaps the most significant element of the RTS is to provide a framework for the future of the primary aggregates sector and to place this within the context of the overall requirement for aggregates and one of long term sustainability.

The policies in MTAN1 on supply can be summarised as follows - they:

- Advise an overall limit to meet aggregate requirements (as a result of demand from in and outside Wales and the region).
- Stipulate that a larger proportion of the total demand should be met from secondary and recycled sources.
- Suggest that, given acceptability in environmental terms, the marine sand contribution should continue at rates similar to those experienced in the recent past.
- Seek that all aggregates, should be used more efficiently and that high specification materials should not be used for lower speciation end uses.
- Acknowledge that primary aggregates should continue to meet the bulk of the residual demand, but that a more sustainable distribution of operational locations should be encouraged, for example with older permissions being phased out of the reserve inventory and a programme introduced for reducing the contribution made from National Parks and AONBs.
- Attempt to minimise the environmental impacts of transporting aggregate e.g. by shortening delivery journeys and where feasible (in economic and environmental terms), promoting modes other than road delivery.

3.23 Not only is North Wales well-endowed with aggregate resources, it has inherited over time, a substantial volume of permitted reserves. Reserves are often variable in terms of quality and location. It is therefore the task of the MPAs, the industry, central government and other stakeholders seek to secure the migration from the present inheritance, to a situation which demonstrates a more sustainable profile.

3.24 Whereas the main vehicle to achieve this transformation is the planning system (of controls and development plans), it is acknowledged that the legacy of commitments in some areas is so great that success will be heavily dependant upon the close cooperation and goodwill of the industry. The RAWPs and the RTS have a role in identifying such opportunities and potential solutions, and once established, bringing together the parties concerned to implement them.

3.25 The previous sections explored the contribution to be made by secondary/recycled aggregates and marine dredged sand and gravel. The key premise of the following major section is that primary aggregates will meet the residual requirement. It is also self evident that this is the sector where there is a greater direct engagement with the planning system, where the data is at its most detailed, one which probably exhibits the most pertinent issues – not only in operational terms, but in respect of transport, exports, specialist requirements and is one which is at least as susceptible as other sectors to financial and technical influences. Its environmental implications are those most readily apparent to the public.

3.26 Many of these themes are closely interrelated and a certain amount of repetition is inevitable, but attempts have been made to minimise this by adopting a sequence (see contents page) which begins by reporting the existing position in terms of production and distribution (including domestic and interregional flows), attempts to estimate consumption and future demand, acknowledges the need for provision in respect of certain special materials, considers existing landbanks and environmental capacity, then moves to a sustainable apportionment of provision for the future. The issues arising from the transport of aggregates are also assessed.

There are a few problems (e.g. of definition) surrounding establishing total sales of primary aggregates per se, and many more challenges in respect of calculating sales of secondary and recycled aggregates (see related sections of the report).

PRODUCTION (i.e. sales)

3.27 Analysis of sales can be approached in several different ways, all of which have implications for planning: for example by rock type, end use or geographic source within the region. It is not possible to present these all in one table, but in some instances, overall long term trends are important to our understanding.

In summary, the period from 1973 has witnessed significant fluctuations in North Wales rock and sand/gravel sales until the last decade. From a high point in the mid 1990s, followed by a fall, the overall pattern has been one of remarkable stability, certainly for the last seven years or so. (See Appendix 6 for detailed statistics).

Since 1973 (the date of the first RAWP Surveys) with very few exceptions, North Wales has accounted for 35 – 45% of the Welsh output of primary aggregates output.

Sales by Primary Aggregate Mineral Type

Production/sales of crushed rock in North Wales has not always followed broader UK trends. Limestone has predominated throughout; igneous rock made up the remainder with sandstone only providing occasional contributions. 1973 was a high point as elsewhere, but the later 1970's saw large falls, then an even higher peak of 10 Mtpa in the late 1980s.

Unlike most other areas, sales through much of the 1990s were maintained at a fairly high level (8-10 Mtpa) mainly as a result of the need for the aggregates to construct the remaining sections of the A55, particularly across Anglesey, and the A483 Chester to A5 road. From 2001 production fell back significantly.

Sand and gravel was at a high point of 2.5 Mt in 1973 which (from available surveys) has not been matched since. In the later 1970s and through the 1980s, into the mid 1990s, output was held at c 1.5-2.0 Mtpa, but has gradually fallen back since, to c 1.0-1.5 Mtpa in recent years.

Table 7 Production of Primary Aggregates in North Wales 2000-2005 M tonnes

	2000	**2001**	**2002**	**2003**	**2004**	**2005**
Limestone	6.178	6.062	5.474	5.189	5.405	5.609
Igneous Rock	1.834	1.136	1.037	1.108	1.100	1.022
Sandstone (b)	-	-	-	-	-	-
Total Crushed Rock	**8.013**	**7.198**	**6.520**	**6.297**	**6.505**	**5.663**
Sand/Gravel (a)	1.528	1.386	1.354	1.271	1.147	1.235
Total Primary Aggs N Wales	9.541	8.584	7.874	7.568	7.652	6.898
S Wales	11.04	11.36	10.70	12.29	13.05	12.29
All Wales	20.58	19.94	18.57	19.85	20.70	19.19

a) including landings of marine sand and gravel (see Table 6).
b) very small amounts of sandstone have been produced occasionally in Anglesey (included in to igneous rock) and in Flintshire (included under limestone).

Location of Production

3.28 The aggregate resources will be summarised later (see Resources, Reserves, Landbanks), but within these areas, production is more concentrated and largely reflects, a) proximity to centres of demand and b) historic patterns, many originating from the period before planning legislation was introduced in the late 1940's, indeed a number of large older sites were determined by the local availability of rail or sea connections a century or more ago.

3.29 In broad terms, limestone production is determined by the resources, forming the highly faulted western rim of the N Wales coalfield from the Wrexham area to the north Flintshire coast, but strongly concentrated on Halkyn Mountain. Others are located around Abergele – Colwyn Bay. A scatter of smaller quarries are found in Gwynedd and Anglesey, mainly of igneous rock. Large coastal igneous rock quarries are to be found at Penmaenmawr and the Llŷn Peninsula, but only the former are now producing on any scale.

Sand and gravel is worked on Llŷn, and to a lesser extent on Anglesey. In the east, operations in the Wheeler Valley on the Flintshire/Denbighshire border supply local needs, whereas the much larger production in the lowland area near Wrexham has increased from about a third of the regional total, to over half in some recent years.

Table 8: N Wales Production of sand and gravel Aggregate by Unitary Authority 1998-2005 (tonnes) (c)

	1998	1999	2000	2001	2002	2003	2004	2005
Anglesey	0	0	0	0	0	0	(d)	(d)
Gwynedd	188998	261310	370094	216197	212964	230924	245307	250,213
Snowdonia	0	0	0	0	0	0	0	0
Conwy	0	0	0	0	0	0	0	0
Flintshire/ Denbighshire	770585	793036	585427	546512	523613	389691	292519	(b)
Wrexham	524007	627036	571737	623832	617553	650771	606833	985,074
Total N Wales S/G	**1483590**	**1681382**	**1527258**	**1386541**	**1354130**	**1271386**	**1144659**	**1235287**

a) Gwynedd s/g includes 44,785 t of sea dredged sand in 2005 and a similar amount in earlier years – see table 6.
b) 2005 figure for Flintshire/Denbighshire combined with Wrexham to protect confidentiality.
c) Excludes slate to allow comparison with earlier years.
d) Anglesey combined with Gwynedd to protect confidentiality.

Table 9 North Wales production of crushed rock aggregates by Unitary Authority 1998-2005 (tonnes) (b)

	1998	1999	2000	2001	2002	2003	2004	2005
Anglesey	318856	911111	1006937	525494	485026	419079	445231	564950
Gwynedd	149339	144874	262717	177063	165480	236924	292705	(a)
Snowdonia	72226	9076	0	0	0	0	0	0
Conwy	1764198	1637307	1858172	1743910	1671991	1502975	1258972	1370431
Denbighshire (b)	2744550	2615243	2332716	1719904	1226523	1066215	1037837	905581
Flintshire	2988178	2678418	2551903	3031829	2970787	3071685	3470501	3254442
Wrexham	0	0	0	0	0	0	0	0
Total N Wales Rock	**8037347**	**7996029**	**8012445**	**7198200**	**6519807**	**6296878**	**6505246**	**6095404**
Total Primary Aggs	**9520937**	**9677411**	**9539703**	**8584741**	**7873937**	**7568264**	**7649905**	**7330691**

a) Gwynedd crushed rock combined with Anglesey to protect confidentiality
b) NB the figure for 2005 is higher than that given in the National Collation report for that year. It relates to an under-recording of limestone in Denbighshire of 431,000 tonnes in that report.

Sales by End Use

Sand and Gravel

Table 10 Sand and Gravel Sales N Wales (a) **K tonnes**

	1999	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
Building Sand	115	210	240	188	286	55	215
Concreting Sand	577 (b)	440	661	674	608	121	444
Concreting Gravel	519 (c)	442	267	302	233	835	465
Fill and	374	436	173	210	144	132	110
Total	1,677	1,527	1,342	1,354	1,271	1,144	1,235

a) includes marine dredged material – all sand
b) including “other gravel”
c) including “other sand”

As far as sand and gravel are concerned, concreting sand and gravel makes up the bulk of sales and has been remarkably stable being 69% ± 4% in all years shown except 2000. All three main source areas (Llŷn, Wheeler Valley and Wrexham) produced the whole range of sands and gravels.

Crushed Rock

Table 11 End Uses of Crushed Rock* 1999-2005 N. Wales K tonnes

	1999	2000	2001	2002	2003	2004	2005
Coated Roadstone	1,267	741	1,161	836	763	655	980
Uncoated Roadstone	2,375	1,498	950	824	698	775	860
Concrete Aggregate	1,397	1,454	1,493	1,787	2,036	1,082	1,436
Rail Aggregate	198	226	236	219	216	209	228
Fill and Other	2,441	4,230	3,359	2,847	2,584	3,783 (a)	2,591
Total	7,678	8,149	7,198	6,511	6,295	6,505	6,095

* NB (excludes slate)
(a) of which 2,967,000 tonnes was for 'unknown' uses

3.30 Most crushed rock quarried in the region is used as aggregate. A smaller but significant amount is used for other non aggregate ("industrial") purposes (see Industrial and Other Uses section below).

Within the aggregates sector, the largest tonnages of sales of crushed rock are recorded in the category "Construction Fill and Other Construction Uses", generally accounting for 40-50% of the total outputs. However, these figures should be treated with caution as they do include some miscellaneous materials meeting a higher specification than that of general fill and almost invariably one large company does not supply a break down of uses. This is usually rectified but this was not possible in 2004 resulting in the published figure in this category being abnormally high.

In the period covered by table 11 the combined figure for roadstone peaked in 1999 at 46% but in other years has hovered between 20 and 30%. The high point was probably related to major work on the A55.

Concrete aggregate has been relatively stable apart from the peaks of 2002 and 2003. 2004 can be discounted for the reasons noted above.

Rail ballast forms part of a long-standing requirement for high specification stone and is largely destined for a central distribution point at Crewe, Cheshire.

In 2005 limestone, amounted for 82% of all the region's roadstone sales, the remainder being igneous rock. It made up an even higher proportion of concrete aggregate (90%) and about the same level of construction fill (87%). Ten years previously, limestone contributed 83% to total rock sales.

High Specification Aggregates

Although there are some igneous rocks and sandstones which could meet the very rigorous requirements of High Specification Aggregates (HSAs) in terms of criteria such as polished stone values (PSV) and aggregate abrasion values (AAV), the region does not have the same reputation for these products as is the case in South Wales. In a major study[1] one quarry in the region (Minffordd) was within the highest quality grouping.

[1] The sustainable use of high specification aggregates for skid resistant road surfacing in England Capita Symonds/ODPM/MIRO Thompson. A, Burrows. H, Flavin. D and Walsh. I

DISTRIBUTION

3.31 Data on the distribution of sales of primary aggregates is only surveyed every four years and is often the subject of considerable estimation on the part of respondents.

Although no published systematic data is available for Wales in respect of distribution of secondary and recycled aggregates, the distances travelled to the consumer are generally relatively small and it can therefore be argued that these materials are generally used well within a 50 km radius of source, indeed they are often re-used on site.

For the RAWP survey of primary aggregates in 2005[1], North Wales was divided into:

a) North East Wales (NEW) (i.e. generally the former Clwyd areas but including the whole of Conwy).

b) North West Wales (NWW) (i.e. generally the former Gwynedd areas excluding Conwy).

3.32 For the first time, this gives some broad hints about internal flows and ultimately, consumption (covered in a later section). Despite these shortcomings, it is evident from tables 12 and 13 that:

a) In the survey, the rock sales from Anglesey and Gwynedd had to be grouped together for confidentiality reasons. They were also listed under "N Wales undifferentiated" (and under the convention used in the table, by inference all to NEW). However almost certainly, the bulk was sold within the NWW sub region and, for reasons related to logistics and availability of competing sources, most of the material produced on Anglesey (0.564 Mt in 2005) is likely to have been consumed on the island itself. It has therefore been assumed that all the rock sales from Anglesey and Gwynedd were within NWW and not NEW.

b) Most of the sand and gravel was also used within the region although 20% was used outside the region altogether. This was probably building sand from Gwynedd, possibly destined for Powys.

c) As might be predicted small amounts of rock produced in Conwy was sold to the west where it would have been in competition with mainly igneous rock produced in that subregion. Five times as much was sold with the NEW sub region. However almost 60% was destined for areas outside the region; the bulk of the latter would have been used in N West England and, from other information (see Table 11) was known to include 228000 t in 2005 (or 17% of the MPAs output) railed as ballast mainly to a depot in south Cheshire. However, also from another response to the survey, 279,000t was known to be dispatched by sea, most of which was understood to be south east England

d) Limestone quarried in Denbighshire was almost equally divided between N E Wales and "elsewhere", i.e. assumed to be mainly N W England..

[1] Collation of the results of the 2005 Aggregate Minerals Survey for England and Wales. British Geological Survey for Department of Communities and Local Government (2007) (Referred to as "National Collation 2005)

e) Flintshire limestone was the main source of the large scale exports to England, with 71% going to the North West, the remainder being utilised within the region (mainly within the sub-region).

f) Marginally more sand won in Wrexham and Flintshire was employed within the region (54%) than elsewhere. This is perhaps somewhat surprising bearing in mind the close proximity to the border of the main source (near Wrexham).

Table 12 Crushed Rock Distribution N. Wales 2005 K tonnes

Destination	NE Wales	NW Wales	North West	Elsewhere	Total
Anglesey	(a,b)	565 (a,b) (100)	-	- -	**565**
Gwynedd	-	(a,b)	-	-	**(a,b)**
Conwy	471 (34)	94 (7)	- -	805 (59)	**1370**
Denbs	238 (50)	0 0		235 (50)	**475**
Flints	692 (21)	259 (8)	2298 (71)	5 (0)	**3254**
Wrexham	- -	- -	- -	- -	**-**
Totals	**1401**	**918**	**2298**	**1045**	**5663**

a) N Wales undifferentiated assumed to be largely NWW.
b) Anglesey includes crushed rock for Gwynedd.
Percentage shown in brackets.
Source: National Collation 2005: table 9K.

Table 13 Sand and Gravel Distribution N Wales 2005 K tonnes

Destination	NE Wales	NW Wales	North West	Elsewhere	Total
Anglesey	(a)	(a)	-	-	**(a)**
Gwynedd	1 (0)	165 (79)	- -	42 (20)	**207**
Conwy	- -	- -	- -	- -	**-**
Dembs	15 (34)	1 (1)	- -	30 (65)	**45**
Flints					
Wrexham	486 (52)	17 (2)	- -	438 (46)	**941**
Totals	**502**	**183**		**510**	**1193**

a) Anglesey shown under Gwynedd.
Percentage shown in brackets.
Source: National Collation 2005: table 9K.

DOMESTIC CONSUMPTION (i.e. Demand from within the Region)

3.33 The term "demand" must be applied with care and must always be qualified in use. Firstly there is the element of demand arising **within** a given area, often known as "domestic consumption" (i.e. irrespective of how that demand is met). Secondly there is demand made **upon** an area; this is the sum of materials sold (or production/output) from quarries in that area (e.g. a region) both to markets (a) within that area and (b) exported to other areas. There are also wider policy issues about demand (as noted below) and about "need", which may be greater, but not necessarily be fully met. However, it is usually assumed that need is met and so equals demand; for example, there is very little if any evidence to suggest that the lack of available aggregates has ever curbed or slowed down construction in the same way that shortages of timber, steel or bricks have done at some peak times in the past (e.g. in 1973).

Primary Aggregate Consumption: North Wales

3.34 Consumption arising within a given area is measured by deducting exports to other areas, from production, then adding in imports. Surveys of distribution, which enable these calculations to be made, have been conducted every four years, since 1973. The resultant figures are subject to unknown error which becomes most pronounced in the major exporting and importing regions. In the case of North Wales, with its very high levels of exports, in line with experience in other net exporting regions, it is very likely that sales within the region are in reality less than recorded, but the extent and reasons for this are unknown. The survey recorded the destinations of all primary and marine aggregates, but not secondary and recycled aggregates. In most cases, the latter are assumed to have a very localised distribution. The survey results for primary aggregates are set out in Table 14 below.

It should also be emphasised that the comments below relate to the 4-yearly survey years. The pattern of consumption in intervening years is not known. Also, unlike some other regions, data for 1973 and 1981 was either not surveyed or comprehensive results were unavailable.

Sand and Gravel

Since the peak of 1989, N Wales sand and gravel consumption fell in stages to only 55% of that level despite some points within that period in which high volumes of structural concrete work were being undertaken to support new roads, notably the A55 and A483.

Crushed Rock

Crushed rock followed a similar pattern again with only a minor peak during the major road construction noted above, during which one would have excepted a significant rise in demand. In this case, at 65% the fall between 1989 and 2005 was even higher.

All Primary Aggregates

3.35 The overall position reflects the above, with peaks in the 1989 – 1993 surveys and low points more recently.

Any general variations arising from say the increase in Landfill Tax or the Aggregates Lev., or to a lower usage of aggregates per unit of construction expenditure would apply to all regions and so cannot explain these local changes. Such general trends are discussed under “Fiscal and Other Influences”.

Table 14: Consumption of Primary Aggregates within Wales and regions K tonnes

Sand & Gravel (a)	**1973**	**1977**	**1981**	**1985**	**1989**	**1993**	**1997**	**2001**	**2005**
South Wales	2755	1890	1834	1689	2263	1934	1963	1198	1628
North Wales	na	1254	na	957	1450	1226	900	977	811
Total Wales	na	3144	na	2646	4083	3160	2865	2175	2439
Crushed Rock									
South Wales	10009	9629	8514	8401	12426	13619	10103	8284	8537
North Wales	na	2233	na	4092	5660	4615	2733	3663	2520
Total Wales	**na**	**11854**	**na**	**12493**	**18086**	**18234**	**12836**	**11947**	**11057**
All Primary									
South Wales	12764	11511	10348	10090	15062	15553	12066	9482	10165
North Wales	na	3487	na	5049	7110	5841	3633	4640	3331
Total Wales	**na**	**14998**	**na**	**15139**	**22172**	**21394**	**15699**	**14122**	**13496**

Source: Based on surveys by South and North Wales RAWPs and other RAWPs published/calculated in National Collation Reports
a) Including marine
NB 1981 South Wales figures are partly estimated.

Unlike the AM Survey 2005 results in S. Wales, it is possible to indicate a broad level of consumption within the two subregions. This is shown in table 15, which is based on combining information from a number of tables in the National Collation Report 2005. This is based on the assumption (as noted above) that the rock sales from Anglesey/Gwynedd combined (show as N Wales undifferentiated) were in fact to N W Wales. This suggests logically that the consumption in N W Wales closely approximate to production in that sub-region. In other words, in terms of local dependences, that sub region was effectively self sustainable.

In the subdivision of the region into North East and North West Wales, it should be noted that the allocation of Conwy poses a dilemma. Whereas the geography and the igneous rock from Conwy is perhaps better grouped with Gwynedd/Anglesey, the limestone in Conwy has a closer relationship to North East Wales. On balance the decision was made to associate Conwy with North East Wales as the bulk of sales more closely parallel that sub region.

Table 15 Primary Aggregates Consumption in N Wales by Sub Regions 2005 K tonnes

	Rock	Sand/Gravel	Total
N West Wales			
Anglesey/Gwynedd	918	228 (a)	1146
North East Wales			
Conwy/Denbs/Flints/ Wrexham	1401	502	1903
Total	**2319 (c)**	**730**	**3049**
Imports	199 (d)	83 (b)	282
Total Consumption	**2518**	**813**	**3331**

a) of which, marine was 45,000t
b) of which marine was 18,000 t
c) of which 1,576,000t was limestone and 745,000 t was igneous rock
d) of which 7000 was limestone, 118,000 t was igneous rock and 75,000 t was sandstone

Source: National Collation 2005, table 5K, 9 K and 11.

The destination data for North Wales sales in reasonably complete and closely correlates with the total sales data. Furthermore, as a major exporting/minor importing region, with the exports focussed virtually entirely in one rather than many directions (subject to the caveat already noted about the tendency for local sales to be exaggerated in surveys), the subregional consumption shown in Table 15 appears to be fairly robust. This situation presents a useful benchmark in the Apportionment process (see Section 4) but should still be treated with caution.

INTER-REGIONAL DEPENDENCY

Key Background

3.36 Traditionally North Wales has been a major exporter of crushed rock, a role which it still maintains. It engages in a very low level of imports. Limestone exports greatly predominate (91% of rock), with igneous rock making up remaining rock transfers.

Further information is given in Appendix 7. This section mainly deals with primary aggregates. Inter-regional flows of secondary and recycled aggregates are not systematically surveyed.

Policy Setting

3.37 At various points in the past, some stakeholders have expressed concerns that the policies for aggregates production in Wales might specifically seek to restrict exports to England. However MTAN1 does not adopt this stance. It begins by noting (para 39) that the English Guidelines for Aggregates Provision (2003) envisage no change in levels of flows from Wales to England in the period to 2016 (subsequent English guidance also advises a continuation of the 2016 level thereafter). (See Appendix 8 - table A8:2). Para 40 of MTAN mainly seeks to apply environmentally sensitive transport policies (see Transport) and the proximity principle and reserves most of its concerns for the flow of aggregates from N. Wales. Furthermore it seeks a level playing field in terms of the application of environmental values on both sides of the national border (para 41), thus applying to both exports and imports. MTAN1 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. In summary, provision is to be made to maintain broadly current levels of exports.

Exports

As shown in table [16] over time, total exports have equated to almost half (±10%) of the region's primary aggregates production, this is as noted earlier, a higher percentage than for any other region of England and Wales.

Consistently, the North West of England has been by far the most significant recipient of aggregates from N Wales.

One might have expected South Wales to be the second largest market after the North West but the low population density in Mid Wales means that the sales from N Wales here are very small indeed. Perhaps surprisingly the next most important destination in recent years is not a neighbouring region but south eastern England in general. Much of the latter is sea borne traffic.

As the sales to North West England are so significant, special consideration is given to the existing and prospective demand from that region in the next section, "Future Demand" (Appendix 7).

Table 16 Exports of Primary Aggregates from North Wales 1973-2005 K tonnes

Destination	1973	1977	1981	1985	1989	1993	1997	2001	2005
West Midlands	45	16	na	2	101	59	42	164	5
North West	4404	1841	na	2665	4231	3017	3014	2347	2943
South Wales	20	5	na	-	46	42	25	235	1
South East (c)	-	-	na	-	785	379	369	662	247
Other	24	150	-	-	-	145	84	28	55
Total Rock	**4493(a)**	**1862**	**677**	**2667**	**5162**	**3643**	**3601**	**3436**	**3251**
Limestone/dolomite	na	1662	na	264	4630	3516	3430	3344	2973
Igneous rock	na	200	na	78	530	127	171	91	277
Sandstone	na		na	-	3	-	-	-	
Total Rock	**4493 (a)**	**1862**	**677**	**2667**	**5162**	**3643**	**3601**	**3436**	**3251**
Sand/gravel Total	**(a)**	**560**	**na**	**628**	**578**	**497**	**244**	**510**	**464**
Non-North West (d)	-	(b)	na	5	12	2	1	34	44
Total Aggs Expt.	**4493**	**2422**	**na**	**3300**	**5752**	**4142**	**3876**	**3980**	**3759**
Exports as a % of production	52	40	na	39	43	42	43	46	54

(a) crushed rock includes unspecified amount of sand and gravel
(b) to N.West
(c) Includes London region in 2001 and 2005
(d) line above in table shows total sales almost all of which were to N West England; non-North West exports shown here

Source: National Collation Reports

Imports

3.38 The total import figures for North Wales have varied considerably from survey to survey within the range 18,000 t to 457,000 t. This is equivalent to 0.3 – 8.9% of total consumption in tonnage terms. This is usually only equivalent to a single small to medium sized quarry.

In most recent years imports comprise mainly igneous rock from South Wales (Powys) with sand and gravel from the North West England and the West Midlands. In some years, limestone was imported from the East Midlands (Peak District) (Derbyshire) and coincided with the closure of a major N Wales quarry near the border.

More detail is given in Appendix 7.

Future Prospects

3.39 There is only limited potential, logic or necessity for increasing imports of primary aggregates apart from normal, local cross border trade, for example for particular types of sand from Cheshire or perhaps as return loads to avoid lorries travelling back empty.

FUTURE DEMAND

NB The various definitions of “demand” are discussed in the introductory section to Primary Aggregates.

Policy Setting

3.40 In the early years of the RAWP’s, demand forecasts were produced using various statistical projections and later, by employing econometric methods. These were generally applied to primary aggregates production (for which data has been conventionally more reliable), with a proportionate allocation – (based on past trends), to primary, marine and alternative aggregates materials respectively. More recently in both Wales and England, it has been the practice first to set either a priority or “target” figure/proportion to be met by alternative materials, then to apportion primary aggregates to meet the residual (although still larger) figure. Secondly current mechanisms have attempted to stabilise the contribution from primary aggregates in absolute terms and require any growth to be met mainly or entirely from alternatives. This stance is set out forcefully in MTAN1 (para 17-19). In effect it signals a change from the so called “predict and provide” approach to the “plan, monitor and manage” approach.

3.41 However the new component in policies is a much greater emphasis on environmental sustainability. In summary, the new policy therefore acknowledges need but indicates that this should be met in a more sustainable manner.

In this particular context, it is important to consider a little further, both the process and nature of demand. The “Plan, Monitor and Manage” approach aims to assess the total market, determine in policy terms to what degree that market should be met and by what raw materials. Most recent attempts to follow this route, accept that there is a legitimate and necessary requirement to deliver construction development on the scale determined by a combination of the market requirements and government land use and economic policies. MTAN1 contains a clear statement indicating that demand for construction materials should be met, which presumably means that the new policies should not be applied to a degree that they would for example impede Government policies on housing provision, transport, flood protection, national economic growth etc.

3.42 Gathering and presenting the evidence base (i.e. monitoring) for decisions has now become much more significant.

3.43 Finally “management” is now generally interpreted as the exercise of controls over the contributions made by the various elements which go towards meeting that demand and in particular, boosting the role of secondary and recycled materials. Some of these particular elements and mechanisms are discussed further under “Other Factors”. They also include probably one of the least understood and least measured elements, that of “efficiency of use”. The inelastic nature of the general demand for aggregates is also considered at that point.

3.44 MTAN1 seeks to apply this more environmental sustainable approach. MTAN1 Para 20 therefore concluded that “the present level of total aggregates demand means consequent production (i.e. the total to be met by land won, marine and secondary sources) of about 23 Mt in Wales, will not increase significantly over the next five years. (i.e. 2004-2009).

MTAN1 continues, that even taking into account the expected economic growth in Wales, it is not anticipated that demand for aggregate will exceed 23-27 Mt by 2010. It indicates that until the RTS is complete, this range should be used for planning purposes and regards this as sufficient to meet envisaged need. This last statement implies that the RTS is required to review and test those figures in the light of information available subsequent to the publication of MTAN1.

3.45 Furthermore MTAN1 (A3 and A4) makes it clear that the role of monitoring of production (sales) and distribution and demand is a function of the RAWPs and that the RTS is the vehicle for presentation. Another fundamental part of this process is to gain an understanding of the environmental capacity to meet this demand and to identify potential shortfall areas. These are considered later.

3.46 It has been pointed out that the levels of demand outlined in MTAN1 over the five year period concerned, did not anticipate any significant deviation from the level of consumption at the time of publication (2004). This has generally proved to be the case, but larger unscheduled projects, such as tidal barrages, may subsequently arise and specific policies may need to be invoked to respond to such situations.

Assessing Future Demand

3.47 Firstly, it is clear that by "demand", MTAN1 1 Para 20 means total demand for aggregates **upon** Wales and equates this to the total production of all aggregates in Wales.

The figures used in MTAN1 (derived from the 2001 surveys of primary and secondary materials) are shown in Appendix [8] which also sets out the mechanics behind the estimates now used. It is important to consider if these assumptions in MTAN1 are still valid. They can be benchmarked by reference to other projections.

3.48 The starting point for forecasts is based upon the latest production figures for primary, (land won and marine), secondary and recycled aggregates. These are summarised in table 17 (more detail is given in earlier sections and Appendix [6]). These more recent figures show total demand rising into the range anticipated by MTAN1.

3.49 As part of the testing process, various estimates and studies were conducted or consulted. Investigations in Autumn 2006 by the QPA, with information from Experian, utility companies and the Welsh Assembly, supported a modest rise in construction demand, both within the region and of exports (see Appendix 8).

3.50 The annual reviews of aggregate demand in Great Britain produced by DCLG (and formerly ODPM) based upon Cambridge Econometrics' compounded economic sectoral analyses, either indicate a level or confirm slight growth pattern for Wales as a whole.

Table 17 Production of Primary and Secondary/Recycled Aggregates: Wales M tonnes

Primary Aggregates	2001	2002	2003	2004	2005	% 2005
North Wales (a)	8.6	7.9	7.6	7.7	6.9	27.38
South Wales a)	11.4	10.7	12.3	13.1	12.3	48.80
Total Wales	**20.0**	**18.6**	**19.9**	**20.8**	**19.2**	**76.9**
Secondary/recycled aggregates						
North Wales (a)(b)	0.8	n/a	1.3	n/a	1.6	6.30
South Wales (a)(b)	2.1	n/a	1.7	n/a	4.4	17.46
Total Wales	**2.9**	**n/a**	**3.0**	**n/a**	**6.0**	**23.81**
All Aggregates						
North Wales	9.4	n/a	8.9	n/a	8.5	33.73
South Wales	13.5	n/a	14.0	n/a	16.7	66.27
Total Wales	**22.5**	**n/a**	**22.9**	**n/a**	**25.2**	**100**

Sources:
(a) SWa RAWP and NWa RAWP Annual Reports
(b) Symonds Survey for 2001 (England/Wales); Smiths Gore Survey for 2003; Faber Maunsell Survey for 2005; (calculations made later in Appendix 4).

GDP in Wales is predicted at 2.7%pa over the next five years (Experian) and construction growth over the period is expected to increase over the period 2005-2010 by 19%. A construction expenditure increase of 3-4%pa would be reasonable.

3.51 However this does not translate directly into the same percentage rise for aggregates demand. Greater efficiencies in aggregate usage (i.e. reduced 'intensity of use') are predicted, for example arising from the influence of fiscal measures (Landfill tax and the Aggregates Levy), more (but unquantified) recycling of aggregates on brownfield sites, greater use of non-aggregate dependant construction techniques. These factors all suggest a lower uptake of primary aggregates per £1000 of construction spend (see Appendix 9). A growth in aggregates demand in the region 1% to 2% would therefore considered more realistic. In terms of a more managed approach to provision, it should be noted that these levels already register an inbuilt expectation of more efficient usage of aggregates than in the past, despite the fact that the consumption of aggregates per head in the UK is already one of the lowest in Europe.

INDUSTRIAL (NON-AGGREGATE) USES

Key Background

3.52 Some materials suitable for aggregates are also used for other purposes notably limestone for cement and iron or steel flux, shaped building stone, lime production, and agriculture. The specific calls which these markets make, sometimes on the same permitted reserves have to be taken into consideration alongside the demand for aggregates.

Table 18 Sales of Non-aggregates: North Wales M tonnes

	2000		2001		2002		2003		2004		2005	
	BS	IS	BS	IS	BS	IS	BS	IS	BS	IS	BS	IS
Limestone/ Dolomite	0.00	0.63	0.01	0.58	0.00	0.63	0.00	0.67	0.00	0.67	0.01	0.51
Sandstone/ Igneous rk	0.00	0.00	0.03	-	0.00	0.00	-	-	0.00	-	(c)	(c)
Total										**0.70**	**0.01**	**0.51**
All NA uses			1.36		0.95							
Sand/gravel	-		0.06		0.06		0.02		0.00		-	

NB Some industrial stone figures may include building stone.
BS = Building Stone
IS = Industrial Uses
NA = Non Aggregates
c) = confidential
0 = production less than 0.01 Mt

Up until the last few decades, North Wales was a very important source of rock for non-aggregate uses, and to a lesser extent sand for the same sector. The most significant product in tonnage terms was chemically high purity limestone for use as a metallurgical flux, chemical production and cement. Large quantities were exported by sea for example historically to produce carbide in Norway, cement at Ellesmere Port and iron in Glasgow. Limestone was converted to lime on a large scale e.g. around Llandulas for the manufacture of soda ash and other chemicals locally on Deeside and in Lancashire and Cheshire. The steel industry of the region and other areas relied upon local limestone. In some cases it was even mined underground. The closure or relocation of most of the consuming industries has resulted in more or less the demise of this trade with one notable exception, that of cement production at Padeswood, Flintshire which is reliant upon Cefn Mawr Quarry on the Flintshire/Denbighshire border.

One further spin off has been the continuation of the use of sea wharf facilities near Llandulas, inherited from the non-aggregate trade, to supply aggregates to south eastern England.

The limestone deposits in the region vary considerably in chemical composition, the purer beds being confined to particular formations, mainly oolites. The latter are relatively extensive but may be complicated by faulting, mineral veins and occasional dolomitisation. Should new industries develop which require such materials, even though relatively plentiful locally, they are relatively scarce on a UK scale and deserve to be safeguarded. Resources are described in more detail in a British Geological Survey Report[1].

One interesting variant, the locally called “Aberdo” Limestone (a clay rich stone) was at one time favoured for cement making. Technologies have since changed making this connection now irrelevant.

The other non-aggregate use of stone in the region was as a building stone. The region was an extremely important source of igneous rock as a paving and kerb material and as such rock from quarries such as Trevor and Penmaenmawr was used all over England and Wales. Small amounts up to say 10,000 t in some years, are still used for walling, paving and buildings, but face strong price competition from overseas sources. These include limestone from Anglesey as well as the sites just mentioned. The largest recent works involved the building of extensive boundary walls alongside the new A55 across Anglesey, mainly arising glacial boulders. Sand has been worked on a small scale for many years, traditionally for use as a domestic abrasive. Brief additional details are given in Appendix 11.

Policy Setting

MPPW2000 (para 72) recognises the significance of local stone in contributing to the maintenance of vernacular buildings. This potential should be taken into consideration alongside aggregates production.

3.53 MPPW (paras 80-83) sets out policies for the provision of industrial minerals. In respect of limestone these include the possible need for longer term landbanks of reserves than for aggregates and for the MPAs concerned to engage in dialogue with industry to this effect, particularly in respect of formulating local planning policies. The issue of safeguarding deposits is of even greater significance than in the case of aggregates.

Conclusions

3.54 Separate details of industrial uses should be collected and monitored, and projections of future requirements be made, covering a longer period than for aggregates.

3.55 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. Furthermore, it is suggested that policies concerning a separate landbank for this purpose and of appropriately balancing high purity stone and aggregates won from that resource, should be given serious consideration.

3.56 In respect of cement raw materials, it is recommended that appropriate areas of resource be safeguarded and that the future stone requirements of this capital intensive works be assessed with relevant stakeholders before the next review.

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[1] Appraisal of High Purity Limestones in England and Wales Part 1 Resources. D. Harrison, JH Hudson, B. Carmel. British Geological Survey for the Department of the Environment 1991

RESOURCES, RESERVES and LANDBANKS

3.57 A distinction needs to be made between "resources" (i.e. the total collection of deposits of a particular mineral) and "reserves". Reserves in this report comprise deposits with the benefit of planning permission unless otherwise qualified. The need for caution in considering reserve data and the definition of landbanks are explained later in this section.

Aggregate Resources

3.58 North Wales is fortunate in having plentiful resources of rock almost throughout the region; deposits of sand and gravel are comparatively restricted and usually more variable in nature. The resources are summarised in Appendix [12] in general order of current economic significance.

3.59 As part of the preparation of the IMAECA Report [1], the researchers examined available resource data and digitally plotted the distribution of outcrops according to twelve predetermined rock types (lithologies). Although these could be described generally as 'resource' maps, they only give a broad two dimensional explanation with no information on the thickness of deposits and only a general inference of quality/suitability. Initial attempts to score the rocks and superficial (sand/gravel) deposits (using a system which had been applied in Ireland) were abandoned in favour of a simpler, more generalised scheme. Some of the assumptions made in the Irish study previously do not necessarily carry over well into the situation in North Wales.

Permitted Reserves and Landbanks

Status of Permitted Reserves

3.60 Data on permitted reserves have been collected and published annually by NWaRAWP for well over a decade.

3.61 However it is important to reiterate most forcefully that the permitted reserves in this context comprise the sum of mainly those figures submitted by quarry operators made in annual returns to the RAWP surveys. It should therefore be remembered that companies have different ways of calculating reserves and that the figures provided may not always have been reassessed professionally for some time. Even where carried out thoroughly, the interpretation of variations in a deposits and their suitability for various end uses may differ from site to site and time to time. This is especially important when considering materials to meet the demand for high specification requirements. Furthermore, although companies are asked to complete a specific reserve figure every fourth survey year, in intermediate years they can opt to use a calculation based on the previous reserve figure, minus subsequent production. Finally, in a small minority of the sites, where no reserve figures were submitted to the MPA, it proves necessary for the MPA to calculate permitted reserves.

3.62 In summary, at a very detailed level, there is scope for ambiguity and inaccuracy in the permitted reserve figures, but at a broader level, the data serves as a very useful indicator. This is a very important factor in the context of development plan provision where for example the

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[1] Implementing the Methodology for Assessing the Environmental Capacity for Primary Aggregates (IMAECA) Enviros (2005). See also Appendix 13

uncertainties are far greater than for example an assessment of land for housing provision. Ultimately, the reserves at a given site can generally only properly known when the site has actually been worked out.

3.63 In recent years it has become the convention to subdivide reserves into three categories: 'active' (i.e. permitted reserves at sites where mineral was extracted during the survey year), 'inactive' (when there was no extraction during the survey year, but which were not defined as 'dormant') and 'dormant' (sites so defined under the 1991 and 1995 Acts; effectively working cannot be resumed/started at such sites until a scheme of conditions is agreed). However, although there appear to be some inconsistencies in the treatment from year to year (the grouping of categories varies and this is not always self-evident), it is clear that most MPA areas in the region are extremely well endowed with reserves in comparison with others. Data should therefore be treated in relative, rather than actual terms.

Table 19a Permitted Reserves of Primary Aggregates 1973 – 2005: North Wales
M tonnes

	1973	1977	1985	1989	1993	1997	2001	2005
Sand/gravel	28	na	20	16	20	26	23	15
Rock	619	na	1,117	772	433	399	505	245
Total	647	na	1,137	788	453	425	528	260

Source: Rock 1973-1997 National Collation (2005) i.e. based on RAWP reports: 2005 from NWaRAWP Annual Report. S/G all from National Collation (2005)

Unfortunately there has been a marked lack of consistency in the presentation of reserve data (and N Wales is no exception), so that it has not always been clear whether "permitted reserves" includes or excludes dormant site data. This is the case at MPA level, but it is possible to plot the recent marked changes in reserve type for rocks at the regional scale.

It should be noted that in years prior to 2001 reserves were generally subdivided into "active" and "inactive" and that the latter included material at sites not operational in the survey years but available to be worked without further agreement to conditions as well as dormant sites as defined above.

In the years 2001 - 4 N Wales RAWP Annual Reports used the term "Active Reserves" as short hand to include all permitted reserves other than "Dormant Reserves", whether or not they were (operational (i.e. "active") in the survey year in question.

Permitted reserves is also now confined to those sites with full permission to work, i.e. it excludes sites recently permitted but where commencement to work is pending agreement on specific matters.

Table 19b attempts to bring together comparable information for the period 2001-5

Table 19b Permitted and Dormant Reserves: N Wales **M tonnes**

	2001		2002		2003		2004		2005		
	A/I	**D**	**A/I**	**D**	**A/I**	**D**	**A/I**	**D**	**A**	**I**	**D**
Limestone	203 (a)	12 (a)	143	47	155	28	132	21	185	6	24
Igneous/Sandstone	11 (b)	217 (b)	58	45	97	75	64	0	49	5	-
Total Rock	**214**	**229**	**201**	**92**	**252**	**103**	**196**	**21**	**234**	**11**	**24**
Sand/gravel	22	?	26	?	19	?	17	?	12	2	7
Total Aggregates	**234**	**229**	**227**	**92**	**271**	**103**	**213**	**21**	**246**	**13**	**31**

A = Active
I = Inactive
D = Dormant
a) Figures for 2001 are for "North East Wales" and not specifically for limestone. It is known to include for example igneous rock in Conwy (35 Mt) and excludes limestone in Anglesey (1 Mt).
b) Figures for 2001 are for "North West Wales" and not specifically for igneous rock/sandstone. It is known to include for example limestone in Anglesey (1 Mt) and to exclude igneous rock in Conwy (35 Mt).

A more detailed analysis presented as table 2 in the 2005 Annual Report.

Table 20 Primary Aggregate Reserves North Wales at 31 December 2005
All figures in 1,000 tonnes

Limestone/Dolomite	Active	Inactive	Total	Dormant
Anglesey	83	0	83	0
N W Wales Total	**83**	**0**	**83**	**0**
Conwy	37,699	150	37,849	0
Denbighshire	20,594	4,541	25,135	11,680
Flintshire	126,206	1,485	127,691	12,000
N E Wales Total	**184,499**	**6,026**	**190,525**	**23,680**
Total Limestone	**184,582**	**6,176**	**190,758**	**23,680**

Igneous Rock				
Anglesey	11,867	5,000	16,867	0
Gwynedd	5,400	0	5,400	0
N W Wales Total	**17,267**	**5,000**	**22,267**	**-**
Conwy	32,138	0	32,138	0
N E Wales Total	**32,138**	**0**	**32,138**	**0**
Total Igneous	**49,405**	**5,000**	**54,405**	**-**
Total rock	**233,987**	**11,176**	**245,163**	**23,680**

Slate				
Gwynedd	41,851	636	42,487	50
N W Wales Total	41,851	636	42,487	50
Total Slate	**41,851**	**636**	**42,487**	**50**
NW Wales Total Rock	59,201	5,636	64,837	50
NE Wales Total Rock	216,637	6,026	222,663	23,680
North Wales Total	**275,838**	**11,812**	**287,650**	**23,730**

N.B. Dormant Reserves **Not** Included In Inactive Reserves

[table continues...

Sand and Gravel	Active	Inactive	Total	Dormant
Gwynedd	950	25	975	225
NW Wales Total	**950**	**25**	**975**	**225**
Denbighshire/				
Flintshire/Wrexham	11,854	2,352	14,206	430
NE Wales Total	11,854	2,352	14,206	430
Total Sand & Gravel	**12,804**	**2,377**	**15,181**	**655**

N.B. Dormant reserves **NOT** included in Inactive reserves

It should be noted that the figures for Flintshire include 45 Mt, set aside to meet the needs of industrial limestone consumers (i.e. principally cement). MTAN1 recognises the problems posed by very old planning permissions with inadequate conditions (if any), often relating to extensive areas, but which have not been worked for many years (or in some instances have never been worked). These are subject to the Review of Old Mineral Permissions (ROMPs) and are officially classed as “dormant” – i.e. operations cannot be resumed until a new scheme of conditions has been agreed between the owner and the MPA. MTAN1 requires all MPAs to examine critically, all dormant sites and to ascertain to what extent they are likely to be proposed for reopening. Annual returns have to be made by MPAs to the Assembly (see Appendix 15). As a second stage, MPAs are asked to pursue serving Prohibition Orders on those sites where working is unlikely to be resumed. North Wales MPAs have been exemplary in this respect. Most of the dormant sites relate to rock, rather than sand and gravel.

Dormant Sites

It has to be remembered that dormant reserves are often based on very imprecise information about volume or suitability for use and frequently have to be estimated by MPAs. In some large dormant sites no reserve information was available and no figures have been included.

The most outstanding feature of these figures is the considerable attenuation of “dormant reserves”. Despite some variations in the information base, it is clear that in 2001 the overall reserves were considerably inflated by dormant reserves; indeed in that year, as far as rock was concerned, at 229 Mt, dormant reserves exceeded permitted (active/inactive) reserves. This contrasts with the 2005 crushed rock dormant figure of about a tenth of the 2001 level.

Further notes on the activities of MPAs in reducing dormant reserves in recent years is given in Appendix 15.

Landbanks Defined

3.64 Landbanks comprise the stock of planning permissions at all active and inactive sites within a given area. The landbank of dormant sites has to be shown separately (MTAN1 para 47). They are conventionally expressed either in tonnes or in years of life at a given (usually a recent average) production rate. MTAN1 (para 45) also confirms (by implication) that the method for calculating landbanks continues to be the tonnage of permitted reserves divided by the average of the last three years production. MTAN1 (para 45) however defines this as the "current landbank". It goes on to define the future (or "extended") landbank as including all land explicitly allocated (i.e. in UPDs/LDPs) for the working of aggregates.

Landbanks - Policy Setting

3.65 MTAN1 is particularly important and specific in establishing the framework for considering the role of primary aggregates. Paragraph 49 requires MPAs (National Parks and AONBs excepted) to maintain landbanks within a given MPA (or group of MPAs) which are adequate but not excessive. For rock this should be equivalent to 10 years "production"[1] (based on an average of sales over the previous three years) and for sand and gravel, a minimum 7 year land-bank applies. Both levels are to apply at any particular point in the duration of a development plan period. A further exception is made where, in cases where allocation cannot be made (e.g. for environmental or resource reasons) an agreed compensating provision can be made by another MPA.

3.66 Where existing landbanks exceed 20 years, plan provision is not required and MPAs are asked to consider whether extensions to existing quarries or new quarries should be permitted other than in exceptional circumstances (examples of these are given in MTAN1). In this context, it should be noted that some of the landbanks contain rock (e.g. certain types of limestone) which should be effectively 'earmarked' for industrial (non-aggregate) uses. In other instances, the nature of deposits constituting the landbank may not suit the specifications now required by the present market which may have to be met from new permissions.

3.67 Applying the MTAN1 requirements to the RTS, the rock landbanks (i.e. current and extended) should set out the means for provision covering the next 15 years (i.e. the 5 years of the RTS review period, plus 10 years) in the case of rock and 12 years (i.e. the 5 year of the RTS review period and 7 years in the case of sand and gravel) at the outset, to enable provision to be rolled forward at the end of the review period (to 2021). Furthermore, the present phasing for preparing LDPs suggests that some indication of requirements for a slightly longer period may also be advisable. Data in the Apportionment section is therefore also given to 2025. Before proceeding to the issue of future working areas and the environmental capacity of such areas to accommodate additional operations if required, it is necessary to consider existing landbanks in the region.

Landbanks – Analysis

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[1] NB the terms 'production' and 'sales' have been traditionally used interchangeably – all the surveys conducted over the last c10 years have technically concerned sales, but the same data are still frequently referred to as "production" or "output".

3.68 Data on reserves of various types is published in the NWaRAWP annual reports. In the 2005 report, a number of the figures for various MPAs were grouped together (see table 20).

3.69 Table 21 indicates the scale of current landbanks in years by MPAs. This indicates clearly that most areas have larger rock landbanks than the minimum required (see above). Consequently, as far as these (in some instances broad) groupings are concerned, all fall into the category under which MTAN1 (para 49) advises MPAs not to make further allocations in development plans, unless there are exceptional circumstances. In detail, this may not be the case, for example, when grouped MPAs are separated out, or in respect of specific aggregate types.

3.70 MTAN1 also infers strongly that the present method of calculating landbanks needs to be reconsidered (i.e. based on apportionment derived from past production and reserves), as it reinforces the existing distribution of operations, a system based on perpetuating historic producing areas.

Table 21 North Wales Aggregates Landbanks in Years

	2001 (b)	2002 (b)	2003 (c)	2004 (c)	2005 (d,e)
Limestone					
Anglesey	9	5	5	+8	+3
Total N W Wales	**9**	**5**	**5**	**+8**	**+3**
Conwy	18.7	30	30	+2	28
Denbighshire	19.1	26	32	.25	24
Flintshire	40	37	35	25	31
Total N E Wales	**28.3**	**33**	**33**	**28**	**29**
Total N Wales Limestone	**28**	**32**	**33**	**28**	**29**

Igneous Rock/Sandstone					
Anglesey	20.9	32	40	42(a)	66
Gwynedd	1111	1110	405	27(a)	29
Total N W Wales	**238.9**	**267**	**161**	**32**	**53**
Conwy	71	87	87	64	82
Flintshire	n/a	-	-	-	-
Total N E Wales	**85.8**	**87**	**87**	**64**	**82**
Total Rock N Wales Igneous Rock/Sandstone	**187.9**	**212**	**105**	**50**	**58**
Total N Wales Rock	**59.1**	**64**	**32**	**32**	**33**

Sand/Gravel					
Gwynedd	10	15	3	5	8
Total N W Wales	10	15	3	5	8
Denbighshire/Flintshire	12.2	15	15	14	15
Wrexham	19.7	18.7	11		16
Total N E Wales	**15.9**	**19**	**18**	**14**	**(14)**
Total North Wales S/G	**14.7**	**18.6**	**14**	**12.7**	**13**

Source: NWaRAWP Annual Reports

a) based on a average of only two years sales
b) includes dormant reserves
c) probably excludes dormant
d) excludes reserves for industrial limestone
e) excludes reserves set aside for industrial uses.

ENVIRONMENTAL CAPACITY

Background

3.71 The Welsh Assembly Government considered that it was important to ensure that the aggregates supply in Wales should in future reflect the ability of resource areas to accommodate workings more closely than in the past. The Assembly therefore commissioned Arup Environmental to carry out a study into the environmental capacity of such areas. Their report, "Establishing in Methodology for Assessing Aggregates Demand and Supply" (EMAADS) was completed in 2003 and advocated a system whereby each grid square containing more than a given proportion of aggregate resource, should be assessed against twelve criteria, reflecting predefined environmental assets. It also advised the adoption of a supply based more closely upon population (as a general approximation to demand) within each MPA (see Demand).

3.72 Having established a methodology, Enviros Consulting Ltd was commissioned by Welsh Assembly Government to generate the resource base, assess the incidence of environmental indicators and to build a system by which values can be attached to each 1km grid square concerned. Their report, "Implementing the Methodology for Assessing the Environmental Capacity for Primary Aggregates" (IMAECA) was published in 2005 and is available from the Welsh Assembly Government. (see Appendix 13) . The values attached to each environmental capacity indicator were fixed by Welsh Assembly Government. The report's authors consider that it will meet most of the requirements of Strategic Environmental Assessment (SEA).

Meanwhile, MTAN1 (published in 2004)(para 50) endorsed the environmental capacity approach.

3.73 The results of IMAECA are displayed in two forms; as twelve segments within each 1km grid square or secondly, as a cumulative indicator for all the environmental criteria within each grid square. The results are relative not absolute. The green values indicate comparatively high environmental capacities to accommodate quarrying, the orange designations an average ability and a red attribution, a low environmental tolerance towards quarrying.

Use and status of EMAADS/IMAECA

3.74 The creators of the methodology, the Welsh Assembly, the RTS sub group and the RAWP wish to emphasise most forcefully that the values given to any given location are only indicative (i.e. not absolute). Secondly, that EMAADS/IMAECA is a tool to be used only at a strategic level for the preparation of the RTS (i.e. not directly in Local Development Plan or in development control or planning appeal decisions). Thirdly, the results are to be taken as only one of a number of input factors (e.g. alongside current landbanks, environmental implications attached to usage different aggregate types, use of secondary materials, transport issues) in informing the future supply of aggregates in the region.
Appendix 16 presents a broad analysis in note form of IMAECA as it applies to aggregate resources in the region and to the section on Guidance to MPA s on Apportionment.

TRANSPORT

Key Background

(see also Appendix 17)

3.75 Mineral movements have traditionally accounted for the greatest bulk of freight transport in tonnage terms. With the demise of the deep mined coal industry in the region, aggregates now account for almost all the minerals transported (i.e. except petroleum products, industrial limestone for cement and occasionally, opencast coal) and with this change, the overall volumes of minerals handled by rail have declined considerably. Aggregates are high in bulk and low in relative value, even compared with other minerals, with transport typically accounting for half the delivered costs in the case of most journeys over c 25 km. The relatively wide distribution of aggregate resources in the region consequently means that currently, about 90% of deliveries are made by road, with the remainder being split between rail and water. This is approximately in line with the average figure for England and Wales as a whole where rail and water generally account for c 10% of all deliveries. This last figure is boosted by very large rail flows exported to other regions from the East Midlands and South West, compared with the virtual absence of rail/water flows from five other regions.

3.76 Although rail and sea transport has been historically significant, by the 1980s, only three quarries were regularly using these modes.

Economics and logistical factors greatly constrain choice of transport mode. There are significant implications for environmental, spatial planning and a number of non-transport policies.

Table 22 North Wales: Sales by Mode of Transport K tonnes

	1973	1977	1981	1985	1989	1993	1997	2001	2005
Rail	na	216	na	(c)	na	na	206	256	342
Water	na	214	na	610	na	na	519	689	279
% of total sales	na	7.2	na	9.4(a)	na	na	8.1	11.0	9.0

(a) This assumes rail was 200,000 t
(c) confidential

3.77 More specifically, MTAN1 (Paras 29 and 40) in respect of land-based aggregates extraction also recognises the significance and impacts of transporting material by road and indicates two potential solutions, i.e. increasing the relative proportion of material carried by other modes or reducing the distance between source and user. Para 40 therefore seeks to apply the “Proximity Principle” to effect the latter. It also acknowledges that road transport is frequently the only option in Wales and that as a consequence, long distance road movements must be reduced.

The implications of these policies in North Wales are now considered.

3.78 Conventionally, aggregates are predominately transported by road. Rail transport is theoretically more environmentally appropriate, but for many reasons is often impractical. Firstly relatively few quarries are suitably located with respect to railways and the same is often true of the main markets served. As significantly, even where railways run through an area, there are often logistical issues concerning the connection of extra sidings at either end of the journey (space, cost and signalling regimes may preclude this). Track specifications and alignments may not be geared to freight traffic and with growing passenger traffic, train paths may not be available during acceptable working hours. Finally, the additional cost of link movements by road, double handling (on/off loading), usually make rail only viable for large volumes of traffic over reasonably long journeys (say over 130km) or alternatively extremely large volumes over shorter journeys. If the material concerned can bear a premium (e.g. HSA stone) or where it is directed to markets where there is no local hard rock, this may be sufficient to cover such additional charges. The length of current journeys is considered under "Road Distribution".

3.79 Apart from exports to N West England, the potential for rail in conventional markets within the region appears to be very limited, apart from the occasional very large projects, requiring particular types of material not locally available and where rail connections are physically and logistically feasible.

3.80 These are interim conclusions based on the application of basic principles of economics and logistics currently applying to road v. rail modes. Within the next five years, the practicalities and economies should be explored further to ascertain whether such principles apply universally to the area and in what circumstances or areas, rail might indeed be a viable alternative to road transport.

3.81 One particular area for investigation might relate to assessment of large construction projects such as tidal barrages, or various projects where government and local authority have opportunities to intervene.

Policy Setting

3.82 Transport is frequently regarded as one of the most intrusive elements of the minerals production/consuming industries. Government policies seek to minimise this impact.

Mineral Policy Wales 2000 (para 42, 43) reiterates Planning Guidance (Wales) Policy (First Revision 1999) and Transport TAN (Wales) 18 (1998) in favouring rail and water modes wherever this is economically feasible. It also points to the importance of encouraging the construction of wharves and railheads and to the need for general integration/coordination of transport with land use planning to this end, including making adequate provision for on-site storage and processing at such sites. It goes on to note that where road transport is the only option, the capacity and nature of the road network is a material consideration and points out that S106 agreements/planning conditions should be applied to control or direct movements. Finally it seeks to reduce the level of road traffic, particularly in residential or congested areas.

A brief desk-top analysis would suggest the following as far as the future is concerned. The promotion of non-road transport and exports to the North West are inextricably bound together. The opportunities for moving considerable quantities of waste slate to England are already being developed with sea transport and rail is being actively preserved.

It is necessary to ask – given the very high levels of exports to N West England, could not more of this material be rail hauled or water borne?

There would appear to be some scope for increasing rail and water usage in Conwy (subject to detailed study) but a commensurate increase in export from the region is likely to follow. In Denbighshire, Flintshire and Wrexham, in general, the journeys to the market are below the general road/rail threshold and in almost all cases operational quarries could not be rail served without substantial addition of branch lines (in some instances by revitalising long since closed routes). The possibility of rail served quarries in the heartland of N Wales is likely to present even greater challenges in terms of cost, logistics and potential environmental impact and again could only be viable if destined for export beyond the region.

It should be emphasised that these findings are based on existing knowledge, advice and data resulting in a fairly superficial analysis. It is recommended that the opportunities and issues presented by the need to balance the proximity principle with encouraging greater carriage by rail and water should be investigated further before the RTS review.

Summary: Transport Issues

The region already makes greater use of sea (and to a lesser extent of rail) than most other regions, but there is scope for increasing these levels of usage.

3.83 The economics, logistics and some of the planning issues governing non-road transport are described above. These suggest that, to be viable economically, they require significant volumes of transfer between fairly tightly defined points (i.e. suitable quarries and markets proximate to dispatch/reception points), and in the case of rail, along available train paths. Also, to support the capital and running costs, the scale and distances usually have to be large and markets sustained. As the total market is inelastic, this also suggests a small number of very large producing units would be most appropriate in this context.

3.84 In contrast, the proximity principle implies that the shortest possible distances between sources and markets should be the aim and in turn, the need for a significant number of small/medium scale operations, proximate to the main centres of consumption. The latter is the normal pattern on Anglesey, along the N Wales coast and in Flintshire. In contrast there are very few quarries outside those areas which are in any case, far less densely populated.

3.85 Many of the problems associated with road transport are experienced over the often relatively short distance between the processing plant and the primary road network. There appears to be a particular need for a more comprehensive approach to decision-making and for opportunities to be taken to improve the situation at older but active plants in this respect, in order to improve local sustainability.

Further analysis (on a desk study scale) of the potential for rail haulage may be worth considering, if only to establish whether or not prima facie there was a reasonable case for developing such proposals in more detail. The overall environmental implications including the possible consequences of thereby promoting a considerable increase in production, would have to be integral to any such study.

In conclusion, the only large scale resources in relatively close proximity to coasts which are outside National Parks and AONBS, appear to be restricted to Porthmadog, Penmaenmawr/ Penmaenbach, Great and Little Ormes and Old Colwyn – Abergele. However some of these are places adjoin marine Special Areas of Conservation, which have very high levels of environmental protection.

MPAs are advised to safeguard potential wharf areas from development which could prejudice the opportunities for ship borne aggregates traffic.

PART FOUR: APPORTIONMENT AND GUIDANCE

APPORTIONMENT PROCESS

4.1 Apportionment is the process of subdividing and assigning the likely requirement for aggregates to be met from a region, to the various resources within a region. This and the following sections draw upon all the strands of information set out in the previous sections.

Method A: Conventional Approach

4.2 The conventional method has been as follows. Demand forecasts have been produced by projection or econometric methods (see Demand) and applied to "national" consumption. Government policies have then determined the proportions of this requirement to be met nationally from primary, marine and alternative sources respectively and these materials are then set on one side ("top sliced"). The residual (large) figure for primary aggregates is then allocated to each region using some form of baseline devised from previous production, which is then multiplied by an anticipated future demand trend.

Method B: Per Capita Approach

4.3 As MTAN1 indicates, this effectively perpetuates historic supply patterns which now do not necessarily reflect the most sustainable approach to supply. It suggests that in this context, other methods need to be considered.

4.4 Two sets of sustainability policies have been brought into play in shaping this method. Firstly the proximity principle (i.e. reducing journey lengths) which aims to source material from as close as possible to the consumer. Secondly, future working should be focussed upon these areas which have the greater environmental capacity to accommodate future working. This method therefore seeks to use the distribution of population as a proxy for the distribution of demand. It generally assumes an average level of consumption per head. This level is set by reference to survey data where available. As in Method A, Method B is directly concerned with primary aggregates, alternative aggregates having been 'top sliced'.

Establishing a Base

4.5 For both approaches, the starting point, i.e. the division of Wales into North and South, has been based on the existing subdivision as reported in the 2005 Surveys (see previous sections) This can be readily justified as the two areas serve entirely different markets.

4.6 There are a number of factors which have to be overcome in order to implement either approach and some compromises are inevitable at least in the short to medium term mainly on account of the imperfect nature of the data (particularly relating to confidentiality groupings) and existing commitments in the form of permitted reserves (see Appendices 14 and 19).

4.7 It must be emphasised that a broad statistical analysis such as that now presented is not capable of reflecting important subtleties in the market, for example the availability of large quantities of Pre Carboniferous sandstone without significant environmental constraints may be of limited value to major market over 100 km distant without rail connections. Different types of aggregate source are not necessarily interchangeable, or, if they are used as an alternative, they may have higher intrinsic environmental costs (see Primary Aggregates – End Uses and Table 2).

4.8 The anticipated growth in demand for aggregates is 1-2% pa (see Future Demand). MTAN1 policies seek to ensure that growth in requirement is met mainly if not entirely from secondary materials. As a starting point, it is therefore assumed that in the period to 2010, the contribution from secondaries will increase at 3%pa and from primary aggregates at 1%pa. Furthermore (using DCLG data for importing regions), export demand will be 1.5%pa and imports (i.e. all primaries) will be at 1%pa. These rates applied to the base 2005 figures for Wales, but making an adjustment to remove the import contribution, are shown below.

Table 23: Primary and Secondary demand: Wales – 2005 – 2025 M tonnes

	Primary Aggregates Consumption	Secondary/ Recycled	Total Consumption	Imports	Exports	Total Demand
2005	13.5	6.0	19.5	0.5	6.4	25.4
2006	13.6	6.2	19.8	0.5	6.5	25.9
2007	13.8	6.4	20.2	0.5	6.6	26.3
2008	13.9	6.6	20.5	0.5	6.7	26.7
2009	14.0	6.8	20.8	0.5	6.8	27.1
2010	14.2	7.0	21.2	0.5	6.9	27.6
2011 - 25	14.2	7.0	21.2	0.5	6.9	27.6

Source: tables in relevant previous sections.

Applying the same growth rates to the 2005 split for North Wales produces the following data.

Table 24: Primary and Secondary demand: North Wales 2005 - 2025

	Primary Aggregates Consumption (a)	Secondary/ Recycled (b)	Total Consumption (c)	Imports (d)	Exports (e)	Total Demand (f)	Primary Aggr Demand (g)
2005	3.3	1.6	4.9	0.3	3.8	8.4	6.9
2006	3.3	1.6	4.9	0.3	3.9	8.5	6.9
2007	3.4	1.7	5.1	0.3	3.9	8.7	7.0
2008	3.4	1.8	5.1	0.3	4.0	8.8	7.1
2009	3.4	1.8	5.2	0.3	4.0	8.9	7.1
2010	3.5	1.9	5.4	0.3	4.1	9.2	7.3
2011 - 2025	3.5	1.9	5.4	0.3	4.1	9.2	7.3

a) Consumption of primary aggregates using National Collation 2005 as base
b) secondary/recycled using NWaRAWP Annual Report/ Faber Maunsell 2005 survey data and assuming all used in the region – (see Secondary/recycled aggregates – section 3)
c) calculated from (a) + (b);
d)e) average of last 3 AM surveys – National Collation as base
f) calculated from (c) minus (d) plus (e)
g) calculated from (f) minus (b)
NB differences of ± 0.1 due to rounding

4.9 In view of the recent increases in the use of secondary and recycled aggregates and the indications of relatively little scope for further practical advancement of CD&EW, the rise in the secondaries contribution envisaged here may appear to be rather optimistic. However, the situation could change radically if the use of waste slate were to be increased substantially (as is possible). If this were to be the case, the degree to which this could offset the demand for conventional primary aggregates and most importantly for these calculations, the balance between this substitution in local or export markets, is a fundamental consideration. This is unknown at present, but is likely to impact more on export than domestic sales.

4.10 When considered against policy for Wales as a whole, the levels projected from 2009 onwards marginally breach the top of the range set (MTAN1 para 20), for 2010. MTAN1 seeks a stable primary output and any growth being fully met by secondary/recycled materials. Within this total, the requirement for primary aggregates is assumed here to rise in actual (but not proportionate) terms. In the light of the uncertainties already expressed in respect of the ability of secondaries to be increased, there is also doubt whether their utilisation could be raised even further to enable primary production to be stabilised. In mitigation, the overall changes in the primary requirement are relatively small and well within any margins of error. For example if flat line figures for primary aggregates were to be adopted for the 2006 – 2021 period, it would mean a cumulative difference shortfall of 2.7 Mt for North Wales, about 0.17 Mtpa, i.e. a figure equivalent to the output of a small to medium sized quarry. Figures assuming a nil growth and a 1% growth in the contribution from primary aggregates are therefore considered later in this section.

If this growth were instead, to be added to the secondary/recycled contribution the pattern would be as follows, equivalent to an increase in the annual figure by 2010 over 2005 of only 12.5%, again a level well within the possible range which could be accommodated by a rise in waste slate usage.

Table 25 Revised Secondary/recycled contribution: North Wales M tonnes

2005	1.6
2006	1.6
2007	1.8
2008	1.8
2009	1.9
2010	2.1
2011 - 2025	2.1

Method A - Projection Based on Existing Consumption Patterns

4.11 The detailed methodology and calculations are given in Appendix 19.
In order to overcome confidentiality issues and to provide a more representative base, averages for the period 2003-05 were used at MPA level in most instances, but where possible, 2005 figures are shown for comparison (see Table 10).

4.12 Subregional apportionment is concerned with primary land won aggregates. The following table therefore summarises the production requirements to 2021 (data to 2025 is also given in

Appendix 19) using both 2005 and 2003-5 averages as a base. In the period to 2010, they are also displayed as and at a constant rate and with a 1%pa growth applied.

The individual components of the primary aggregates contribution would therefore be as set out in table 26.

Table 26 Composition of annual base primary aggregate demand – rebased 2005 figures
M tonnes

Limestone/dolomite	4.7
Igneous rock	1.0
Total rock	**5.7**
Landwon S/G	1.2
Marine S/G	
Total	**6.9**

Source: table 24 and 2005 figures

Table 27 North Wales Primary Aggregates Projections Method A: Summary of Cumulative

M Tonnes	(a)	(b)	(c)	(d)	Permitted Reserves (e)(f)
Crushed rock					
Anglesey/Gwynedd	9.0	10.5	9.0	10.5	25.85
Conwy	21.0	21.0	22.3	22.3	69.99
Denbighshire	15.0	15.0	16.2	16.2	25.14
Flintshire	48.0	49.5	50.7	52.2	127.70
Total rock	**93.0**	**94.5**	**98.2**	**101.2**	**248.66**
Sand/gravel					
Gwynedd/Anglesey	3.0	3.0	3.0	3.0	0.98
Flints/Denbs	15.0	4.5	16.2	4.5	14.21
Wrexham		9.0		9.0	
Total S/G	**18.0**	**18.0**	**19.2**	**16.5**	**15.18**
Total Aggs	**111.0**	**112.5**	**117.5**	**117.7**	**263.84**

See Appendix 19 for details
a) 2003-5 average MPA split applied to 2005 – constant to 2010 (table A19.2)
b) 2003-5 average MPA split applied to 2003-5 – constant to 2010 (table A19.3)
c) 2003-5 average MPA split applied to 2005 – 1%pa growth to 2010 constant thereafter (table A19.5)
d) 2003-5 average MPA split applied to 2003-5 – 1%pa growth to 2010 constant thereafter (table A19.7)
e) permitted reserves at end 2005 NWaRAWP Annual Report (excludes dormant reserves)
f) includes in Gwynedd, slate in ground (3.5 Mt) but not slate in tips.

Method B

Projection based on population as a proxy for market demand. The detailed methodology and calculations are given in Appendix 19. In order to safeguard commercially confidential data (see Appendix 14), it has proved necessary to group the data for certain MPAs. At the same time attempts have been made to present information at as detailed a level as possible. Unfortunately the grouping necessary for rock and sand/gravel differ, and if added together would result in a very broad level of apportionment indeed. It would not be logical to estimate per capita apportionments separately for rock and for sand/gravel, as although the two commodities can be interchanged for some purposes, this can be only to a certain degree, and there is also a risk of double counting.

4.13 In applying Method A, data had to presented using both a 2005 and an average 2003-5 base in order to produce a more detailed breakdown at MPA level. This resulted in different base figures being set. To enable direct comparisons to be made, both bases are used here also.

4.14 Although neither geological resources of aggregate nor consumption is evenly distributed throughout the region, it has been suggested that a more equitable distribution of operations may be gained by allying production points more closely to consumption, and to do this by applying the average consumption per capita to population distribution. This follows the alternative approach advocated in the EMAADS Report[1].

Average consumption of primary aggregates per head in the region is 4.9 tpa. Theoretical consumption base figures using this per capita rate one displayed below.

Table 28 North Wales Primary Aggregates Average per capita-based consumption estimates: 2005 K tonnes

Sub Region (d)	MPA	Population X 1000 (a) (c)	%	Consumption Primary Aggs 2005 (b)	
N West Wales	Anglesey	68.7	10.2	340	923
	Gwynedd	117.7 (e)	17.5	583	
North East Wales	Conwy	111.0 (f)	16.5	550	2408
	Denbighshire	95.8	14.2	473	
	Flintshire	150.1	22.3	742	
	Wrexham	130.2	19.3	643	
	Total Aggs	**673.5**	**100.0**	**3331**	**3331**

a) Population in thousands from mid-year estimates for 2005 (takes into account recent boundary changes (2003/2005)
b) Total from regional consumption (National Collation 2005); average per capita consumption on this basis is 4.9 tpa.
c) Snowdonia National Park population (26,250 in 2005) is distributed to all the relevant local authority areas otherwise listed but most of the population is resident in Gwynedd – see notes (e) and (f). Small differences in total due to rounding
d) Sub-regional consumption as defined in National Collation 2005. See also Domestic Consumption (main text).
e) of which in 2001, 21,000 (i.e. 18% was in Snowdonia NP
f) of which in 2001, 4,500 (i.e. 4%) was in Snowdonia NP

[1] Establishing a method for Assessing Aggregates Demand and Supply Arup Environmental 2003.

4.15 The three “Apparent” surpluses/deficits noted above offer a very crude theoretical indication of the extent to which parts of the region are self sufficient. It should be noted that (c) and (e) Do not take into account the very large amount of exports (hence the high level of surplus in N E Wales) and the minor level of imports. The figures in (f) however indicate that the imbalance (at 317,000 t) between the per capita theoretical consumption and surveyed consumption is remarkably small.

Table 29 North Wales 2005 Primary Aggregates comparison of surveyed consumption, per capita consumption and production K tonnes

<table>
<tr><th>Sub Region (g)</th><th>MPA</th><th>Production (a, h)</th><th>Surveyed Consumption (b)</th><th>Difference (a - b)(c)</th><th>Per capita Consumption (d)</th><th>Difference (a - d) (e)</th><th>Difference (b-d)(f)</th></tr>
<tr><td rowspan="2">N West Wales</td><td>Anglesey</td><td rowspan="2">815</td><td rowspan="2">1240</td><td rowspan="2">-425</td><td rowspan="2">923</td><td rowspan="2">-108</td><td rowspan="2">+317</td></tr>
<tr><td>Gwynedd</td></tr>
<tr><td rowspan="4">North East Wales</td><td>Conwy</td><td>1370</td><td rowspan="4">2091</td><td rowspan="4">+4424</td><td rowspan="4">2408</td><td rowspan="4">+4107</td><td rowspan="4">-317</td></tr>
<tr><td>Denbighshire</td><td rowspan="3">5145</td></tr>
<tr><td>Flintshire</td></tr>
<tr><td>Wrexham</td></tr>
<tr><td colspan="2">Total Aggs N Wales</td><td>7330</td><td>3331</td><td>+3999</td><td>3331</td><td>+3999</td><td>0</td></tr>
</table>

a) from tables 8 and 9 (see also footnote (f) below)
b) from table 15 (from National Collation 2005)
c) “Apparent” suppliers/deficit (i)
d) from table A19.9
e) “Apparent” surplus/deficity (ii)
f) Apparent surplus/deficity (iii)
g) Sub region defined in National Collation 2005.
h) NB the figure for 2005 is higher than that given in the National Collation report for that year. It relates to an underrecording of limestone in Denbighshire of 431,000 tonnes in that report

Appendix 19 details the calculations whereby projections are made using the per capita/population based 2003-5 average data, are calculated for each year to 2021. Two sets are used: one projected at a constant rate; the other assumes 1% growth p.a. to 2010 and constant thereafter. Both sets include provision for exports. The cumulative results are summarised below and compared with permitted reserves.

Table 30 North Wales Aggregates – Summary of per capita estimates 2007 – 2021

Sub Region (g)	MPA	(a)	(b)	Permitted reserves (c)		
				Rock	Sand/gravel	Total
N West Wales	Anglesey	6.0	6.0	16.9	-	16.9
	Gwynedd	10.5	10.5	5.4	1.0	6.4
North East Wales	Conwy	21.0	22.3	69.9	-	69.9
	Denbighshire	15.0	16.2	25.1	- (d)	25.1 (d)
	Flintshire	49.5	52.2	127.7	5.3 (d)	133.0 (d)
	Wrexham	15.0	16.2	-	8.9 (d)	8.9 (d)
	Total Aggs	**117.0**	**123.4**	**245.0**	**15.2**	**260.2**

a) 2003-5 average based per capita consumption plus exports: constant throughout
b) 2003-5 average based per capita consumption plus exports: 1% growth to 2010; constant thereafter.
c) Permitted reserves as at 31/12/05 – N Wales RAWP Annual Report
d) In 2005, sand and gravel reserves were grouped for Denbighshire, Flintshire and Wrexham. The reserves in Denbighshire were very small. The 2005 figures for Wrexham (62.5%) and Flintshire/Denbighshire (37.5%) were therefore divided by applying 2004 proportions and Denbighshire was assumed to be “nil”

GUIDANCE TO MPAS ON APPORTIONMENT

4.16 In this section, the various sources of aggregate supply, the permitted reserves, demand assessments, transport, Assembly policies and the findings of the environmental capacity study (IMAECA) are drawn together, to provide a regional assessment of aggregates demand and supply, and a basis for aggregates policies in LDPs.

The reader is referred to those specific sections for explanations of limitations and methodologies in arriving at the recommendations now made. In particular attention is drawn in respect of the cautions attached to the application of the IMAECA data.

In terms of the need for allocations to be made by MPAs, these all relate to primary land won aggregates, the demand to be met by secondaries/recycled materials and from marine sources having been ascertained and "removed" ("top sliced") at regional level. As far as the contribution from secondary and recycled aggregates is concerned, it is acknowledged that this may not be achieved evenly in all parts of the region (and there is any event a lack of suitable monitoring data at MPA level).

This section is intended to be strategic in nature and does not present detail relating to the importance of protecting natural and cultural assets (apart from as echoed in general terms by IMAECA). However policies which seek to restrict future aggregate operations in National Parks and AONBs are strategic in their effect. Whereas no recommendations are made for additional allocations, references are made to the need to safeguard resources, in order to protect them against developments which might sterilise them. (see Appendix 20).

The following analysis inter alia compares current landbanks (i.e. permitted reserves expressed in years of life based on 2003-5 average production) with the various projected requirements. MTAN1 stipulates that provision should be made for 10 year landbanks in the case of rock and 7 year landbanks for sand and gravel. As noted in para 3.67 above, 5 years has to be added to each of those periods to cover the review cycle for the RTS.

The apportionments set out in this section do not take into account permissions granted since 2005 (which may reduce the level of allocations now required), dormant sites or allocations already in UDPs or proposals in UDPs and LDPs. Existing provision in policies is worded in various forms and cannot always be readily compared across the region. Allocations in plans are termed "extended landbanks" in MTAN1.

Box 1

The guidance to MPAs that follows is based on the outputs of the Method A and Method B apportionment processes, (as detailed at the beginning of Section 4). This guidance deals only with the apparent requirements for crushed rock and sand & gravel resources to be made available on the basis of total requirements compared with the current total of permitted reserves in the relevant area and therefore does not take fully into account factors that may be material to ensuring an adequate supply of aggregates obtained from appropriately located sources. Such factors include:-

- The technical capability of one type of material to interchange for another.
- The relative environmental cost of substitution of one type of material by another
- The relative environmental effects of changing patterns of supply
- Whether adequate production capacity can be maintained to meet the required supply

In preparing Local Development Plans, planning authorities need to take these factors into account in determining whether resource allocations are required.

(Appendix 19 is relevant in this respect)

1. Anglesey

[NB for confidentiality reasons, the apportionment for Anglesey has been made jointly with Gwynedd. Further guidance is given below].

Anglesey can claim major deposits of almost all main rock types – and in particular limestone, various igneous rocks, and sandstone although much of the island is cloaked in glacial deposits. Relatively small sand and gravel deposits are found inland from Red Wharf Bay. Historically, being an island, the area has been more self sufficient in aggregates than probably any other county in England and Wales.

In 2005, active quarries included two igneous operations, four limestone units and one sandstone working (shown in data under igneous rock). Production in recent years has declined following the completion of the A55 across the county but may also have been influenced by the increasing use of slate waste (see Gwynedd).

The use of secondary aggregates is confined to occasionally processing locomotive ash at Trywyn Trewan and recycled glass is mixed with stone for asphalt at one quarry. There may be some additional potential for recycling CD&EW in the event that MOD or industrial land is released.

Although none of the quarries are currently rail-served, there are two lines across the island and ports at Holyhead (major) and Amlwch (minor). A sea wharf serving Dinmor Quarry was removed about decade ago.

Most of the igneous rocks and limestone areas exhibit low environmental capacity. Much of the exposed limestone lies within the AONB and includes a number of large former quarries.

MPAs are not expected to make allocations in plans for areas situated in AONBs (MTAN1 para 49).

Based on recent shares of production Anglesey and Gwynedd combined would be expected to contribute 9.0 Mt to 10.5 Mt of crushed rock and 3 Mt of sand and gravel over the next 15 years.

On a per capita basis, this would equate to 6 Mt for Anglesey and 10.5 Mt for Gwynedd. It is anticipated that the vast bulk of sand and gravel would be derived from Gwynedd, but that the proportion of crushed rock would be more equally divided, however with Gwynedd accounting for a much greater proportion than in the recent past. Current permitted reserves of rock are adequate in overall terms, but there is an imbalance between the two MPA areas in terms of distribution, with Anglesey bearing substantially more reserves than in Gwynedd. If anything the call is likely to greater in the latter area. The proximity principle has a particular bearing on this balance as transfer across the Menai Straights should be avoided in order not to exacerbate traffic volumes across the bridges any more than at present.

It is difficult to asses the amount of sand and gravel which should be provided for. As a general indicator, natural sand/gravel accounted for a quarter of regional consumption; if applied to the per capita requirement figures, that would imply a need for 1.5 Mt (i.e. 24% of 6 Mt) cumulatively over the next 15 years.

Recommendation:

On the basis of the information on permitted reserves available and in the light of MTAN1 policy (para 49), and applying Method A and Method B apportionment, no crushed rock resource allocation is required at present. However, the situation concerning the availability of material to meet market specifications should be monitored carefully. Furthermore in preparing Local Development Plans, consideration should be given to whether the factors in Box 1 (para 4.16) above give rise to any requirement for resource allocations.

The LDP should make allocations for 1.5 Mt of sand and gravel. Land based sand and gravel resources should be safeguarded.

Whereas it is recognised that the geology of the island is extremely complex, the case for safeguarding rock resources, particularly of limestone and the better quality igneous rocks, should be explored over the next five years.

Bearing in mind the need to ensure that the area is as self sufficient as possible, the levels of demand, particularly arising from any substantial development, should be carefully monitored.

Existing and potential wharf and rail siding facilities and rail routes should be safeguarded for protection in the LDP.

Opportunities for recovery CD&EW from redundant sites should be maximised.

2. Gwynedd

[NB for confidentiality reasons, the apportionment for Gwynedd has been made jointly with Anglesey. Further guidance is given below].

Historically Gwynedd (in the form of Caernarfonshire) was one of the leading producers of igneous rock in the UK, being second only to Leicestershire. Stone was shipped from coastal quarries particularly on Llŷn from numerous jetties. The legacy of old mineral planning permissions resulted in a considerable volume of reserves in sites designated as "dormant". In recent years those have been eliminated by the use of Prohibition Orders. There are now only two regularly active igneous rock quarries. The small number of quarry ownerships means that production cannot be disclosed for confidentiality reasons. There are two glacial sand operations, the only significant ones in North West Wales.

Almost all of the main igneous rock masses on Llŷn lie within the AONB. These deposits largely fall within areas exhibiting a low environmental capacity to accommodate future working. MTAN1 (para 49) also makes it clear that allocations should not be made in AONBs in normal circumstances. The environmental capacity of sand and gravel deposits is more variable, but still relatively low, apart from the area between Caernarfon Bay and Snowdonia.

Marine sand is landed at and distributed from Port Penrhyn near Bangor. It is won by dredgers which also deliver into Merseyside docks.

Gwynedd is by far the main source of slate waste in the UK (see Appendix 18 for a detailed analysis). Usage has increased recently and is set to rise further (to c 1 Mt in 2007), particularly with the recent introduction of sea transport to Liverpool and Manchester. However the full potential cannot be realised until the logistics of transporting material by rail have been overcome. At the time of writing there were also uncertainties over the future of the leading slate waste processor. There may be indications that slate waste is displacing the output of primary aggregates in North West Wales, but the evidence from trends is complicated as the period under review coincided with the completion of major roadworks when a downturn would have normally been expected. Increased use of slate waste probably offers the best potential for N Wales achieving the secondary/recycled aggregate target set in MTAN1.

Trevor "granite" quarry still has workable reserves, is on the coast and a small port remains nearby. It is not clear to what degree additional use of sea transport could or (apart from its use for slate waste) should be encouraged. Facilities at a number of potential wharves have been lost to other forms of development e.g. marinas and housing; consideration should be given to safeguarding remaining wharf facilities for transferring aggregates by sea.

Based on recent shares of production, Gwynedd and Anglesey combined would be expected to contribute 9.0 Mt to 10.5 Mt of crushed rock and 3 Mt of sand and gravel over the next 15 years i.e. pro rata 2.4 Mt over the next 12 years.

The imbalance between Gwynedd and Anglesey needs to be addressed in the Gwynedd LDP. It is most unfortunate that the data sets for the two MPAs cannot be separated out.

It is clear that with only 1 Mt permitted reserves of sand and gravel, further releases are required in Gwynedd. The situation with rock is a little more complicated as there are planing permissions to quarry 3.5 Mt of virgin slate (ie not slate waste) in addition to the 5.4 Mt of permitted reserves of conventional rock, making a total of 8.9 Mt.

Applying the per capita data to the overall proportions of rock: sand/gravel consumed in the sub-region suggests a sand/gravel requirement in Gwynedd of c2.52 Mt (i.e. 10.5 Mt x 24%) over the 15 year period, of which 1.0 Mt is already available from current permitted reserves. Converting this further to the 12 year sand/gravel requirement suggests a level of 2 Mt being necessary.

On this basis there is a sufficient permitted "rock" reserve. However 40% of this rock reserve is of slate which may not be suitable for all aggregate purposes (see Table 2). The future situation will therefore require careful monitoring.

Although secondary/recycled aggregates are "top sliced", as a special case (and in the light of a better statistical base than for other secondaries) it could be also argued that increased utilisation of waste slate might obviate the need for additional hard rock provision in this area. It is acknowledged that this might indeed be the case, in which event, the release of rock from such an allocation might need to be specifically dependent upon justification for material of a particular quality which cannot be met from processed slate waste.

Recommendation:

On the basis of the information on permitted reserves available and in the light of MTAN1 policy (para 49), and applying Method A and Method B apportionment, no crushed rock resource allocation is required at present. However, the situation concerning the availability of material to meet market specifications should be monitored carefully. In the event of rock allocations becoming appropriate the release of such reserves" should be controlled to ensure that these are justified by a need which cannot be satisfied by the use of slate waste. Furthermore in preparing Local Development Plans, consideration should be given to whether the factors in (para4.16) above give rise to any requirement for resource allocations.

On the basis of the information on permitted reserves available and in the light of MTAN1 policy (para 49), and applying Method A and Method B apportionment, allocations should be made in the LDP for 1.0 – 1.5 Mt of sand and gravel.

Landbased sand and gravel and rock (mainly igneous rock) resources should be safeguarded in the LDP where appropriate, especially where these are of limited occurrence and in particular (but not exclusively) outside the AONB.

Existing and potential wharfs, rail connections and railways should be safeguarded in LDPs, against prejudicial development. All reasonable steps should be taken to facilitate and maximise the use of waste slate for aggregates and CD&EW where this is environmentally and technically acceptable. In particular this should include promotion of improvements to the transport network.

3. Snowdonia National Park

The area contains extensive outcrops of igneous rock, slate and hard Pre Carboniferous (i.e. Lower Palaeozoic) sandstones. These rocks are the main factor in giving rise to the dramatic scenery of the National Park. There are also small scattered sand and gravel deposits.

Very large dormant reserves, (notably at Arenig) have all been deleted following the successful serving of Prohibition Orders (see Review of Dormant sites Appendix 15). The last active quarry at Tonfannau near Towyn ceased working when reserves were exhausted in 1998.

The IMAECA study was carried out for the whole of Wales on a uniform basis. This confirmed that there were very large areas of the National Park which exhibited a low environmental capacity to accommodate quarrying. However a number of zones, particularly in the south east, as well as to the east and centre of the main Snowdon range, display a relatively high environmental capacity. This does not of course mean that proposals for future quarrying would be acceptable in such areas.

Notwithstanding the MTAN1 policy which precludes allocations in National Parks, the absence of quarrying on any scale for almost a decade, and the lack of permitted reserves mean that Method A cannot in any case be applied, as the base data does not exist. On a per capita basis, the National Park with a population of only 26,000 people (mid 2005) would in theory require 0.127 Mtpa (at 4.9 tpc), i.e. equivalent to a relatively small quarry. Over the 15 year period this would amount to 1.911 Mt. In the calculations made for the other MPAs apportionment, the per capita estimates were effectively absorbed in the figures for Gwynedd and Conwy.

These amounts are comparatively small when considered in the context of the volumes of slate waste available in Gwynedd, the permitted reserves in Conwy, or the extent of resources (as opposed to permitted reserves) located in Gwynedd.

Recommendation:

Where appropriate, hard rock resources (mainly igneous rock) should be selectively safeguarded against prejudicial development, especially in those areas exhibiting high environmental capacity. The relatively small areas of sand and gravel should be identified and similarly safeguarded. However such a designation should not be taken to infer that future working will be permitted.

Support should be given to facilitate the use of slate waste and CD&EW for aggregates where this is environmentally acceptable. This includes assisting efforts made to exploit and transport material from areas outside the National Park such as Blaenau Ffestiniog.

4 Conwy

Both the limestone and igneous rock deposits are very largely concentrated along the coastal zone. The large permitted areas of both these rocks are confined to relatively small parts of this band of the county, which they share with the main costal settlements and key communications routes.

The latter have enabled stone to be carried by sea as well as rail from the area, including for export to England, for more than a century, indeed one of the main quarries was operated by a shipping line for many years and another supplies rail ballast to Crewe. There is probably potential for additional transfer by rail and sea, but this would involve exporting additional quantities beyond the region. Where this could substitute for existing road borne exports, it could be regarded as relatively sustainable, but long term increases would need to be assessed in the context of the proximity principle. Away from the coast, there are very large areas of Pre Carboniferous (Lower Palaeozoic) sandstones often alternating with smaller igneous rock outcrops none of which are currently exploited. The three large active quarries include two producing limestone and one working igneous rock. A small operation produces building stone intermittently.

No significant sources of secondary or recycled aggregates were identified with the possible exception of relatively small slate waste tips.

Most of the igneous rock outcrops lie in an area of low environmental capacity. The limestone deposits show greater variation, but do include some zones relatively more able to accommodate quarrying

Ironically, although both the major limestone and igneous rock quarries made substantial contribution to the construction of the A55 Expressway, the direct links to/from these quarries

still pass through built up areas before reaching the dual carriageway. However ships and trains currently loaded via conveyors from the quarries.
Based on recent shares of production or on a per capita calculation, Conwy would be expected to contribute 21 Mt to 22.3 Mt over the next 15 years. Permitted reserves of both limestone and igneous rock are well in excess of this requirement. There is no sand and gravel production but resources have been identified in the Conwy Valley. No provision has been made for sand and gravel at present provision is not possible from these materials.

Recommendation:

On the basis of the information on permitted reserves available and in the light of MTAN1 policy (para 49), and applying Method A and Method B apportionment, no rock resource allocation is required at present. However, in preparing Local Development Plans, consideration should be given to whether the factors in Box 1 (para 4.16) above give rise to any requirement for resource allocations for rock or sand and gravel.

Rock (mainly igneous rock and limestone) and sand and gravel resources should be safeguarded in LDPs.

Existing and potential wharves, rail links and railways should be identified for safeguarding in the LDP. This includes facilities, the transfer of waste slate from other areas, through Conwy.

Where appropriate possible measures should be taken to improve access routes between quarries and, the primary road network, and major rail or ship loading points and to maximise the use of CD&EW.

5. Denbighshire

For confidentiality reasons it has been necessary to combine Denbighshire and Flintshire as far as sand and gravel are concerned.

The limestone outcrops follow an irregular line flanking the west of the Vale of Clwyd and also occur as a shared outcrop with Flintshire along much of the eastern border of the county. Limestone is quarried in both these areas, there being four operational sites in 2005. In the centre, south and west of the MPA area there are numerous irregular outcrops of Pre Carboniferous (Lower Palaeozoic) sandstones mainly forming the higher ground but previously worked in the land north of Corwen. Although some of the harder sandstone historically were sold under the name “granite”, the country lacks igneous rocks.

The post Carboniferous (Permo-Triassic) sandstones (forming the base of the Vale of Clwyd) are poorly exposed and are far too soft for use as aggregate, apart from possibly being crushed to produce sand.

Sand and gravel is found in glacial and river valley deposits. It was produced at one relatively small site in 2005.

Tips of slate waste are far less extensive than in Gwynedd, but were processed at one location. Other than these no significant sources of secondary aggregate were identified.

Although the area was served by a number of railways, the only one part of the main network, is the North Wales Coast line. Only the former dormant quarries around Prestatyn are reasonably close to this line. There are no suitable port facilities for aggregates.

In terms of environmental capacity to accommodate quarrying, the levels recorded in the IMAECA study for limestone outcrops were mainly in the low to medium range. Some of the Pre Carboniferous areas scored high.

The Clwydian Hills AONB embraces the northern tip of the limestone around Prestatyn as well about half of the outcrop as far south as Llandegla and just beyond. Incidentally the limestone outcrops even further south around Llangollen, although of landscape significance, statutorily designated.

Based on recent shares of production, Denbighshire would be expected to contribute between 13.5 Mt and 16.2 Mt of crushed rock (limestone) over the next 15 years and to add a small share of sand and gravel to the 4.5 Mt combined output of Denbighshire–Flintshire for the same period. It is difficult to estimate the extent of Denbighshire commitment in respect of sand and gravel. This might be better informed by reference to the notional per capita requirement. On a per capita basis, the Denbighshire apportionment for all aggregates over the next 15 years would range between 15.0 Mt and 16.2 Mt. However these figures broadly corroborate the Denbighshire rock only figure, thus emphasising the small scale of the sand and gravel requirement. Also, using the relative populations of Denbighshire and Flintshire to define proportions, 1.0 Mt should be regarded as a sand/gravel target covering 12 years for Denbighshire within the global Denbighshire – Flintshire sand and gravel total. Permitted reserves of rock exceed the 15 year requirement.

Recommendation:

On the basis of the information available on permitted reserves and in the light of MTAN1 policy (para 49), and applying Method A and Method B apportionment, no resource rock allocation is required at present. However, in preparing Local Development Plans, consideration should be given to whether the factors in (para 4.i6) above give rise to any requirement for resource allocations.

An allocation of 1.0 Mt sand and gravel in the Denbighshire LDP to cover at least a 12 year period should be made in liaison with Flintshire. Steps should be taken to maximise the use of CD&EW as aggregates.

Sand and gravel and rock (especially limestone) deposits should be safeguarded in the LDP.

6. Flintshire

For confidentiality reasons it has been necessary to combine Flintshire and Denbighshire as far as sand and gravel are concerned.

Although the county area is relatively small, since c2002, it has accounted for about half the region's crushed rock output. This is entirely of limestone and in 2005 was drawn from six quarries all located on or near Halkyn Mountain.

In addition to aggregates, another large limestone operation is solely devoted to supplying the cement works at Padeswood which also relies upon colliery spoil as feedstock.

In the past, varying but generally small amounts of Coal Measure sandstone have been produced.

The county, together with a nearby pit in Denbighshire also produces sand and gravel from two glacio-fluvial sites in the Wheeler valley. In regional terms the scale of the outcrops in the county appears to be second only to Wrexham in extent (although the areas in Gwynedd are not easily compared).

Small amounts of clay and shale are produced intermittently for construction fill at two sites. These are not included in the apportionment statistics.

The main limestone outcrop is sandwiched between the Coal Measures (of the former Coalfield) to the east and the Clwydian Hills. The Denbighshire/Flintshire border follows an irregular course, in many places bisecting the limestone. The sandstones lie immediately to the east of the limestone (a narrow band of "Mudstone Grit – often very hard and siliceous) as well as highly dissected deposits within the coalfield.

Only near the northern tip does the limestone approach the main rail line and this area is mostly in the Clwydian Hills AONB. The outcrop is traversed by the highest points of the A55 Expressway west of Holywell. There are port facilities at Mostyn. Existing quarries could not be rail or port connected without substantial new capital investment (which in some instances may require the reopening of former rail route) or without intensively used lorry runs. This is unfortunate as it greatly inhibits any schemes to move the substantial volumes transported to N West England other than by road. However the length of most of the delivery journeys to the N West is relatively short (most are less than 50Km – a conventional upper limit for road deliveries). Counter to this, rail is uniquely employed for distances of this length or less out of the Buxton area but in very large volumes. In some instances, the main issue appears to be the need for quarry traffic to pass through small villages en route to the primary road network.

The Clwydian Hills AONB affects the far north of the limestone outcrop as well as much of the deposit south of the Wheeler Valley. The latter includes a number of active operations as well as some units which are dormant or have closed recently. Much of Halkyn Mountain outside the AONB and those areas already permitted for quarrying has been designated a Special Area of Conservation.

The environmental capacity exercise showed that much of the limestone displays a low level of ability to accommodate additional quarrying, with the notable exception of a zone around the A55 in the north.
The confidentiality requirement has resulted in a need to combine sand and gravel data for Flintshire with Denbighshire and, in 2005 with the substantial output from Wrexham. This complicates the apportionment process. Flintshire accounts for about 50% of the estimated

dormant reserves in the region, but the total has been reduced considerably in recent years by the use of Prohibition Orders. In addition, unquantified (as far as reserve % tonnages are concerned) dormant sites are also present. They include two sand and gravel sites as well as three limestone units.

In most instances former dereliction in the coalfield has been removed and new, high-tech industries have replaced earlier activities, leaving little further opportunity for generating secondary aggregates on a regular basis. For example the closure of Shotton Steelworks has been superseded by BAE systems as the major employer in the area. Unknown quantities of navigational dredgings are landed at Mostyn Dock, some of which is understood to have been deployed for low specification construction fill.

The relatively high levels of industrial and commercial development and redevelopment (including in the past mining and MOD facilities) generate a significant but unquantified proportion of the regions CD&EW. There may be some further opportunities in the south of the MPA.

Based on recent shares of production, Flintshire would be expected to contribute 48.0 Mt to 52.2 Mt crushed rock (limestone) over the next 15 years and to supply the bulk of the 4.5 Mt joint sand and gravel requirement for Flintshire and Denbighshire. On a per capita basis, this would equate to a total aggregate apportionment of 49.5 Mt to 52.2 Mt. Whereas permitted rock reserves are considerably in excess of these levels, permitted reserves of sand and gravel at 5.3 Mt (when combined with a small reserve in Denbighshire), are only just mathematically sufficient to cover the 15 year period.

Recommendation:

On the basis of the information on permitted reserves available and in the light of MTAN1 policy (para 49), and applying Method A and Method B apportionment, no rock resource allocation is required at present. Statistically sand and gravel reserves are just sufficient for the 12 year period. This situation should be closely monitored and the need for allocations should be kept under close review. In addition, in preparing Local Development Plans, consideration should be given to whether the factors in (para 4.16 above) give rise to any requirement for resource allocations.

Resources of rock (particularly limestone) and sand and gravel should be safeguard in the LDP.

The feasibility of increasing the proportion of export material carried by rail should be investigated.

Every effort should be made to measure and increase the amount of CD&EW generated and used as aggregates.

In the next 5 years there is a need to review the available reserves and long term (20 years) needs for limestone to support Padeswood Cement works and other non aggregates consumers and if appropriate to made specific allocations in this respect.

7. Wrexham

Whereas Wrexham does contain outcrops of limestone (those at Minera were historically very important), as far south as Chirk, they are no longer exploited. Hard quartzitic sandstone and silica rock occur above the limestones but are also not now quarried.
No reserves at dormant sites were recorded in 2005.

The resources of sand and gravel in the MPA area are the most extensive and generally the thickest in the region. There were two substantial sand and gravel sites operational in 2005.

The IMAECA study showed a very mixed range of environmental capacities for sand and gravel but generally very few high capacity areas. Most of the rock outcrops had a low capacity.

Two rail lines cross the area, that from Chester to Wrexham being relatively near the sand and gravel workings but the latter generally serve markets within 30-40 km. There are no ports nor commercial canals. The former quarry at Minera was rail served but the whole site has been closed for many years. A rail siding serves Padeswood cement works.

The relatively high levels of industrial and commercial development and redevelopment (including in the past mining and MOD facilities) generate a significant but unquantified proportion of the regions CD&EW.

Until relatively recently slag banks were processed intermittently at the former Brymbo Steelworks for construction fill and also in the past, colliery spoil heaps have been used as embankment fill. A substantial amount of derelict land and buildings associated with the mining and clay products industries e.g. around Ruabon has been cleared and other tips have been reprofiled leaving little scope for generating further material from such sources.

Based on recent shares of production, Wrexham would be expected to contribute 9.0 Mt of sand and gravel over the next 15 years. The lack of rock production in recent years means that a comparable rock calculation cannot be made. However, on a per capita basis the figure for aggregates as a whole is significantly higher at 15.0 Mt to 16.2 Mt over the same period. These last requirements greatly exceed the existing permitted reserve (c8.9 Mt in 2005), although the latter being sand and gravel, does accord with the MTAN1 (para 49), stipulation that landbanks should equate to at least 7 years supply.

Recommendation:

The sand and gravel landbank should be monitored carefully and the total landbank for all aggregates increased gradually over the period so that it accords more closely to the per capita requirement. This may necessitate the need to make allocations at the end of the first review period and consideration should be given to the provision of rock as well as sand and gravel.

Particular attention should be given to monitoring and maximising the use of CD&EW.

The feasibility of using rail transport for aggregates should be investigated.

The safeguarding of resources particularly of sand and gravel will be especially important in this MPA area and every reasonable opportunity should be taken to promote the extraction of sand and gravel prior to development which could otherwise sterilise deposits.

APPENDIX 1 LISTS OF MEMBERS

NWaRAWP Members:

Gareth Jones (Chair)	Gwynedd Council
Ian Thomas (Tech Sec)	National Stone Centre
Karen Down	c/o National Stone Centre
Dafydd Gareth Jones	Gwynedd Council
Gareth Lloyd	Snowdonia National Park
Gary Nancarrow	Flintshire County Council
Jonathan Cawley	Denbighshire Council
Wynford Rowlands	Wrexham County Borough Council
Ceri Thomas	Conwy County Borough Council
John Williams	Anglesey County Council
Nicholas Brown	Norwest Sand & Ballast Mersey SandSupplies/BMAPA
Tom Brown	Hanson Aggregates/QPA
Keith Frost	Cemex/QPA
Graham Gibson	Alfred McAlpine Slate Ltd
Ken Hobden	QPA
Richard Hulse	Tarmac North West/QPA
Richard Millard	QPA Wales
Ian Pearson	Lloyds Quarries Ltd/British Aggregates Association (BAA)
Darrell Williams	Darrell D P Williams (Holdings) Ltd/Independent
Gerard Sloyan	Sloyan Doyle (Demolition) Ltd/NADC
Peter Bide	Communities and Local Government
Steve Bool	Bridgend County Borough Council/S Wales RAWP
Andy Farrow	Cheshire County Council/N West RAWP
Paul Lusty	British Geological Survey
William Mackenzie	Communities and Local Government
Sue Martin	Welsh Assembly Government/Planning Division
Stewart Mitchell	Cemex/QPA
Phil Northam	Wales Environment Trust
Meryl Read	Environment Agency
Raymond Roberts	Countryside Council for Wales
Carolyn Warburton	Welsh Assembly Government/Planning Division
Siwan Williams	Welsh Assembly Government/North Wales

RTS Sub-group

Gareth Jones (Chair)	Gwynedd Council
Ian Thomas (Tech Sec)	National Stone Centre
Karen Down	c/o National Stone Centre
Gary Nancarrow	Flintshire County Council
Graham Gibson	Alfred McAlpine Slate Ltd
Richard Millard	QPA Wales
Ian Pearson	Lloyds Quarries Ltd/British Aggregates Association (BAA)
Darrell Williams	Darrell D P Williams (Holdings) Ltd
Steve Bool	Bridgend County Borough Council
Sue Martin	Welsh Assembly Government
Chris Dobbs	Tarmac/QPA Wales

RTS Members Forum

Cllr R Hywel Wyn Williams (Chair)	Gwynedd Council
Peter Weston	Snowdonia National Park Authority
Dr Iolo ap Gwynn	Snowdonia National Park Authority
Cllr Mark Pritchard	Wrexham County Borough Council
Cllr Howard Monysen	Wrexham County Borough Council
Cllr Tony Tobin	Conwy County Borough Council
Cllr John Williams	Anglesey County Council
Cllr Jim Jones	Flintshire County Council
Cllr Gareth Williams	Flintshire County Council
Cllr Bob Barton	Denbighshire County Council

APPENDIX 2 NORTH WALES REGION: its character and economy

The area forming North Wales extends as far south as a line drawn north eastwards from the Dyfi Estuary. It occupies about 30% of the total land area of Wales.

Its current population is approximately 675,000 persons and is mainly concentrated in an narrow arc from Llandudno in the west running along the coast, then broadening in the Mold/Wrexham to Ruabon in the south.

Economic activity is closely aligned to the coastal transport routes from Caernarfon to Prestatyn and in the former coalfield areas of Denbighshire, Flintshire and Wrexham in the east. The strongest growth is anticipated in this eastern area and forms a part of wider zone of economic development embracing the Wirral and Merseyside.

Within N Wales, there is a diverse and extremely broad range of landscapes, coastal and urban settings. A number of reasonably distinct areas can be defined:

Cambrian Coast and Llŷn - The narrow coastal strip together with the Llŷn Peninsula is heavily dependent upon tourism which naturally tends to be very seasonally based but the area offers a wide range of local interests and features (including stunning landscapes). There are now no other large scale industries in this area. Communications are challenging particularly around the three large estuaries.

Llŷn differs in that extensive low lying agricultural land is punctuated by prominent but generally isolated upland areas of hard rock, many of which in the past supported quarry industries important on a UK on even European scale.

Most of the southern coast lies in the Snowdonia National Park. Significant parts of Llŷn are designated AONB. Some former working ports have been converted into marinas.

Anglesey – Despite an abundance of ancient hard rock, the whole island has generally low topography, the result of extensive glaciation, the related deposits masking the bedrock over much of the area. The exception is Holyhead Mountain. Although the Anglesey has been linked to the mainland by bridges since 1826, it still functions very much as an island, with farming (and at one time mining) as the main traditional occupation.

Economic activity is focussed in the north, Holyhead Port, and Anglesey Aluminium and the MOD being significant employers. However closures of other key industries in that area have resulted in some economic decline. Elsewhere tourism is locally important in the south east. Most of the coast comprises an AONB.

Northern Coastal Belt – From Caernarfon to Prestatyn but also including the broad Vale of Clwyd. This shares some of the characteristics of the southern coastal area but the population is significantly greater, and it has the decided advantage of good road and rail links. It is also an area of great contrast including the university city of Bangor, the Victorian resorts of Llandudno and Colwyn Bay, popular holiday destinations at, Rhyl and Prestatyn and the ancient strongholds of Conwy and Caernarfon. Like the southern coast, the towns often became established where inland routes met the sea and suitable harbours developed. Most of the towns depend both on tourism and upon relatively modern SME based industries. Limited parts of the area are in the Snowdonia National Park and an AONB.

North East Wales - The character and settlement pattern is very closely determined by the extent of the former N Wales Coalfield – forming the coastal lowland and reclaimed ground alongside the Dee Estuary, broadening to Mold then running southwards to the Dee at Chirk. The western edge runs through the Clwydian Hills AONB. Although sandstone is present this is very much brick country as far as buildings are concerned. All collieries have closed and so too have the dependent industries - the two iron and steel works, a power station, most of the chemical and all the brickworks. However this is still by far the most industrial part of the region, the main players being aircraft manufacture at Broughton as well as numerous activities on industrial parks, particularly around Wrexham.

The Hinterland - The most extensive area by far comprises the remainder of the region. The western half constitutes the Snowdonia National Park. The Clwydian Hills AONB form the north eastern limit.

Whereas it could be subdivided into the Snowdon Massif (including the highest peaks in England and Wales), the Rhinogs, Berwyns etc, it is essentially a very large area of predominantly upland terrain incised by narrow, often deep long valleys. The latter offer the main usually more gentle routeways between small stone built market towns and villages.

Apart from agriculture and its use by mainly coastally based tourists, the main land uses are water gathering for the English conurbations and forestry, although most small towns have established small industrial areas over the last three decades. The slate (former and current) producing areas, in Gwynedd do not fit well into this pattern, in the past supporting very large work forces and being a major “World scale” industry in its own right. Their relative isolation posed considerable challenges in the interwar period and this legacy still lives on to some extent, despite innovative tourism and power generation initiatives.

APPENDIX 3 WALES SPATIAL PLAN OBJECTIVES

To achieve the vision of sustainable development, mineral planning must seek to address a number of specific aims and objectives which have been identified in the Wales Spatial Plan (WSP) as follows:

(vii) respecting distinctiveness
(viii) valuing our environment
(ix) building sustainable communities
(x) increasing and spreading prosperity
(xi) achieving sustainable accessibility and
(xii) embracing the future

At first sight, the relationship between quarrying and some of the objectives in the Wales Spatial Plan might appear to present considerable challenges. However there are direct linkages which can be summarised as follows.

Distinctiveness - this is embodied in the sense of place and in turn, local pride. One of the contributing factors, particularly strong in many parts of the region, is the use of vernacular building materials and particularly stone. The same material often equally forms the foundations of our landscape. Although the RTS is concerned with the aggregates sector, some quarries produce both building stone and aggregates, thus contributing to this distinctiveness.

Valuing Environment – in places such as those just noted, a supply of relevant materials, either simply shaped or subject to appropriate processing, will be required to conserve and enhance the related built environment. Conversely there is always a need for the quarrying industry to continue improving environmental and operational standards and in some cases, where there is earlier dereliction, it can be used as a tool for enhancing local environments, by planned reshaping of damaged landscapes, or by the provision of leisure space or may offer important opportunities for bio/geo conservation. However in some instances, the value placed on a particular environment may be such as to limit, or preclude quarrying altogether, particularly where less environmentally intrusive opinions are available. This choice is usually available in the core of aggregates.

Sustainable Communities – the quarrying industry, the manufacture some of the related "downstream" products and their distribution, provide vital and longstanding sources of employment, (alongside agriculture and tourism) in certain rural areas.

Increasing Prosperity – the quarrying industry including produces essential raw materials to underpin the construction industry, which is fundamental to development and prosperity.

Sustainable Accessibility – minerals can only be extracted where they occur. North Wales is blessed with a wide variety of good quality aggregates. Transport (and hence energy) costs represent a significant proportion of the delivered costs of aggregates. In most areas of the region it is therefore feasible to sustain the proximity principle in respect of aggregate supplies. MTAN1 (para 29) promotes the greater use of water or rail transport on environmental grounds. MTAN1 (para 29) also indicates that self sufficiency within regions should be sought. These policies therefore need to be applied in an informed context as the situation in North Wales is complicated and could actually result in larger quantities being extracted in the region and transported longer distances for export to other regions. This in itself raises inherent questions about sustainability. Indirectly, the use of aggregates by providing materials for transport infrastructure will support improvement to such networks.

The future – the maintenance of adequate future supplies within a sustainable context is the prime aim of this document.

APPENDIX 4 SECONDARY AND RECYCLED AGGREGATES

The various types of secondary and recycled aggregates in North Wales summarised in Section 3 are reviewed in turn below (more detail is given in MTAN1. They are divided into three broad categories: i) CD&EW, ii) other industrial materials, iii) mine and quarry wastes. Slate in its waste and virgin forms is decribed in Appendix 18.

i) Construction, Demolition and Excavation Wastes (CD&EW)

This includes crushed or other material suitable for use as aggregates, recovered from construction projects, demolition of buildings and structures, wholesale removal of roads, aircraft runways, docks etc. It may be crushed on site (and reused on site or sold offsite) or taken to a depot/static site and processed for reuse.

All the statistics referred to in this section have a significant "health warning" attached for the following reasons:

- The nature of the industry is extremely varied and in many cases highly transient, naturally responding directly to the sites where demolition is taking place.

- The legislative control of the industry is split between local authorities and the Environment Agency[1].

- The categories of site are complicated (with potential for survey duplication or under representation) so that it is difficult to ensure a true population of aggregates processing sites is being surveyed[1].
- The locations where businesses are based and data is accounted for, are often distant from the processing activity on the ground. This is particularly the case in N Wales where a number of the operators are based in North West England.

- It is becoming more economic to use/hire smaller crusher and screening plants, and for smaller tonnages to be recovered over shorter campaign periods, resulting in increasingly transient operations.

- Significant quantities are reused on site, particularly on larger schemes (to obviate transport costs, Landfill Tax and, more recently the Aggregates Levy on primary aggregates), very little of which is measured. However, Environmental Agency Wales are seeking to gauge levels of reuse onsite in their current survey. This could amount to a considerable proportion of the total volumes recycled and is usually by far the most sustainable activity in this sector.

- Unlike primary aggregates, there are only limited statutory reporting procedures and no centrally held data system of all throughputs by location of activity or usage.

[1] These are described in detail in the Faber Maunsell 2005 Survey [2007]

As a result of all the above and as ODPM/CLG and Welsh Assembly Government CD&EW surveys are not statutorily required, nor have they been traditional or regular, the level of response is generally very low (effectively 15% of all sites in 2005) and the confidence limits set around central estimates so broad as to render them questionable. They are therefore perhaps best used in a qualitative rather than a quantitative way. However the underlying trend demonstrated by the latest figures is significant and reinforces the results of earlier surveys. It is also understood that the Environment Agency C&D survey for Wales nearing completion at the time of writing, has received a 70% response.

Surveys of England and Wales were carried out for the government in 1999 and 2001[1]. The former was ostensibly for "inhouse" use only, largely on account of the uncertainty of the results. Particular cautions were attached to the results at anything below the level of totals for England and Wales, i.e. at "regional" level. Bearing in mind that the total amounts and scale of the industry in Wales as whole are less than that for any English region except possibly the North East, this makes data for Wales particularly suspect, and that for North or South Wales even more questionable. Totally separate surveys were conducted for England and Wales in respect of 2003[2] and 2005[3]. The results are summarised below in table A4.1.

The treatment of the low levels of returns received for the 2003 survey was questioned during the 2005 survey which may result in the need for reappraisal. A survey was carried out by WET for 2005 of sales from static crusher plants only, which indicated 0.370 Mt of secondary aggregate.

Notwithstanding these limitations the results of the national surveys are shown below:

Table A4.1 Arisings and usage of CD&EW as aggregates 1999 – 2005

M tonnes	**1999**	**2001 (a%)**	**2003 (a%)**	**2005**
Total Arisings				
N. Wales	nsa	1.56 (135)	1.46 (100)	nsa
S. Wales	nsa	3.46 (90)	4.54 (100)	nsa
Wales	3.29	5.02 (74)	6.01 (100)	9.89
Total recycled as aggregate				nsa
N. Wales	na	0.46 (135)	0.64 (45)	nsa
S, Wales	na	1.09 (90)	1.74 (43)	nsa
Wales	na	1.55 (74)	2.38 (b)	3.97 (b)

a) Bands ± around estimate shown, at 90% confidence level shown in brackets.
b) Aggregates figures for 2003 and 2005 include soil. When this was separately recorded in 2001 it amounted to 5% of total arisings; the same proportions are applied here to 2003 and 2005.
nsa - not separately available

[1] Survey of Arisings and Use of Construction and Demolition Waste in England and Wales in 2001 (Symonds) 2002.
[2] Smiths Gore 2003 Survey
[3] Faber Maunsell 2005 Survey

In order to corroborate earlier data, separate attempts were made to calculate 2005 figures by using data from the National Federation of Demolition Contactors Survey grouped for Wales and Midlands, in conjunction with data from the 2005 Survey for England. However the two sets of data proved contradictory in certain aspects and so could not be used.

More than 94% of CD&EW is currently regarded by WET as "low value" aggregate (i.e. only suitable for uses requiring less demanding specifications), but a substantial proportion could be upgraded to "high value" given the availability of suitable equipment, some of which is currently being installed. As with other waste and by-product materials, CD&EW has to meet the requirements of the WRAP Protocol or it may be considered by the Environment Agency as waste and have to be treated accordingly.

A separate survey is being conducted for 2005 by the Environment Agency Wales covering various other categories of CD&EW processing points in Wales and is expected to report in autumn 2007. This will cover some 350 construction companies e.g. to ascertain the amounts being generated, and used for aggregates on and offsite.

The 2001 and 2003 surveys separated the results into North and South Wales. The 1999 and 2005 studies did not as the level of returns was regarded as insufficient to be able to produce data at this degree of detail. Bearing in mind the strong cautionary notes attached to the usage of this data, it is regarded as inadvisable to rely upon further subdivision, but this is absolutely necessary for planning purposes. A pragmatic approach is therefore adopted below. Firstly, the average of the proportions apparently from the 2001 and 2003 surveys are applied. These are then compared with a breakdown using the relative populations as a weighting tool, most of the arisings and potential for usage being understood to be closely related to population.

Table A4.2 Weighting CD&EW aggregates 2005

	2001%	2003%	Average %	Applied to 2005 Mt	Million people	Population %	Applied 2005 Mt
South Wales	70	73	71.5	2.84	2.285	77	3.06
North Wales	30	27	28.5	1.13	0.673	23	0.91
Wales	100	100	-	3.97	2.958	100	3.97

From the above and bearing in mind the need for caution, the application of rounded figures of 3 Mt for of CD&EW usage for aggregates in South Wales and 1 Mt for N Wales respectively, would appear to be a reasonable way forward.

If, as government policy seeks, new construction becomes more concentrated upon brownfield sites than in the past, CD&E waste recycling could increase accordingly, at least in short to medium term until the stock of such sites dries up. Higher than the levels of CD&EW recycled within N.Wales.

It is axiomatic that if overall aggregates demand remains reasonably stable, the level of contribution from secondary and recycled aggregates could be maintained and indeed some elements (CD&EW) may actually rise in parallel with an increase in construction on brownfield sites.

However, if there were to be a significant and rapid increase in demand for aggregates, it is unclear to what degree an uplift of secondary and recycled aggregates could keep pace. In contrast, the primary sector is likely to be able to respond rapidly and fully.

MTAN1 para 157 also sets a target to recycle at least 40% of C+D waste (construction and demolition) arisings by 2005. (NB C&D waste now includes excavation waste).

The Faber Maunsell survey for 2005 recorded 9.89 Mt of total arisings for Wales as a whole, of which 4.46 Mt (i.e. 45%) was used as recycled aggregates, i.e. the same proportion as in the 2003 survey. However both the 2003 and 2005 data incorporated an undisclosed proportion of recycled soil. Soil was only separately identified in the 2001 survey which then amounted to 5% of all arisings. It would therefore appear that the target was met in 2003 and the position was maintained in 2005.

Based on the dynamics of the market, it has been suggested that the levels of recycling in N. West England, especially on Merseyside, are likely to exact a much greater influence on market demand for all aggregates from the North Wales industry. The North West RAWP is conducting a detailed survey of CD&EW arisings and usage in that region.

ii) Other Industrial Materials

A number of industrial materials mainly by product can be used instead of primary aggregates. Foremost of these are metallurgical slags but they also include material from power stations (p.f.a/f.b.a) and a wide variety of materials such as glass and ceramic waste. In some cases e.g. asphalt planings and rail ballast, it might appear more logical to group the substances under CD&EW. However, the coverage of CD&EW is already well defined in terms of survey returns, so those items are included in the industrial materials category. Data is collected by a number of agencies and in various forms.

Rail Ballast

Although rail ballast and road planings (i.e. road surfaces planed off before renewal) are forms of construction waste (CD&EW), usually their use is considered separately.

Spent rail ballast from the region is taken to Crewe, Cheshire, to be recycled. Annual Quantities arising here are not recorded.

Asphalt Planings

Information on road planings has been collected in some recent years by NWaRAWP from local highway authorities only. However those should be regarded as minimum as they do not include planings arising from work on the motorway and trunk road network which are administered by Transport Wales. The latter are likely to be substantial.

Table A4.5: Arisings and usage of road surface planings: North Wales 1999–05

K Tonnes	1999	2000	2001	2002	2003	2004	2005
Arisings	26	n/a	n/a	40 (a)	60 (f)	(e)	n/a
Recycled	24	n/a	n/a	40	60	(e)	n/a
a) b)		n/a	n/a	?	3	(e)	n/a
c) %		n/a	n/a	?	50	(e)	n/a

Source: NWaRAWP Annual Surveys Reports

a) Response rate was not 100%; includes estimates to produce a total
d) Includes estimates for non-returns.
e) Only one MPA made a return – Flintshire = 8,700 t.
f) Although the response rate was only 50% from LAs, it did include a return from the Trunk Roads Agency.

Most recycled planings are currently used for low grade tasks such as verges, cycle tracks footpaths and farm roads. Occasionally major resurfacing schemes have involved significant quantities over a short period.

The collection of road planings information is particularly unsatisfactorily in a number of respects. Firstly the agency administering Trunk Roads and Motorways currently Transport Wales, does not regularly provide data. This is likely to be a substantial omission. Secondly the responses from MPAs vary considerately from year to year. Thirdly, as virtually all road planning is carried out by public sector contracts, the volumes recycled annually should be regarded as one of the key sustainability indicators. Finally although the bulk of material is only applied to low grade uses, it has potential for upgrading, a factor which should also be monitored and which WES is attempting to conduct.

Miscellaneous Materials

iii) Mine and Quarry Wastes

The waste products of certain non-aggregate mineral operations can sometimes be converted to aggregates. Those occurring in North Wales include slate and colliery spoil (minestone). Slate is described in more detail in Appendix 18. Wastes arising from aggregates production are discussed under Primary Aggregates and the possibility of using china clay sands are discussed under “Interregional Dependency”. Sandstone has occasionally been worked effectively as a “by-product” of open cast coal mining (i.e. as a “windfall source”), but there are sometimes significant issues relating to the phasing of operations, stockpiling and the need to achieve acceptable final landforms.

Colliery Spoil/Minestone

Quantities of colliery waste in tips in the past here were considerable – either unburnt (“black shale”) often with a high carbon and pyrite/sulphur content) or red (burnt) shale. In may cases the latter was preferred as being a more chemically stable construction fill. Following the Aberfan Disaster (1966), a long government programme of tip removal or landscaping under the

Derelict Land Reclamation Scheme (and successors) took place. This “loss” of tips as sources of aggregates was accelerated by the major colliery closure programme of the 1980s – 90s so that now, very few tips in the region are considered available for processing as aggregates. Apart from local (social and planning) and fiscal objections to reworking former tips, EU and UK government regulations may deter prospective recyclers in this respect. The overall potential is small for those reasons but could be locally significant. [MPOs to comment please].

One notable exception has been the gradual removal of a large tip at the former Llay Main Colliery. Since 1949 this has been used in conjunction with limestone from Cefn Mawr Quarry as the feedstock to Padeswood Cement Works, Flintshire. However as the usage is not for aggregates, it has not been included in the data collected annually by NWaRAWP. For this purpose it is environmentally more sustainable as the carbon content of the shale helps to reduce energy costs at the works. Whereas it could be regarded as deleterious if applied as construction fill instead of freshly quarried material.

Navigational Dredgings

It is understood that material dredged from the Dee, Mersey and Manchester Ship Canal channels has been landed at Mostyn Dock, Flintshire. The quantities are unknown but it is believed that the majority of the material is silt, not usable sand.

Other Sources of Secondary Aggregates

In 2004, estimated permitted reserves of 0.5Mt of clay were declared by operators, for use as construction fill. This is considered to be an underestimate as some sites were not reported. All such sites were located in the North East Wales Coalfield area, [mainly?/all] in Flintshire. The amounts of usage of clay and shale as construction fill have not been recorded recently.

Traditionally, large quantities of blast furnace slag were produced at various iron works in the region notably at Brymbo (Wrexham) and Shotton (Flintshire) and p.f.a/f.b.a at Connahs Quay Power Station (Flintshire). With the closure of all these works, stockpiles were depleted, with the last exploitation being recorded at the Brymbo site in 1997. Occasionally, small unquantified volumes of slag encountered during site restoration activities at Shotton works, have been recycled on site as foundation fill.

Very small amounts of so called ash/clinker have been worked intermittently at Tywyn Trewan, Anglesey, the origin of which is unrecorded, but may have been locomotive cinders.

More recently waste glass collected in N Wales has been crushed to a fine sand and used in asphalt mixes at a quarry on Anglesey. Tonnages are relatively small (a few thousand) but are understood to be growing. Small amounts of recycled glass from North Wales are also taken to South Wales for recycling as aggregates. It is also possible that small quantities of foundry moulding sand are recycled, but details are not known.

Total amounts in this “other secondary/recycled aggregates” category are unknown and where known, individual volumes are confidential, but overall are expected to vary greatly from year to year and in any one year to be less than 0.01 Mtpa.

Given the nature of general industry in the region, there is very little prospect of additional substantial arisings and potential use in this sector. For example, since the closure of Connah's Quarry Power Station, power generation has been by nuclear (now ceased), or by hydro and gas systems, as opposed to coal fired and light hi-tech industry is replacing traditional manufacture.

APPENDIX 5 MARINE AGGREGATES

Introduction

Of the nine regions receiving marine sand and gravel in England and Wales, landings in North Wales at 45,000 t in 2005 are the smallest. However dredging capacity and the main licensed resource which lies off the north coast of Flintshire/Dee Estuary, are effectively shared with North West England. Investigations have shown that it was not easily possible to segregate the sourcing of material from either side if the median line between England and Wales, for example Hilbre Swash licence area straddles the boundary . Landings to the North West region, primarily Merseyside were 838,000 t, but were drawn from a large area off Cumbria/Isle of Man, as well resources further south.

Marine sand does occur more widely offshore, but has to compete with land based resources elsewhere in the region in Gwynedd and particularly the extensive deposits around Wrexham, and outside the area, in Cheshire.

Currently the only receiving port in the region is Penrhyn near Bangor. This has been the case for many years. Landings of marine dredged material are shown in table 6.

Dock, river channel and canal dredgings are also landed at Mostyn Dock. These have a price advantage in not attracting the Aggregates Levy, but are understood to comprise mainly silt. The quantities landed or used are not known.

The Resource

Until recently, relatively little was known of the location, quantity and quality of resources and the impact of conservation and other interest on their possible exploitation for marine aggregates in the region. Under a European collaborative fund – (Interreg IIIA Community Initiative Programme 2000 – 2006), the IMAGIN project was launched in 2005 as a joint research venture between the Welsh Assembly and the Irish Government, one of the main motivations being the paucity of good quality sand to supply the high and growing levels of demand in the Republic of Ireland. The final report was being cleared at the time of writing and is likely to be released in early 2008.

The project has brought together existing information with some preliminary additional survey results and this identified more clearly, but still in very general terms, the extent of resources up to the median line, off North Wales. As well as the northern coasts, including Anglesey, the interim results of the study have also located deposits in Cardigan Bay as far south as St David's Head. These were mapped along with "constraints", such as areas important for marine conservation, fisheries, oil drilling/gas platforms, wrecks, pipeline safety and coastal protection.

Areas for follow up survey work were delineated, perhaps the most significant in the N Wales context being a large tract to the east of Anglesey, north of Llandudno and Rhyl.

The expansion in development of offshore windfarms off the region's coast may constrain areas of potential sand and gravel resourceson account of the significant areas they cover. Commercially viable resources are extremely localised. It is therefore essential that all the

potential future uses of the sea bed are assessed as part of the consent process for offshore renewable energy .
Marine resources “competing” for markets which might be served off N Wales include those related to N West England, Isle of Man and the Republic of Ireland each with separate legislative frameworks.

Control of Dredging and Landing

Licences to dredge are issued by the landowner, based on commercial terms agreed with the operator. However production operations will not be permitted until the operator is also in possession of a dredging permission – in effect the environmental consent. This is determined by the Welsh Assembly Government (or the Marine & Fisheries Agency (M&FA) if the site is in English waters), after consideration of detailed environmental studies – including a comprehensive EIA.

Not only does the control regime for marine aggregates differ from that of land won sand and gravel, so does the general approach to defining reserves.

The maximum amount that may be taken from production licence areas in any one year (i.e. the ‘offtake’) is controlled by the dredging permission and/or the dredging licence. The potential annual capacity of the production licences in the region can be derived by adding together, the maximum permitted annual offtakes for the period approved.

Local authorities do have a rôle in two situations. Where deposits extend from the foreshore into deeper, dredgable waters some deposits may come under normal planning controls. This is unlikely to be the case in N Wales. The second is in securing the protection (in statutory plans) of existing and potential landing facilities. The pressure of other types of waterfront development e.g. high quality residential/retail/civic, could be a real threat at some sites.

Markets

The demand from within N Wales is relatively small, as there are many alternative sand resources onshore.

The main call upon resources off the N Wales coast is likely to arise from N West England and particularly Merseyside. In this respect it is worth noting that there has recently been substantial capital investment in landing and processing facilities in Liverpool.

Resources to the west of Anglesey and in Cardigan Bay although considered physically workable, are not likely to be commercially viable on account of distance to markets.

APPENDIX 6 PRIMARY AGGREGATES

Definitions

The definition of primary aggregates and the situation relating to slate is described in the introduction to Primary Aggregates in section 4.

As previously noted, “sales” from quarries i.e. primary aggregates are recorded annually (but are often loosely termed as “production”), whereas “production” strictly includes all materials sold, stock-piled and discarded as waste from quarries. In general, stockpiles and waste can be discounted, but there are some special issues, which have arisen in this respect last few years as a result of the Aggregates levy/Landfill Tax and the demand for High Specification Aggregates (HSA). The terms sales, production and output are used in this document interchangeably to denote sales, unless otherwise qualified.

However secondary and recycled aggregates when surveyed and reported are conventionally labelled as “Arisings” (i.e. tonnages arising from a particular process e.g. iron/steel production, demolition of buildings, planning of road surfaces) and are distinguished from materials “sold” or “used” as aggregates.

In contrast, “consumption”, is the amount of aggregates used **within** any given area and can be defined as: tonnages sold, minus exports to other areas, plus imports from other areas (see Domestic Consumption).

There are a few problems (e.g. of definition) surrounding establishing total sales of primary aggregates per se, and many more challenges in respect of calculating sales of secondary and recycled aggregates (see related sections of the report).

Production (i.e. Sales)

Table A6.1 Historic Sales Trends of Primary Aggregates: Wales by Region   M tonnes

Sand/ Gravel	1973	1977	1981	1985	1989	1993	1994	1995	1996	1997	1998	1999	2000
South Wales	2.4	1.8	1.8	1.5	2.5	1.8	1.6	2.8	1.9	2.0	1.5	1.5	1.2
North Wales	2.5	1.9	2.2	1.6	1.9	1.7	1.7	1.7	1.7	1.4	1.5	1.7	1.5
Wales	4.9	3.6	4.0	3.1	4.4	3.5	3.3	4.5	3.6	3.4	3.0	3.2	2.7

Crushed Rock	1973	1977	1981	1985	1989	1993	1994	1995	1996	1997	1998	1999	2000
South Wales	10.2	10.3	9.2	9.5	13.1	14.7	15.6	14.9	13.9	12.9	12.3	12.5	9.8
North Wales	6.2	4.1	6.8	7.0	11.4	8.0	8.7	8.5	7.0	7.5	8.0	8.0	8.0
Wales	16.4	14.4	16.0	16.5	24.5	22.8	24.3	23.4	20.9	20.5	20.3	20.5	17.8

Primary Aggregate	1973	1977	1981	1985	1989	1993	1994	1995	1996	1997	1998	1999	2000
South Wales	12.6	12.1	11.0	11.1	15.7	16.6	17.3	17.7	15.8	14.9	13.8	14.0	11.0
North Wales	8.7	6.0	9	8.5	13.3	9.8	10.4	10.2	8.7	8.9	9.5	9.7	9.5
Wales	21.4	18.1	20	19.6	29.0	26.3	27.7	27.9	24.5	23.8	23.3	23.7	20.5

Source: RAWP and National Collation reports (except some data for 1981, 1994:- based on BGS UK Mineral Statistics).

APPENDIX 7 CONSUMPTION AND INTERREGIONAL FLOWS

Domestic Consumption (Demand within the Region)

By far the largest proportion of construction development is likely to continue to be located along the coastal belt from Broughton to Bangor and secondly in the former Coalfield area as far south as Chirk. This has been stimulated by completion of the A55 Expressway which is also intended to revitalise Holyhead Port and by the significant improvements to the A483 (T) in the east as far south as the A5 near the Dee. The building of the first of these roads itself had a significant impact on aggregates demand in the region at various points between the 1960s and 2001 when the final sections across Anglesey were opened. As an indicator of scale, that investment accounted to c £700 m (at prices at the time of construction) for the 100 Km route.

Once open, these roads have generated significant further development particularly, in the revitalisation of the economy in the eastern zone of the region.

The last major link road in the area is now under construction (2007), the Welsh section being £4.5 m of a £51 m scheme (between Drone Corner and Ewloe) to improve access between the A55 and the M56. No further road schemes on this scale in the region are contemplated in plans at present, but substantial housing and other development is proposed at Shotton, and there is more industrial provision around Wrexham. Comparatively little construction is planned in the hinterland of or in the West of the region, apart from Holyhead Port.

Many of the recent large investments in the region e.g. the £45 m gas conversion plant at Connahs Quay however have consumed relatively small volumes of aggregates.

In the Wrexham area, development will continue to be concentrated along the A483(T) corridor between Chirk and Rossett.

In Denbighshire and further west, the demand for construction is less buoyant. The A55 and coast zone is likely to be the main area of growth, but with some expansion in the Vale of Clwyd towns.

North West England

With approaching half the demand for aggregates produced in the region emanating from North West England, in the absence of policies inhibiting sales there, it is important to consider aggregates requirements in that area (see Appendix 10).

As recorded elsewhere, contrary to some perceptions, there is no Welsh Assembly policy against exporting to regions in England. However, four policies do have bearing: namely aggregates should be worked in as close proximity as possible to the market; rail and water modes are favoured over road transport; the total level of production in Wales should not exceed 27 Mt before 2009; and the environment in Wales should not be prejudiced over less sensitive areas elsewhere.

Table A7.1 Imports to Wales: 1973 - 2005 **'000 tonnes**

Sand and Gravel	1973	1977	1981	1985	1989	1993	1997	2001	2005
South Wales	342	96	na	160	233	152	114	195	98
North Wales	56	54	na	13	132	-	92	135	83
Wales	398	150	na	173	365	152	206	330	181
Crushed Rock									
South Wales	941	183	na	112	380	381	309	626	161
North Wales	11	135	na	5	325	113	136	279	199
Wales	952	318	na	117	705	494	445	905	360
Total Primary									
South Wales	1303	279	na	272	613	533	423	821	259
North Wales	97	189	na	18	457	113	228	414	282
Wales	1400	468	na	290	1070	646	651	1235	541

Difference in totals includes undifferentiated. NB Glensanda material noted in text not included here.

APPENDIX 8 ASSESSMENT OF FUTURE DEMAND

Up until the early 1990s, joint guidelines were produced for England and Wales which contained forecasts of demand. In 1995, in the absence of Government guidelines for Wales, the two Welsh RAWPs published guidelines for South and North Wales respectively for primary aggregates.

Table A8.1 Forecasts of Demand – South and North Wales RAWP Guidelines
M Tonnes

Expressed as average annual figures	Crushed Rock		Sand and Gravel		Total Aggs Wales averages
	SW	NW	SW	NW	
1992 – 1996 Landwon	12.4	8.8	0.2	1.6	23.0
1997 – 2001 Landwon	14.2	10.8	0.2	2	27.2
2002 – 2006 Landwon	15.2	12.8	0.4	2.4	30.8
Marine Dredged (1992-2006)	-	-	2.3	-	2.3
Total Demand (1992-2006)	**13.8**	**10.8**	**2.6**	**2.0**	**29.2**

Source: Adapted from 5 yearly block figures shown in MTAN par 25.
The 5-year periods do not add up to the total shown in the table

It should be noted that in this context “demand” means demand made **upon** Wales or effectively “production” (or sales) of primary aggregates. In the period 1992 – 1996 these proved to be significant underestimates in South Wales but closer to the actual figures in North Wales. Both sets of data were closer to the actual levels experienced than the econometric forecasts produced in the Mineral Planning Guidance 6 (MPG 6) in England (MTAN 1 para 25,26).

Although the Department of Communities and Local Government (previously ODPM) does not have jurisdiction over aggregates policy in Wales, it still publishes forecasts of all aggregates (primary and secondary) demand for Great Britain which show separate figures for Wales. These are based upon projections of construction output for each of a large number of construction sectors (produced by Cambridge Econometrics). These projections are then applied to a base figure derived from “National Collation” consumption data[1]. Calculations are made for each year up to 2011; beyond that, they are held at the 2011 level. It should be noted that they refer to **consumption** in each area, not production/sales.

[1] E.g. National Collation for 2005 (2006).

Table A8.2: Projected Consumption **Mt.**

	2004 Review (a)		2005 Review (b)		2006 Review (c)	
	England	**Wales**	**England**	**Wales**	**England**	**Wales**
2005	254	20	246	19	239	18
2006	256	20	247	19	242	18
2007	260	20	247	19	245	18
2008	266	20	249	19	247	18
2009	273	21	252	19	248	18
2010	280	21	257	19	250	18
2011	286	22	262	19	254	18
2012	286	22	262	19	254	18
2013	286	22	262	19	254	18
2014	286	22	262	19	254	18
2015	286	22	262	19	254	18
2016	286	22	262	19	254	18

a) National and Regional Guidelines for Aggregates Provision in England 2001 – 2016: First Monitoring Report Oct 2004 (data April 2004)
b) National and Regional Guidelines for Aggregates Provision in England 2001 – 2016: Second Monitoring Report Nov 2005 (data June 2005)
c) National and Regional Guidelines for Aggregates Provision in England 2001 – 2016: Third Monitoring Report Sept 2006 (data June 2006)

[Draft (as yet unpublished) figures for demand arising in Wales in the same series suggest a reversion to levels closer to those generally envisaged in the 2004 Review, but it is not known at this stage whether these indicate an actual increase, a reinterpretation of earlier base data or changes in methodology; those figures are still under discussion].

The 2004-2006 review figures illustrate a number of factors. Firstly a stable demand within Wales contrasting with a gradual rise in England. Secondly they have been progressively reduced in the three review rounds shown. However the latter is mainly considered to be the result of revisions of past data, rather than to any real changes in demand. Overall these show a very gradual rise to 2010 then stable figures thereafter. The same reports go on to indicate expected ratios of primary and alternative aggregates for England and Great Britain (but there is no separate analysis in this respect for Wales). Forecasts are also given for the English regions (but not for N/S Wales) which could be used to inform the likely demand for exports to such areas.

In September 2006, the Quarry Products Association, responding to a request from the North and South Wales RAWPs, prepared an analysis of demand and consumption estimates for primary and secondary aggregates in Wales for use in the RTS process. In summary, this is based on interpretations of economic indicators and sector by sector reviews sourced from a range of agencies such as Welsh Water, Welsh Assembly Government and Experian. The main trends are as follows:

General Economy - for Wales – particular focus along the M4 (Cardiff 20% of Wales GDP); financial services less significant than England. Exports

	strong, Wales' GDP is lower than England and Assembly aims to catch up to 90% by 2010. 5yr GDP growth of 2.7% predicted (i.e. lower than Assembly aspirations).
Construction Output	After a stable period in the 1990s, strong growth was experienced from 2001-4. Key drivers – **Private housing** and **commercial sector** (together 56%) **Maintenance/repair** at a high (36%) but stable level; **Other public sector** – a small fall followed by growth 2007-10. **Infrastructure** – growth 2006-7 then mild decline post 2008. **Industrial** – volatile but includes some major commercial projects along M4. **Repair/Maintenance** – consistent long term growth.

Since this analysis was prepared, there has been a growing acknowledgment of the national need to increase the housing stock and a greater awareness of the requirement to improve river and coastal flood defences (one recent statement indicated that at least half of the latter required attention). However it is not yet clear how and to what degree, these changes will relate to North Wales.

However lack of appropriate data on volume splits makes direct application of these trends to aggregates demand difficult, but overall, they do tend to support the likelihood of modest growth.

QPA therefore adopted the following approach a) in the light of AM2005 consumption data not being available at the time, the AM2001 ratios of consumption/exports were retained and applied to the published Annual Minerals Raised Inquiry (AMRI) data, b) it was then assumed that exports would follow the DCLG forecast for England and that c) the trend of aggregates "intensity of use" (i.e. tonnes of aggregates consumed per unit of construction output usually measured in terms of expenditure in £s) would continue to decline and finally, d) an assumption of positive economic and construction growth over 2005-10. As there are considered to be too many uncertainties beyond this, 2010 levels were adopted thereafter.

It was further assumed that secondary/recycled materials would take up a higher proportion of the growth (4% pa) and primary (at 1% pa), a lower percentage. This produced the forecasts set out in table A8.2.

Table A8.2 QPA's Estimated Trend in Aggregates Demand for Wales 2004–2010 M tonnes

	Primary Aggregates Consumption	Recycled/ Secondary Materials	Total Consumption	Exports	Total Demand
2004	14.0	3.9	17.9	5.7	23.6
2005	14.1	4.1	18.2	6.1	24.3
2006	14.3	4.2	18.5	6.1	24.6
2007	14.4	4.4	18.8	6.2	25.0
2008	14.6	4.5	19.1	6.2	25.3
2009	14.7	4.6	19.3	6.2	25.5
2010	14.9	4.8	19.7	6.2	25.9
2011-6 (pa)	14.9	4.8	19.7	6.2	25.9
2005 Actual	13.5	6.0	19.5	6.4	25.9(a)

NB 2004 and 2005 figures were projections at the time. These calculations take no account of imports (which are in any case minimal), but assume that domestic consumption plus exports equals total production (i.e. "demand").
a) of which imports were 0.54 Mt giving actual demand of 25.36 Mt)

This suggests a rate similar to the DCLG - derived June 2005 forecast (see above), (which was downgraded in June 2006). Neither of these forecasts had the advantage of the AM2005 survey data or the Faber Maunsell Report for 2005.

The earlier Cambridge Econometric forecasts for Great Britain envisaged the strongest growth areas to 2015 being Wales and the Midlands. It was understood that this was based upon a sharp improvement in the consumer services and manufacturing sectors, combined with high construction growth.

As a number of the forecasts relate to Wales as a whole, it is briefly worth reviewing the relative share contributed by North Wales to the whole country.

Table A8.3 - Contributions to Primary Aggregate sales by percentage (1973-2005)

	1973	1977	1981	1985	1989	1993	1997	2000	2001	2002	2003	2004	2005
South Wales	59	67	55	57	54	63	62	54	57	58	62	63	64
North Wales	41	33	45	43	46	37	38	46	43	42	38	37	36

The average percentage for North Wales in the period 2000 – 2005 c40%.

APPENDIX 9 FISCAL AND OTHER INFLUENCES

In this particular context, it is important to examine briefly "demand" a little further. Firstly, unlike most consumer goods, the requirement for aggregates as a whole is generally inelastic – i.e. aggregates are normally only produced to meet a specific market demand which is not particularly price-sensitive (i.e. lowering the price doesn't normally increase demand). However, within the overall aggregates sector, when materials such as secondary aggregates (on account of the Aggregates Levy and Landfill Tax) were able to enter the market with a price edge over primary aggregates, they were able to capture a larger proportion of the market from primaries than previously.

There is little direct evidence that these fiscal measures have played a significant role in reducing the overall demand for aggregate, but there may have been some marginal responses e.g. more efficient use on construction sites to avoid Landfill Tax charges. Other factors such as changes in architectural fashions, construction technology, land prices forcing more compact development etc, are likely to have played a bigger role, but none have been quantified on a large scale.

A detailed government sponsored report[1] indicated that for at least 15 years up until 1995 the amount of aggregates consumed per unit of construction i.e. "intensity of use" (usually expressed in tonnes/£1000 spent) had grown. Even at that stage and continuing today, the UK consumption of aggregates in per capita terms is one of the lowest in Europe.

Since that report however, the intensity of use has fallen. The reasons for this have not been assessed in detail, but are likely to be due to a combination of the following:

1. Landfill tax – causing much more material to be recycled on site. (note that recycled aggregates used off-site would not contribute to this effect).
2. Brownfield sites – Government policy favours the development of such sites, there is greater potential for recycling and often some existing usable infrastructure at brownfield sites.
3. Aggregates Levy – raises costs, causing consumers to specify and use in more controlled manner.
4. Less wastage on site – more pre-bagged and controlled usage resulting from increasingly space/time constrained projects.
5. Denser building – current standards generally seek a greater density of residential building (including medium rise buildings and denser low rise packing per ha). These patterns require less infrastructure per unit completed.
6. Construction techniques – a movement to greater use of steel, portal frame and glass/metal/plastic sheet infill in industrial/retail/commercial sector. Moves in housing towards drylining (i.e. timber stud and plasterboard) interior walls has reduced the demand for concrete blocks and the thickness specification for concrete foundation slabs. More recently, the move to factory-prefabricated units for offices and homes (of wood/composite materials), will further these trends.

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[1] Ecotec Research and Consulting for Department of the Environment 1995. Aggregates in Construction – current practice, scope for substitution and intensity of use.

7. In terms of roads, there has been a greater emphasis on repair and maintenance and for new or replacement build using road structures requiring less volume, but higher performance materials.
8. Property refurbishment (rather than new build) has also increased considerably on all fronts.

Contrary potential trends might include:

1. The much greater volume of residential building than that has occurred over the last 20 years.
2. Higher investment in sea and river flood defences with the prospect of climate change.
3. The requirement for higher thermal efficiencies in buildings is likely to demand more insulation materials.
4. Technological changes based on environmental choices which could result in more, low energy-costing materials e.g. locally won aggregates being substituted for higher energy consuming materials such as steel, glass and hydrocarbon-based materials e.g. plastics.

From the limited information available and the complexity of the systems, it is far from clear whether these two general trends will cancel each other out or which will predominate. Some, such as the availability of brownfield sites are likely to have an effect over a limited duration (as the supply of such sites will diminish over time), and the extent of other impacts such as efficient use of materials on site (driven by costs) may already be having their maximum effect. On balance, a stable or very small rise in the aggregates market (despite a far greater increase in the rate of construction spend) might represent a cautious, but realistic assessment.

Probably the two most significant and recognisable effects were the recent fiscal changes. These are now summarised.

The **Aggregates Levy** was introduced in April 2002, with the prime objective of encouraging the use of other materials to substitute for virgin primary aggregate. A charge of £1.60 was levied on each tonne of primary aggregate extracted by the industry but certain mineral wastes including shale and slate were excluded. In 2007 this was increased to £1.95/tonne, i.e. a level broadly in line with inflation during the intervening period. This levy was set as a strong financial measure to influence the market.

The Quarry Products Association (QPA) in their report entitled “QPA Assessment of the Impacts of the Aggregates Levy” issued in September 2003, raised a number of fundamental questions as to the merits of the levy. These centre on the increase of unsold quarry waste which at some sites has sterilised reserves; unauthorised activity notably in Ireland; the general decline in crushed rock sales which may have masked the alleged benefits of the levy; the general increase in the use of construction and demolition waste and secondary aggregates prior to the introduction of the levy which is chiefly attributed to the introduction of the Landfill Tax and lack of environmental targets or outcomes.

There is no doubt the full effects of the Levy may take some time to become apparent and will be difficult to disentangle from the effect of the Landfill Tax (see below), but the early trends appear to demonstrate that it has reinforced to some degree, an increase in the use of recycled aggregates. Further research is probably required to analyse the claims and counterclaims regarding the benefits of the levy and it would be unwise to make any final judgement at the moment.

The **European Landfill Directive** was issued in 2002 and the UK Government responded by introducing a charge of £2/tonne for the disposal of inactive/inert waste, (this is increasing to £2.50 in April 2008) and a standard rate of £24/tonne for other mixed wastes to landfill (increasing to £27/tonne in April 2008). The general reaction of the waste skip industry was to start to recycle and segregate inert and other waste for which hitherto, landfill was considered as the only economic disposal option. Over the last 5 years there has been a marked change in the number of inert waste recycling sites and [MRFs] screens and crushers are now commonplace on brownfield re-development sites. Indeed most of this type of construction and demolition waste never leaves the sites involved and is employed for low specification end uses such as sub-base for roads/footpaths or general foundation fill for embankments; in such cases it may not be quantified.

There is no doubt that the Directive has initiated a sea-change in the disposal of a variety of waste materials including those that can substitute for low end use aggregates. This trend is likely to continue and to rise, particularly if the landfill charges increase as expected in line with other EU countries. There is also still a considerable difficulty in quantifying the volumes of construction, demolition and excavation waste (CD&EW) actually generated or reused.

APPENDIX 10 NORTH WEST REGION

The North West of England is such a significant market for N Wales aggregates (3.4 Mt in 2005) that it deserves specific analysis.

Sources of Supply

Rock - As far as rock sales are concerned the limits of the area served by N Wales are largely defined by its relationship with other sources servicing the same market. On the east, the Carboniferous Limestone of Derbyshire and the Peak District National Park supplied 4.5 Mt in 2005 to the North West and mainly to the area as far west as the M6 by road and rail (including most of the Manchester conurbation) and by rail into Merseyside. North of Manchester, the eastern flank is also served by hard sandstone (Millstone Grit) quarries along the west of the Pennines. On the south, where there are no large centres of population, limestone from the Peak District and East Staffordshire are the main sources approximately as far north as the A50 although this boundary is not well defined. To the north of the region, the area approximately as far south as the M62 is mainly dependent upon the limestone and gritstone from east and west Lancashire respectively e.g. Clitheroe and as well as the Arnside peninsula i.e. both within the North West region. Hard rock was also supplied from north Cumbria and Yorkshire.

Of these other supply areas, Arnside is an AONB and c2 Mt of material in 2005 was derived from the Peak District National Park; smaller amounts were drawn fro the Yorkshire Dales National Park. Furthermore, material derived from Cumbria and Derbyshire outside the National Parks often has to pass through those designated areas en route to the North West.

These limits are very generalised and indicate only the main focus of sales. At least some material from all these areas flows beyond these “boundaries”.

Sand and Gravel – Traditionally Cheshire has been the main source of sand south of the Mersey (amounting to 70% of the region’s output). This is very largely sand (rather than gravel) and is used with crushed rock from the rock quarry areas just noted. However in recent years, output in Cheshire has declined (although there are still permitted reserves at mothballed sites) and imports of sand from N Wales (mainly Wrexham) have increased as a proportion of consumption.

To the north of the Mersey sand sources in southern and eastern Lancashire are supplemented by marine landings on either side of the Mersey Estuary, which, for the region as a whole, have more than doubled over the last decade.

Development

As the North West is able to call upon a range of sources the impact of construction growth is dissipated. For example much of the development around Salford Quays, Trafford and the expansion of Manchester Airport has been serviced by the East Midlands. The highly buoyant economic drive on Merseyside in recent years, notably much of it related to the ‘Capital of Culture ‘effect’, has depended upon a wider spectrum of sources, including North Wales.

The investment of £70m in upgrading cement production at Padeswood, Flintshire (and an even larger sum at Tunstead, Peak District), which mainly supplies the North West, supports the buoyant view of the local construction based economy.

In general, the region has enjoyed a very high level of construction growth over the last decade. The general consensus (2006) is that this momentum is likely to be sustained until at least 2008/9.

APPENDIX 11 INDUSTRIAL AND OTHER USES

Metallurgical Fluxes

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. Furthermore, it is suggested that policies concerning a separate landbank for this purpose and of appropriately balancing high purity stone and aggregates won from that resource, should be considered.

Cement

The manufacture of cement requires sources of limestone, shale or clay and fuel, plus various more minor ingredients.

Although the stone quality does not have to be as pure as that for iron and steel making and chemical uses, it does have to be as consistent as possible. It is therefore recommended that appropriate areas of resource be safeguarded and that the future stone requirements of this capital intensive works be assessed.

Building stone and other non-aggregate requirements

Building stone (including slate – see Appendix [4]) is a relatively small but very specific market, usually demanding stone of a particular appearance and physical make-up. The growing awareness of the need for authentic building conservation and for blending new work with the vernacular means that the demand, although still comparatively, small is likely to grow. In some cases, aggregates quarries may provide a source but, it other cases, micro-fissuring resulting from blasting may render the stone unsuitable for building work. Conversely, the waste arising from building stone (particularly slate), may provide a source of secondary aggregates (see Secondary and Recycled Aggregates). Although in terms of scale and market, the relationship is perhaps marginal, (certainly at strategic level), MPAs will need to be mindful of the need to take this requirement into account in the future decisions on aggregates provision. Further brief guidance is given in MPPW (paras 71-75) and more information is contained in the “Symonds Report”[1].

Small amounts of ground limestone are also used in farming as a soil conditioner.

[1] Planning for the Supply of Natural Building and Roofing Stone in England and Wales (Symonds Group) for the Office of the Deputy Prime Minister: London (2004)

APPENDIX 12 AGGREGATE RESOURCES

More details of resources in the region are available in various reports of the British Geological Survey (e.g. as sections in geological reports relating to potential development areas around Wrexham), the IMAECA Report [1] and a number of other commissioned research reports, notably on sand and gravel in North West Wales[2]

As part of the preparation of the IMAECA study, the researchers examined available resource data such as that just noted and digitally plotted the distribution of outcrops according to twelve predetermined rock types (lithologies). Although these could be described generally as 'resource' maps, they only give a broad two dimensional explanation with no information on the thickness of deposits and only a general inference of quality/suitability. Initial attempts to score the rocks and superficial (sand/gravel) deposits (using a system which had been applied in Ireland) were abandoned in favour of a simpler, more generalised scheme. Some of the assumptions made previously in Ireland do not necessarily carry over well into the situation in North Wales. A description of the process involved is given in the section on Environmental Capacity in the main report and Appendix 13.

North Wales is particularly well endowed with a range of resources suitable for aggregates. Within the rock section, the summary below is broadly in order of economic significance (but does not reflect environmental considerations or designations).

Carboniferous Limestone

This usually comprises a series of relatively hard limestones which may vary from muddy to extremely chemically pure ("high purity") stone. The latter also has strategically important applications for industrial (non-aggregate) end uses.

The limestones can be traced as a number of sinuous and fault-broken outcrops from the English border around Chirk in the south, forming the western rim of the North Wales Coalfield via Llandegla and Halkyn Mountain to the coast at Prestatyn. Narrower and even more fragmented deposits define the western side of the Vale of Clwyd from Rhuthin in the south, via Denbigh to the coast between Abergele and Old Colwyn. The same formations form the Great and Little Ormes and two broad tracts on Anglesey running inland from Dulas Bay/Red Wharf Bay south westward and forming the north western shore of the Menai Straights. The Penmôn Peninsula is also of Carboniferous Limestone.

Igneous Rocks

Igneous rocks exhibiting a considerable variety of types, many suited to aggregates use, are found in numerous outcrops throughout much of Gwynedd, Snowdonia National Park and Anglesey. In particular, they make up most of the higher land in the Snowdonia Massif reaching the coast at Penmaenmawr. They form a ring around the Harlech Dome (except along the coast) and are the basis for a whole series of very prominent hills on the Llŷn Peninsula. On

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[1] Implementing the Methodology for Assessing the Environmental Capacity for Primary Aggregates (IMAECA) Enviros (2005).
[2] The Sand and Gravel Resources of North West Wales: University of Liverpool and Enviros for Welsh Assembly Government (undated).

Anglesey, interleaved with metamorphic rocks, they comprise a series of south west – north east trending bands, but are heavily obscured by glacial material.

Sandstones

Many different types and ages of sandstone are found in the region. The Harlech Dome and in much of the southern/central part of the region is underlain by “grits” (coarse hard sandstones) and in the latter area particularly, alternating hard sandstones and hardened shales or siltstones, some of which have been metamorphosed to form slate.

Extremely hard silica rock is often to be found in a narrow band between the Carboniferous Limestone and the Coal Measures. It was used in the past for furnace refractories and the same resources were sometimes worked for aggregates, but their hardness makes processing costly. Similarly chert bands in limestone have been used, but are also generally uneconomic. A number of sandstones form part of the Coal Measures themselves in the east from Talacre in the north to Cefn Mawr in the south. Several have been employed as locally important building stones and occasionally used as aggregates.

The floor of the Vale of Clwyd is of relatively soft Permo-Triassic sandstones. Similar Triassic sandstones are also found in small outcrops along the border south west of Chester. In the past, these have been crushed to produce sand.

Sand and Gravel

North Wales is far better placed for sand and gravel resources than is the case in South Wales. The most significant are the thick glacio-fluvial outwash (sheet and delta) sand and gravel deposits running up to the English boarder around Wrexham. Further North West, the Wheeler Valley on the Denbighshire/Flintshire border also contains glacio-fluvial deposits formed nearer the ice front. There have been several calls for research to define more fully, the distribution and quality of sand and gravel resourses in North East Wales.

In North West Wales, a comprehensive study[1] of sand and gravel, examined 89 potential resource blocks, estimated to contain 530 Mt. 92% was located in Gwynedd, the remainder being split between Anglesey and Conwy, with virtually none available in the Snowdonia National Park. More than 75% of the material was found in three areas of Gwynedd: Cors Geirch (Pwllheli), south of Nefyn, and at Penygroes.

Most of the deposits are highly variable and of glacial or glacio-fluvial origin. The Penygroes area currently supplies the bulk of the sub-region’s sand and gravel. The report went on to observe that there were substantial areas covered by planning constraints in some of these areas and to identify areas for future safeguarding: e.g. around Pentraeth, Anglesey.

[1] Same reference to report as on previous page

APPENDIX 13 IMAECA EXECUTIVE SUMMARY

(Implementing the Methodology for Assessing the Environmental Capacity for Primary Aggregates) (See also Appendix 16)

Minerals Technical Advice Note 1: Aggregates (2004) proposes a different approach to the provision of aggregates in Wales through a careful assessment of the supply of aggregates based on a study of the environmental capacity of resource areas. Research commissioned by the Welsh Assembly Government, titled "Establishing a Methodology for Assessing Aggregates Demand and Supply" (EMAADS) completed in 2003, examined different ways of providing for aggregates and developed a new methodology, which is based on environmental capacity, for assessing the suitability of different areas of Wales to supply primary aggregates.

Enviros Consulting Limited was commissioned by the Welsh Assembly Government to implement the 2003 methodology. The objective of the work was to ensure that the future primary aggregates supply is obtained from the most acceptable locations taking into account the availability of different types of geological resources for aggregates and the environmental capacity of areas in Wales to supply those aggregates.

The study was completed in February 2005. All available geological information on potential primary aggregates was collated and digitised. The EMAADS methodology was applied utilising a Geographical Information System (GIS) and a software tool was developed to enable the user to query geological and environmental information across the whole of Wales.

The software tool provides automatic 'scoring' of environmental capacity for 1Km squares across Wales. Twelve national environmental indicators are used to determine whether a square turns green, orange or red (lowest environmental capacity). The colouring is an indication of the capacity of the area within the square to accommodate aggregate extraction. This provides opportunities for nationally consistent and sustainable strategic decisions on aggregates provision. These decisions are to be made by the Regional Aggregates Working Parties (RAWPs) in Wales when they prepare the Regional Technical Statements. RAWPs will need to take into account environmental capacity as indicated by this tool, national policy, and a balance between need and resource availability.

The Welsh Assembly Government is able to change settings within the tool. The settings include threshold levels for each indicator, the weight to be applied to each indicator and the bands applied to total scores for each square. Changing the settings has the potential effect of changing the colour of individual squares.

The tool is to be delivered to the RAWPs with the setting fixed by the Welsh Assembly Government and the tool is designed to be used only by the RAWPs to support the development of Regional Technical Statements and should not be used directly in Local Development Plans, development control decisions or planning appeal decisions.

In preparing the geological resource database it was necessary to introduce an aggregate classification scheme. The tool identifies 11 classes of aggregate type to take into account the primary aggregate resources currently worked and other geological resources with the potential to be worked for primary aggregates. In addition an extensive bibliography of the aggregate resource was assembled to assist the work of the RAWPs.

Copyright for the environmental capacity tool is held by the Welsh Assembly Government and one copy has been prepared for each of the RAWPs in Wales.

Enviros Consulting Limited was assisted by the University of Liverpool and Environment Systems, Aberystwyth.

APPENDIX 14 CONFIDENTIALITY GROUPINGS

In the past, concerns about confidentiality of data provided by individual companies have resulted in some very broad groupings of reserve and production data. Companies have relaxed their conditions of use in recent years but complete publication for all categories is still not possible. Nevertheless the information presented here and in the NWaRAWP Annual Reports is much more detailed than that available from other Government sponsored surveys.

The rationale for the present groupings is:

a. To provide as much detailed data as possible.
b. To respect the confidentiality undertakings which form an integral part of these voluntary surveys.
c. Where possible to benefit from explicit relaxations agreed with companies; their cooperation in this respect is most welcome.

However, it has still been necessary to group together rock and sand/gravel figures for Anglesey and Gwynedd to protect confidentiality in each case, of one of the two MPAs concerned. Until recently this has not been the case. Traditionally sand/gravel for Flintshire has included a small amount for Denbighshire. Unfortunately in 2005 it proved necessary to combine the information for these two MPAs with that of the substantial output from Wrexham. This has an important bearing on the degree of detail which can be applied at the apportionment stage.

APPENDIX 15 REVIEW OF DORMANT AGGREGATE SITES: NORTH WALES 2006

MTAN1 recognises the problems posed by very old planning permissions with inadequate conditions (if any), often relating to extensive areas, but which have not been worked for many years (or in some instances have never been worked). These are subject to the Review of Old Mineral Permissions (ROMPs) and are officially classed as “dormant” – i.e. operations cannot be resumed until a new scheme of conditions has been agreed between the owner and the MPA. MTAN1 requires all MPAs to examine critically, all dormant sites and to ascertain to what extent they are likely to be proposed for reopening. Annual returns have to be made by MPAs to the Assembly. As a second stage, MPAs are asked to pursue serving Prohibition Orders on those sites where working is unlikely to be resumed. Most of the dormant sites relate to rock, rather than sand and gravel.

MPAs in N Wales have been exemplary in negotiating and serving Prohibition Orders to remove dormant reserves from the planning system. In almost all cases, this has been achieved by agreement with the owners of the reserves and has been accomplished to a far higher degree than for any other area of the UK. Details of progress can be summarised as follows:

1998 The Quarry Products Association (QPA), announced that a number of its leading members were prepared to relinquish planning permissions on a number of large sites within National Parks in England and Wales, where they would not oppose Prohibition Orders. In this region, they included Pengwern Quarry (also known as Pant y Carw) near Llanrwst and Arenig Quarry near Bala (the latter having extensive permitted reserves, at one time put at 700 Mt).

1999 Pengwern Quarry Prohibition Order confirmed.

2001 Craig y Tan Quarry, Trawsfynydd, Prohibition Order confirmed.

2002 Gwynedd held 222 Mt of igneous rock at sites on the Llŷn Peninsula, mostly covered by dormant consents. Flintshire had an unknown quantity of permitted reserves at 41 sites most of which were classed as dormant - within this, limestone sites contained 35 Mt.

2003 Gwynedd Council served five prohibition orders on dormant sites on Llŷn, four of which were confirmed by the Welsh Assembly, reducing overall reserves by 140 Mt.

Snowdonia – Arenig Quarry Prohibition Order confirmed (objection withdrawn)

Flintshire limestone dormant sites were calculated at 16 Mt.

2004 Abbreviated Annual Report – so no narrative details. Statistics show no dormant reserves of igneous rock remaining.

2005 Flintshire dormant limestone reserves stood at 12 Mt.

2006 (NB some of the statements below may duplicate actions reported above).
By 2006:

- 17 of the Prohibition Orders served by Flintshire had been confirmed (mainly for limestone and silica stone) – no reserve had been previously attributed to these sites but, based on area they were equivalent to the removal of almost 200 Mt of reserves.

– Denbighshire had served seven Prohibition Orders (mostly limestone and millstone grit). Confirmation of six now received; one awaited.

– Gwynedd - a further two Prohibition Orders had been confirmed (in all five for rock; two for sand/gravel). A further three sites (all slate) are under consideration.

– Wrexham had received confirmation of Prohibition Orders for Tir Celyn and Pen y Graig limestone quarries. Two further Orders for Bwlch Gwyn were outstanding.

APPENDIX 16 IMAECA APPLIED TO AGGREGATE RESOURCES IN NORTH WALES

The IMAECA process and application is described in Appendix 13

Key

- Green Values = a relatively high level of environment capacity to accommodate quarrying
- Orange Values = an average level of environmental capacity to accommodate quarrying
- Red Values = a relatively low level of environmental capacity to accommodate quarrying.

Summary of Results

Anglesey – Rock

Igneous rock - Most coastal areas (NW and E) are red except a small area near Amlwch which is green. The main green area follows the NE-SW bands of rock to the N of and through Llangefni respectively.

Carboniferous Limestones – There is a largely red area between Llangefni and Wharf Bay and on the Penmon Peninsula, otherwise the outcrops are red or orange.

Carboniferous Sandstones – Insignificant

Pre-Carboniferous Sandstone – (i.e. almost all Pre Cambrian) – these follow a NE-SW zone inland from Valley; it becomes increasingly green inland. Further deposits between Llangefni and Dulas Bay are generally red or orange.

Anglesey – Sand and Gravel

These deposits are very patchy. Sub-alluvial gravels occur almost randomly in small areas in the centre of the island and inland, but parallel to the Straits. Almost half the readings are green and many of the remainder are orange. A small area of glacial gravels inland from Red Wharf Bay is mainly red and orange.

Gwynedd – Rock

Igneous rock – There are extensive areas of igneous rock in much of Llyn, (especially on the N and isolated headlands in the south), extending to the Bangor area. The majority of measures are red, with orange inland on Llyn and some on green in E Llyn and around Bangor. Igneous rock in the Bl Ffestiniog and Tywyn 'enclaves' is scored as red.

Carboniferous Limestones – the very small area around Bangor is red or orange.

Carboniferous Sandstones – Insignificant.

Pre-Carboniferous Sandstones – On Llyn, the areas in the far W are red and two small areas around Criccieth are green or mixed. The Blaenau Ffestiniog and Tywyn 'enclaves' are red/orange. The two NE-SW trending zones to the N of Snowdonia are red in the S and mainly orange or green in the N.

Gwynedd – Sand and gravel

A belt of glacial gravels crossing Llyn from Llanbedrog to Nefyn, is mainly red in the W but becomes less constrained in the E. In the zone between the National Park and Caernarfon Bay/The Straits, red areas predominate in the S, whereas orange with some green resources occur nearer the coast. Sub-alluvial gravels found in the coastal strip between Llanbedrog and Chwilog have more limited environmental capacity in the E than the W. The deposits in the Porthmadog-Glaslyn area are generally red.

Snowdonia National Park – Rock

The aggregate resources in this area are extensive and the environmental capacity measures are the most complicated of all the MPAs to describe.

Igneous Rock – In the S, i.e. S and E of the Mawddach, there are significant outcrops. Within this zone, almost all those in the W (i.e. the Cader Range) are red; to the E (central part) is a band scoring orange, but further E still there are relatively large green areas. The main Snowdonia Massif is largely red or orange in the SW, but green in the centre and E. Most of the area fringing the Conwy Valley and coast is orange or red.

Pre-Carboniferous Sandstones - In the far SE is a green, and a smaller mixed area. The very large outcrop between the Mawddach and the Vale of Ffestiniog is largely red with a smaller area of orange in the S and E and moderate sized green area in the extreme SE. On the S edge of the Snowdonia Massif are orange and red areas, but to the NE of Blaenau Ffestiniog is an extensive green area. A scatter of outcrops on the N edge of the Park are largely red.

Snowdonia National Park – Sand and gravel

The deposits are extremely small and widely separated. Those in the Dyfi Valley (part in S Wales RAWP area) are green, red in the Dysynni Valley and red or orange in the remainder, i.e. around Glaslyn, Vale of Ffestiniog, Conwy Valley and S of Llyn Tegid.

Conwy – Rock

Igneous rocks – the most prominent are those in the Penmaenmawr-Llanfairfechan area. They mostly appear as red, with the exception of a small green area. A few small occurrences around Corwen register as green.

Carboniferous Limestone – The outcrops between The Great Orme and Abergele are mainly shown as red, apart from resources immediately E and W of Colwyn Bay. The latter, and the Abergele to Bodelwyddan zone are green.

Pre- Carboniferous Sandstones – these are mainly scattered outcrops, primarily in the S between Pentrefoelas and Cerrigydrudion ; they score green.

Carboniferous Sandstones – minimal presence.

Conwy – Sand and gravel

The Conwy Valley is mainly red and orange. Parts of the Elwy Valley and tributaries, as well as various other small deposits in the S are marked as green.

Denbighshire – Rock

Carboniferous Limestone – the broken outcrops along the W of the Vale of Clwyd show little consistent pattern, with orange and red being more or less in balance and green slightly under represented. The main focus of the latter is W of St Asaph and N of Denbigh. On the E flank, the N sector of the outcrop is predominantly red with lesser areas of orange (i.e. between the A55 and the coast). In the S portion of the outcrop, (i.e. from a point S of Mold where it re-enters the county) as far as Llandegla, red accounts for about half (mainly N) with orange, then red further S. Red is found again in the limestone areas N of Llangollen.

Pre-Carboniferous Sandstones – A small number of outcrops in the Corwen vicinity are mainly scored green. Other limited outcrops are orange or red.

Post-Carboniferous Sandstones – These floor the Vale of Clwyd (apart from an area around St Asaph). Most are designated green in the Rhyl-Rhuddlan area, but S of St Asaph, apart from a few green areas in the W, the remainder of the outcrop is almost all orange or red.

Denbighshire Sand and gravel

The deposits in the Vale of Clwyd are labelled green or orange from Denbigh northwards, but orange or red to the S. In the Wheeler Valley, most of the gravel areas are red with some orange. In the Dee valley, the Corwen area is shown as green; further S and also in the valley narrows to the E of here, most deposits are in red or orange territory.

Flintshire – Rock

Carboniferous Limestone – The large outcrop from Prestatyn to the Denbighshire border (south of Mold) is delineated red in the far N; the centre and S and much of the remainder of the N, together with the detached section around Caergwrle are scored as orange. There are however some small green areas alongside the A55 in the N.

Carboniferous Sandstones – The irregular outcrops of sandstone between Mold and Hawarden are mainly in the red zone (NB the squares shown do not appear to correlate with the outcrop shown on the geological map – the latter appears to be more to the S).

Post-Carboniferous Sandstones – in the narrow outcrop along the English border in the E and SE, most of the areas are identified as green, with red and orange to the S of the A55.

Flintshire Sand and gravel

Flintshire appears to be second only to Wrexham in terms of the extent of sand and gravel. The scattered and widespread glacial deposits are found both on the Wheeler Valley and across some of the higher ground in the centre and N of the county, where they are denoted as red or orange. In the area roughly from Flint to Mold, and to the E of here, green areas account for just under half the total. Sub-alluvial gravels are more irregular and are found on the far N where they are red or orange, around Holywell where they are scored green and around Mold where green predominates.

Wrexham – Rock

Igneous rock – This is logged as over 50% green on the hills above Glyn Ceiriog (but the outcrops are extremely narrow).

Carboniferous Limestone – The Bwlch Gwyn-Minera outcrop is signalled red; those in the Vale of Dee and from Chirk southwards are more or less equally divided between the three levels.

Carboniferous Sandstones – These appear to display a larger outcrop than the limestone of the same period. They are mainly red with some orange.

Wrexham - Sand and gravel

The glacial deposits account for a large area encircling Wrexham and running S as far as Chirk. Red, and to a lesser extent orange, make up the bulk of the area. The smaller green areas are not grouped in any particular part of the outcrop. In the Maelor area, green and orange dominate. The terrace and sub-alluvial gravels are also extensive and can be followed in an arc from the lower Ceiriog Valley, along the Dee to the Cheshire border. Red areas account for well over half the total. There are very few green areas.

Key Conclusions and Summary

Igneous Rock – The largest areas which according to IMAECA have sufficient environmental capacity to accommodate aggregates extraction, i.e. illustrating green scores, lie in central and E parts of the Snowdon Massif. They are also to be found in the National Park elsewhere, for example in the upper reaches of the Mawddach catchment. Smaller but appreciable areas occur in a zone through Llangefni on Anglesey. In Gwynedd, green areas are found in SE Llyn and around Bangor and there also are some green areas around Corwen (Conwy),

Carboniferous Limestone – A very large proportion of this very important resource is delineated red. Green areas are remarkably limited but exceptions include scattered parts of S Anglesey, around Abergele-St Asaph-Denbigh (Conwy and Denbs) and in the far N and S of the main (E) Clwydian outcrop (i.e. in Flints and Denbs respectively).

Pre-Carboniferous Sandstones – In the National Park, in addition to a significant area N of Blaenau Ffestiniog, there are small green areas in the far S. Elsewhere they occur in E Llyn, inland from Valley (Anglesey), around Bangor and along the A5 (in Conwy and Denbighshire).

Carboniferous Sandstone –This is generally insignificant, but where it does occur in Flintshire, it is not located in the green zone.

Post-Carboniferous Sandstone – some green areas exist in the N and to a lesser extent in the W. parts of the Vale of Clwyd. Along the English border, green areas are restricted to the outcrops N of the A55.

Sand and Gravel – There are a reasonable number of isolated green scores on Anglesey and small areas in SE Llyn and in the National Park, along the Dyfi Valley. A few remote areas in the upper reaches of the Elwy Valley catchment of Conwy show as green. Similarly N of Denbigh in the Vale of Clwyd and in the Vale of Dee around Corwen, there are relatively small green areas. There are a number of green designations in Flintshire, namely around Holywell, and the Mold-Flint area. In contrast, there are relatively few green markers in the major sand and gravel spreads of the lowlands around Wrexham, with scattered readings and a small, cluster in Maelor.

APPENDIX 17 TRANSPORT

Rail Transport

The region is currently served by the N. Wales Main Line (NWML) running from Chester along the coast to Bangor and then across Anglesey to Holyhead. Branch lines connect with Almwch, Blaenau Ffestiniog and Llandudno. Another, north-south line runs from Wrexham (and beyond that to Shrewsbury) via Shotton to Bidston on the Wirral. Freight sidings connect with Valley (Anglesey Aluminium), Penmaenmawr (Quarry), Mostyn Docks and Penyffordd (Padeswood Cement Works). The Cambrian coast line runs from Machynlleth via Aberdyfi, Barmouth and Porthmadog, to Pwllheli. The link between that and Carnarfon/Bangor was closed in the 1960s as were many other lines across the region. Major Quarries in the Vale of Clwyd, the Corwen area, Arenig and elsewhere were also rail linked until that decade.

The possible upgrading of the route from Blaenau Ffestiniog to Llandudno Junction is under consideration by Network Rail, the Welsh Assembly and McAlpine, as a means of moving significant quantities of slate waste to England for use as aggregates. Network Rail's Route Plans 2006 refer to the need to improve track signals and earth works on the Conwy Valley line and gave a completion year of 2008/10, although at the time of preparation of the RTS (2007), finance was still under discussion. Outline planning permission was given (expires June 2009) to establish an aggregate loading and multi-use rail loading facility at Rhiwbryfdir, Blaenau Ffestiniog.

Apart from Padeswood (which serves cement not aggregates), the only active rail traffic is of rail ballast from Penmaenmawr to Crewe. For many years this has been running at c 200-250,000 tpa. Whereas a number of older quarries (mainly along the coast) could be physically directly connected, this is not possible for almost all the larger active limestone units in Flintshire/Denbighshire. Whereas some of those were rail connected e.g. along the Wheeler Valley, most are now at least 5 Km from operational rail lines. Connections between quarry and sidings would probably therefore have to be by road or by long distance conveyor systems as the topography alone would preclude most direct rail links, apart from the limited stretches of the north coast. For example the only place where the eastern limestone outcrops come close to the NWML is around Prestatyn and Dyserth and at this point, the limestone is largely within the Clwydian Range AONB.

Nevertheless, the volumes of material transported from the limestone area to Cheshire and Merseyside are considerable and longstanding. Counter to this the distances involved are effectively equivalent to "local trade" in any other context, i.e. in most instances within say 50 Km. The variety of destinations apart say from Birkenhead and Liverpool may also militate against the viability of establishing rail reception depots.

Further analysis (on a desk study scale) of the potential for rail haulage may be worth considering, if only to establish whether or not prima facie there was a reasonable case for developing such proposals in more detail. The overall environmental implications including the possible consequences of thereby promoting a considerable increase in production, would have to be integral to any such study.

Water Transport

N. Wales makes greater use of water transport than any other region of England and Wales in distributing aggregates produced within its borders. This trade comprises limestone shipments (249,000 t in 2005) from the Abergele – Colwyn Bay group of quarries to South East, (168,000 t), London (79,000 t) and the East of England (55,000 t). (The difference between the total for these areas [302,000 t] and the sea traffic, being road borne sales). For about 20 years prior to the 2005 survey, the level of tonnage has been running at c 600,000 tpa.

This has been part of a very longstanding use of sea to sea for transporting rock, but in earlier years was dominated by deliveries of high purity limestone for industrial uses (see Industrial Uses). Many other quarries to the west of here also exported stone by sea, limestone in the case of the Great and Little Ormes and on Anglesey (within the AONB), Pennôn/Dinmor and Benllech.

Igneous rocks were quarried and shipped on a very large scale (mostly as cobbles and paving; latterly as crushed rock aggregate) from Penmaenmawr and on Llŷn from Clynnog, Trefor/YrEifl/Llithfaen, Nefyn, Llanbedrog, Pwllheli, Porthmadog and smaller sites. All of these except Penmaenmawr (which borders Snowdonia National Park) are now located with the AONB. Quartzite was similarly sent out from Holyhead.

The uses of sea transport for carrying slate, on this occasion slate waste for aggregates, recently (2007) been resumed with serves into Liverpool and Manchester.

Conclusions

In conclusion, the only large scale resources in relatively close proximity to coasts which are not environmentally heavily protected, appear to be restricted to Porthmadog, Penmaenmawr/Penmaenbach, Great and Little Ormes and Old Colwyn – Abergele.

MPAs are advised to safeguard potential wharf areas from development which could prejudice the opportunities for ship borne aggregates traffic.

Road Transport

As already noted, roads account for c 90% of aggregates transport. N.Wales is fortunate in that the A55 runs relatively close to quarries on Anglesey, Penmaenmawr, Old Colwyn, Abergele and the northern part of the Vale of Clwyd. The same road crosses the eastern Carboniferous Limestone outcrop, but the largest set of quarries lie a little to the south on Halkyn Mountain, about 2-4 km from the route but using minor roads. South of the Halkyn group, most quarries are poorly served by road, indeed the difficulty of accessing some sites e.g. Minera, Burley Hill may have been one of the contributory factors leading to the closure of some sites.

It is also often the traffic on minor roads between quarries and the primary road network which has the greatest impact upon local communities and can affect them for very long periods indeed. In such cases, often quite minor works or greater coordination of road planning at the outset, could greatly alleviate such problems. One case in point is for example the lack of eastbound access to the A55 at Penmaenmawr. In contrast, heavy traffic between Cefn Mewr

Quarry and Padeswood Cement Works is now able to avoid Mold town via a series of new road links.

APPENDIX 18 SLATE

Introduction

Prima facie, stockpiles of waste slate and waste china clay sand represent by far the greatest resources of potential secondary aggregate material remaining to be tapped in the UK. The largest volumes of accumulated slate waste are located in North Wales, principally in the Snowdonia massif[1].

In a general sense, the term "slate" has been applied to any kind of rock which can be readily split into thin sheets and is sufficiently durable to be capable of use in roofing. Geologists have further restricted the use of the word slate to apply to metamorphosed clay/silt-grained rocks. Some of the World's best quality roofing slates are to be found in the Cambrian, Ordovician and Silurian rocks of North Wales and particularly North West Wales. The less fissile beds were worked to produce slab materials, used for walling foundations, engineering bases etc, but all are generally grouped under the term "slate".

Although slate was being used in medieval times for roofing, extraction moved onto an industrial scale in the C18th. In the peak period of working, the 250 years to 1914 (at which point the market declined significantly), typically only 5% of material lifted from the ground was used; the remainder was tipped. Thus a detailed study in 2001[2] estimated that 730 Mt of waste slate had been accumulated on tips in the region, with almost half of this total lying at Penrhyn (Bethesda) and Blaenau Ffestiniog. In North Wales there are several hundred abandoned slate quarries, each with one or more often, many individual waste tips.

The slate industry in the region employs c400 people.

Availability of slate waste for aggregates

The 2001 study calculated that some 270 – 370 Mt of slate waste in North Wales had potential for conversion to aggregate. The remaining stockpiles were either too difficult to access (in terms of location, safety etc), or reworking was considered to be environmentally unacceptable. Since World War II until recently, the active slate industry has been relatively small by comparison with earlier periods. However in 2001 it was reckoned, that 6 Mt of slate was still being won to produce a few tens of thousands of tonnes of non-aggregate slate products (non aggregate uses in N Wales in 2005 were recorded by NWaRAWP at only 10,000 t, the UK figures for this category were c100,000t).

Considerable efforts have been made in the last few years to promote a greater utilisation of slate waste for aggregate purposes.

There are essentially three potential sources:

1. Use of "historic" slate waste
2. Use of "mill run" slate waste

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[1] Slate tips and workings in Britain, Richards, Moorhead and Laing Ltd for DOE 1995
[2] North Wales Slate – Tips – Sustainable Source of Secondary Aggregates: ARUP Environmental for Welsh Assembly 2001

3. Use of virgin immediately “as dug”

The first two are classed as secondary aggregate. The third is strictly “primary” but is still often counted as secondary. However if it is a genuine by-product of say roofing slate production, its primary/secondary status is debatable.

The first category constitutes by far the largest readily available resource. The second requires usage of such waste to be integrated as part of the immediate arisings of slate, as non-aggregates are being produced.

The third category could include either material worked and selected for aggregates alongside that quarried for non-aggregates, or slate quarried specifically for aggregates.

In 2004 and 2005 it was estimated that there were about 79 Mt of slate waste available with planning permission for use as aggregates. Of this 42.5 Mt were located in Gwynedd. In addition just over 3 Mt of unworked slate in the ground had permission to be extracted as aggregates. [NB some of the provisional 2006 figures differ markedly from these and are being checked].

Aggregates Levy

Slate per se, i.e. in all these categories, does not attract payment of the Aggregates Levy (currently £1.60/tonne but due to rise to £1.95 in April 2008). The introduction of the levy in 2002 therefore gave new impetus to the use of slate for aggregates.

General Slate usage

Detailed figures of slate usage are not available in a comprehensive form. Data published by National Statistics (NS formerly Business Statistics Offices – BSO) relates to totals grouped for Great Britain as a whole and are shown in table A4.6.

Table A4.6: Sales of slate in England, Scotland and Wales

<table>
<tr><th>‘000 tonnes</th><th>2001</th><th>2005</th></tr>
<tr><td>Roofing</td><td>34</td><td>44</td></tr>
<tr><td>Cladding and decorative</td><td rowspan="2">38*</td><td>87</td></tr>
<tr><td>Powder and Granules</td><td>15*</td></tr>
<tr><td>Crude blocks</td><td>39</td><td>92</td></tr>
<tr><td>Fill and other uses</td><td>440</td><td>690</td></tr>
<tr><td>Total</td><td>551</td><td>928</td></tr>
</table>

Source BSO/NS
* These figures were withheld at the time of publication but have now been recalculated here as residuals.

Data for North Wales slate use as aggregate (and occasionally for other uses) has been gathered and published by the N Wales RAWP. These are set out below in table A4.7 together with the broader based BSO/NS figures for comparison. This indicates that by far the greatest volumes of slate waste being used for aggregates are those being deployed in N Wales.

Table A4.7: Utilisation of Slate for Aggregates 1999 – 2005 tonnes

	1999	2000	2001	2002 (b)	2003	2004	2005
North Wales	262,320 (a)	361,802	379,172 (g)	593,163 (c)	587,000 (d)	625,126 (e)	548,835 (e,f)
Great Britain	246,000 (g)	371,000	440,000	622,000	728,000	681,000	690,000

a) Gwynedd and small amount from Denbs.
b) Aggregates Levy £1.60/tonne was introduced from April 2002.
c) 87% from Gwynedd; figure included some decorative material for garden use as well as aggregate.
d) One operator failed to make a return.
e) i.e. amount of slate used as aggregate; it is understood that up to 20% of this was actually aggregate produced from primary extraction of material, not slate waste.
f) In addition 10,037 t was used for non-aggregate purposes.
g) The Arup Environmental study of 2001 recorded a usage figure of 275,000t.
Sources: N Wales – N Wales RAWP Annual reports; GB – BSO/NS

Suitability of Slate for Aggregates

From the earliest days of the industry, slate has been recognised as suitable for use as a basic low specification aggregate, but its physical characteristics (principally its shape and cleavage properties) limit its versatility in this respect. This is still a widely held perception and is reflected in the fact that in 2002 only 15% of aggregate sales of slate waste were recorded as being for "roadstone and industrial minerals" i.e. higher quality end uses[1].

However calculations by WET, based on their 2005 survey suggested that in terms of production capacity over 50% of processed slate waste was capable of use for more demanding aggregate uses than the general requirements for bulk construction fill. However that study does not make clear the degree of actual use for such purposes.

There are also some variations in the suitability for aggregates of the different types of slate. It is acknowledged that some of the "newer" i.e. Silurian slates to be found in Denbighshire and Wrexham are not as robust and may have more cleavage planes (i.e. lines of potential weakness), than the older slates of Gwynedd and therefore may be rather less suitable for use as aggregates.

The slate industry has been very proactive in recent years in seeking to move their slate waste-based products, "up market". For example its suitability has been recognised in modifications to the Specification for Highway Works, slate aggregates are now claimed to be fully compliant with specifications for concrete, concrete products, bituminous road bases, pipe bedding, drainage and filter materials, as well as the more conventional applications as sub-bases and construction fill. For example research by the University of Ulster has demonstrated that, far from the laminar shape of slate creating planes of weakness in a structure, fragments lock together to form an excellent granular sub-base. Its chemical inertness also results in no adverse reactions with cement. When crushed appropriately, it makes a good concreting sand and has the potential to fill an important possible gap in the natural sand market in the region.

[1] NWaRAWP 2002 Survey Report

Despite these findings, there still appears to be a certain amount of sceptism and resistance in the aggregates markets to the use of slate waste for the more demanding aggregates requirements. Counter to this, some authorities are looking to slate waste to meet their policies directed to increased dependency on secondary/sustainable materials.

Transport and Location

(see also Appendix 17)

One of the main issues affecting usage in the market accessibility to slate waste tips. As noted, most are located in Gwynedd and the immediate neighbourhood. Apart from the A55 (which runs within 5 -10 km of two of the nearest large sources - Penrhyn and Llandberis/Dinorwic), the road network is generally poor and an unsustainable transport mode. A planning condition on the working of waste slate at Penrhyn also limits road movements to 650,000 tpa (or a maximum of 2,600 tp day) without the written consent of the MPA. Notwithstanding this, the advent of the Aggregates Levy provided a cost premium within a radius initially reckoned to be about 50km of slate waste tips, over conventional primary aggregates. This means that the greatest impact has been on primary aggregate producers in Gwynedd, Anglesey and Conwy. The recent hikes in road fuel costs have reduced this advantage, but the planned increase in the Aggregates Levy in April 2008 will restore some of this differential.

Early signs of the effects on the area however are difficult to quantify as the recent decline in output of primary aggregates, particularly of lower specification materials (see tables 2 and 11) also broadly coincided with the completion of the A55 works in 2001.

It has also long been recognised that the main potential markets in terms of tonnage are located in England, but that there are substantial logistical issues. The most efficient and sustainable means of meeting this challenge is to use rail and water transport.

This would require either new railways, the upgrading of existing railways, or the rebuilding of former rail routes to link with either the main North Wales coast railway and/or upgrade of ports such as Penrhyn, Caernarfon, Conwy or Porthmadog.

The only existing connecting standard gauge rail line i.e. between Blaenau Ffestinog and Llandudno Junction is designated as having a track standard of “RA7”. This would need to be improved to about “RA 10” and involves a long length of tunnel.

Various studies of the logistics involved have been carried out most of which indicate considerable capital investment will be required. The Freight Facilities Grants and Track Access Grants are relevant in this respect. Discussions between rail operators, quarry companies, government agencies and local authorities over rail capacity, the investment required and sources of funding, have been held over a number of years. At the point of writing (late 2007), agreement had been reached on the works required and their costs; it was understood funding had been identified to cover most of the outlay and sources to bridge the remaining requirements were under consideration.

A survey in 2006 by WET for 2005 indicated that capacity to process slate for aggregates was around 20% higher than current output and industry sources in 2007 suggested that capacity (in terms of processing/transport ability) had risen to 2 Mtpa, with well over half of this being utilised.

In 2007 one company began shipping slate waste from Port Penrhyn to Garston Dock, Liverpool and Trafford, Manchester, marking the first significant breakthrough into the English Market. However as well as cost, there are limitations in terms of port capacity, restrictions on the number of lorries used between the quarry tip (see above) and the port and on the availability of vessels of an appropriate size and type

Sustainability

It has been suggested that slate production is inherently an unsustainable operation in that substantial amounts dug are tipped as waste. This traditional situation has changed radically in the last few years. Recent improvements in the production of slate for roofing and other non-aggregate purposes, including the development of new products and the employment of more mechanical processes, mean that the rate of usage of material won from the ground has improved recovery rates from the traditional 5%, to about 90%.

Secondly the view has also been put forward that movement of slate waste over considerable distances to major markets e.g. in England (i.e. often considered to be the only way in which substantial amounts can be disposed of), is counter to the proximity principle and therefore against good environmental practice. However, such an approach does utilise material already dug and partially processed, generally (involving past, low carbon energy usage during extraction) and would deploy rail transport, a more sustainable mode than road.

APPENDIX 19 APPORTIONMENT PROCESS

Method A: Basic Steps

AIM

Projections based on past shares of production.

Establish base production by MPAs

1) Average 2003-5 (from surveys)
2) Convert to percentages
3) Apply to produce new “2005” base

[table A19.1]

Apply percentage splits of above as:

1) Constant figure
2) 1% growth to 2010, constant thereafter.

[A19.2, 3-5, 7]

[Tables A19.4 and 19.6 calculate 2005-10 growth]. [Table 19.8 summarises

Method B: Basic Steps

AIM

Projections assuming that consumption for the region as a whole is averaged out on a per capita basis; exports are then added to make up total theoretical requirement from each MPA.

Population by MPA is expressed as % age.
Above MPA percentages are applied to National Collation regional total consumption data to give "per capita" MPA consumption.
[A19.10]

Production, surveyed consumption and per capita consumption are compared to give notional surpluses and deficits – (sub regional) [A19.11]

Average 2003-5 production, exports are deducted and imports added to create calculated ("residual") consumption as far as possible at MPA level.
[A19.12]

The revised regional total consumption is multiplied by the population percentage to give a theoretical MPA consumption.
[A19.13]

Per capita 2005 and 2003-5 consumption at MPA level compared with residual consumption [A19.12] to give differences.

[A19.14]

↓

Exports added to per capita 2003-5 MPA consumption to give annual MPA requirement, i.e. the base for A19.16-18.

[A19.15]

↓

Annual average MPA requirement is used as a base to produce projections

1) constant throughout [A19.16].
2) 1% rise to 2010, constant thereafter

[A19.8]

[A19.17 is calculation of 1% rise 2005-2010].

↓

MPA requirements by different per capita methods are compared with each other and with permitted reserves in MPAs.

[A19.19]

Information Base - Limitations

There are a number of factors which have to be overcome in order to implement either approach noted below and some compromises are inevitable, at least in the short to medium term, mainly on account of the imperfect nature of the data and existing commitments in the form of permitted reserves.

Firstly the level of consumption in any given area is not known precisely (see Domestic Consumption). Consumption survey data, even from the more sophisticated 2005 survey, is insufficiently specific to be able to identity uptake down to MPA level and in any event, MPA boundaries do not in any way reflect the margins of market areas. However it is reasonable to use the 2005 consumption data at sub-regional level in North Wales.

Furthermore, if the experience of other interregional flows is applied, large exporting areas tend to have higher than normal, and importing regions, lower than normal consumption rates respectively. Survey-derived consumption data is also to be used with great caution at sub-regional level let alone MPA level.

Although it is likely that population is a general indicator of consumption, actual levels of usage are likely to be higher per capita in most urban areas i.e. where building levels are usually more intensive, than in predominantly rural areas. This is in general, the direct reverse of the apparent survey bias just noted. The population density and general distribution is also far from evenly spread in the region even between MPAs.

Another major factor is that in the region, there is a considerable legacy of permitted rock reserves although exemplary efforts have been made in North Wales to review and remove dormant reserves. This means that unless owners are prepared to relinquish such permitted reserves without compensation, they will remain "live" (for the RTS period at least) and therefore these "traditional" source areas will be available to supply the market for very many years to come.

A further consideration is that geological resources are not uniformly distributed either geographically or in proportion to population.

Yet another element concerns the environmental capacity measures. These may suggest that some areas which are close to markets may be less able to accommodate quarrying than those more distant, so that there could be a need to make difficult decisions about trading off environmental capacity against the proximity principle.

Finally a broad statistical analysis such as that now presented is not capable of reflecting important subtleties in the market, for example the availability of large quantities of sandstone without significant environmental constraints may be of limited value to a market in need of say a sustainable source of concrete aggregate. Different types of aggregate source are not necessarily interchangeable, or, if they are used as an alternative, they may have higher intrinsic environmental costs (see Primary Aggregates – End Uses).

Method A - Projection Based on Existing Production/Consumption Patterns

The first step is to establish a base level of production at MPA level. Subregional apportionment is concerned with primary land won aggregates. Unfortunately there are confidentiality issues in using some of the 2005 information at MPA level. Furthermore, using data for a specific year as a base may be unrepresentative. To overcome both these aspects, it is proposed to use the average of the period 2003-05 as a base in most instances. However, where possible, 2005 figures are given for comparison (see Table 8 & 9).

Table A19.1 Annual Average Aggregate Production by MPA 2003-5

<table>
<tr><th>M Tonnes</th><th>Average Production 2003-5</th><th>% of North Wales</th><th>Production 2005</th></tr>
<tr><td colspan="4">Crushed rock</td></tr>
<tr><td>Anglesey/Gwynedd</td><td>653</td><td>8.7</td><td>565</td></tr>
<tr><td>Conwy</td><td>1377</td><td>18.4</td><td>1370</td></tr>
<tr><td>Denbighshire</td><td>1003</td><td>13.4</td><td>906</td></tr>
<tr><td>Flintshire</td><td>3266</td><td>43.7</td><td>3254</td></tr>
<tr><td>Total rock</td><td>6299</td><td>84.3</td><td>6095</td></tr>
<tr><td colspan="4">Sand/gravel</td></tr>
<tr><td>Gwynedd/Anglesey</td><td>194 (b)</td><td>2.6</td><td>250</td></tr>
<tr><td>Flints/Denbs</td><td>342</td><td>4.6</td><td rowspan="2">985</td></tr>
<tr><td>Wrexham</td><td>633 (a)</td><td>8.5</td></tr>
<tr><td>Total S/G</td><td>1169</td><td>15.7</td><td>1235</td></tr>
<tr><td>Total Aggs</td><td>7468</td><td>100</td><td>7330</td></tr>
</table>

Source:

a) Published data for 2005 was grouped for Denbighshire, Flintshire and Wrexham for confidentiality reasons. However as the proportions have been relatively constant, the average split for 2003 and 2004 was applied to 2005.

b) Anglesey constitutes a very small proportion of this total. This excludes marine (average 2003-5 48,000t)

The following tables therefore show the production requirements for aggregate until 2021 and 2025 using both 2005 and 2003-5 averages as a base. In the period to 2010, they are also displayed at a constant rate and with a 1%pa growth applied.

Table A19.2 Projection of North Wales Primary Aggregates Production using 2003-5 average MPA split applied to 2005 base: constant throughout.

<table>
<tr><th>M Tonnes</th><th>%</th><th>2005</th><th>Cum.
06-10</th><th>Cum.
11-15</th><th>Cum.
16-20</th><th>Cum.
21-25</th><th>Cum.
(a)
07-21</th></tr>
<tr><td colspan="8">Crushed rock</td></tr>
<tr><td>Anglesey/Gwynedd</td><td>8.7</td><td>0.6</td><td>3.0</td><td>3.0</td><td>3.0</td><td>3.0</td><td>9.0</td></tr>
<tr><td>Conwy</td><td>18.4</td><td>1.4</td><td>7.0</td><td>7.0</td><td>7.0</td><td>7.0</td><td>21.0</td></tr>
<tr><td>Denbighshire</td><td>13.4</td><td>1.0</td><td>5.0</td><td>5.0</td><td>5.0</td><td>5.0</td><td>15.0</td></tr>
<tr><td>Flintshire</td><td>43.7</td><td>3.2</td><td>16.0</td><td>16.0</td><td>16.0</td><td>16.0</td><td>48.0</td></tr>
<tr><td>Total rock</td><td>84.3</td><td>6.2</td><td>31.0</td><td>31.0</td><td>31.0</td><td>31.0</td><td>93.0</td></tr>
<tr><td colspan="8">Sand/gravel</td></tr>
<tr><td>Gwynedd/Anglesey</td><td>2.6</td><td>0.2</td><td>1.0</td><td>1.0</td><td>1.0</td><td>1.0</td><td>3.0</td></tr>
<tr><td>Flints/Denbs</td><td>4.6</td><td rowspan="2">1.0</td><td rowspan="2">5.0</td><td rowspan="2">5.0</td><td rowspan="2">5.0</td><td rowspan="2">5.0</td><td rowspan="2">15.0</td></tr>
<tr><td>Wrexham</td><td>8.5</td></tr>
<tr><td>Total S/G</td><td>15.7</td><td>1.2</td><td>6.0</td><td>6.0</td><td>6.0</td><td>6.0</td><td>18.0</td></tr>
<tr><td>Total Aggs</td><td>100</td><td>7.3</td><td>37.0</td><td>37.0</td><td>37.0</td><td>37.0</td><td>111.0</td></tr>
</table>

Small differences (± 0.1 Mt) in the totals for rock/sand & gravel are due to rounding.
a) i.e. 15 years

Table A19.3 Projection of North Wales Primary Aggregates production using 2003-5 average MPA split applied to 2003-5 average as a base: constant throughout.

M Tonnes	%	2003-2005	Cum. 06-10	Cum. 11-15	Cum. 16-20	Cum. 21-25	Cum. (a) 07-21
Crushed rock							
Anglesey/Gwynedd	8.7	0.7	3.5	3.5	3.5	3.5	10.5
Conwy	18.4	1.4	7.0	7.0	7.0	7.0	21.0
Denbighshire	13.4	1.0	5.0	5.0	5.0	5.0	15.0
Flintshire	43.7	3.3	16.5	16.5	16.5	16.5	49.5
Total rock	**84.3**	**6.3**	**31.5**	**31.5**	**31.5**	**31.5**	**94.5**
Sand/gravel							
Gwynedd/Anglesey	2.6	0.2	1.0	1.0	1.0	1.0	3.0
Flints/Denbs	4.6	0.3	1.5	1.5	1.5	1.5	4.5
Wrexham	8.5	0.6	3.0	3.0	3.0	3.0	9.0
Total S/G	**15.7**	**1.2**	**6.0**	**6.0**	**6.0**	**6.5**	**18.0**
Total Aggs	**100**	**7.5**	**37.5**	**37.5**	**37.5**	**37.5**	**112.5**

Small differences (± 0.1 Mt) in the totals for rock/sand & gravel are due to rounding.
a) i.e. 15 years

Table A19.4 Projection of North Wales Primary Aggregate production using 2003-5 average MPA split applied to 2005 base year with 1% growth to 2010; calculations of 2005 - 2010 growth

M Tonnes	Base %	2005 (a)	2006	2007	2008	2009	2010	Cum. 2006-2010
Crushed rock								
Anglesey/Gwynedd	8.7	0.6	0.6	0.6	0.6	0.6	0.6	3.0
Conwy	18.7	1.4	1.4	1.4	1.4	1.5	1.5	7.2
Denbighshire	13.4	0.9	0.9	0.9	0.9	0.9	0.9	4.5
Flintshire	43.7	3.2	3.2	3.3	3.3	3.3	3.4	16.5
Total rock	**84.3**	**6.1**	**6.1**	**6.2**	**6.2**	**6.3**	**6.4**	**31.2**
Sand/gravel								
Gwynedd/Anglesey	2.6	0.2	0.2	0.2	0.2	0.2	0.2	1.0
Flints/Denbs	4.6	1.0	1.0	1.0	1.0	1.0	1.1	5.1
Wrexham	8.5							
Total S/G	**15.7**	**1.2**	**1.2**	**1.2**	**1.2**	**1.2**	**1.3**	**6.1**
Total Aggs	**100**	**7.3**	**7.3**	**7.4**	**7.4**	**7.5**	**7.7**	**37.3**

a) 2005 figure rebased using 2003-5 average.
NB Figures in total rows are based on the sums of the columns above (i.e. not directly calculated as 1% pa growth).

Table A19.5 Projection of North Wales Primary Aggregates primary production using 2003-5 average MPA split applied to 2005 base year: 1% growth to 2010 - constant thereafter

M Tonnes	%	2005 (a)	2011-25 (b)	Cum. 06-10	Cum. 11-15	Cum. 16-20	Cum. 21-25	Cum. (c) 07-21
Crushed rock								
Anglesey/Gwynedd	8.7	0.6	0.6	3.0	3.0	3.0	3.0	9.0
Conwy	18.4	1.4	1.5	7.2	7.5	7.5	7.5	27.3
Denbighshire	13.4	1.0	1.1	5.1	5.5	5.5	5.5	16.2
Flintshire	43.7	3.2	3.4	16.5	17.0	17.0	17.0	50.7
Total rock	**84.3**	**6.2**	**6.6**	**31.8**	**33.0**	**33.0**	**33.0**	**98.2**
Sand/gravel								
Gwynedd/Anglesey	2.6	0.2	0.2	1.0	1.0	1.0	1.0	3.0
Flints/Denbs	4.6	1.0	1.1	5.1	5.5	5.5	5.5	16.2
Wrexham	8.5							
Total S/G	**15.7**	**1.2**	**1.3**	**6.1**	**6.5**	**6.5**	**6.5**	**19.2**
Total Aggs	**100**	**7.3**	**7.9**	**37.9**	**39.5**	**39.5**	**39.5**	**117.5**

a) see table A19.4
b) annual figures
c) i.e. 15 years
small differences are due to rounding

Table A19.6 Projection of North Wales Primary Aggregates production using 2003-5 average MPA split applied to 2003-5 average as base – 1% growth to 2010 – calculations of 2005 – 2010 growth

M Tonnes	Base %	2005 (a)	2006	2007	2008	2009	2010	Cum. 2006-2010
Crushed rock								
Anglesey/Gwynedd	8.7	0.7	0.7	0.7	0.7	0.7	0.7	3.5
Conwy	18.4	1.4	1.4	1.4	1.4	1.5	1.5	7.2
Denbighshire	13.4	1.0	1.0	1.0	1.0	1.0	1.1	5.1
Flintshire	43.7	3.3	3.3	3.4	3.4	3.4	3.5	17.0
Total rock	**84.3**	**6.4**	**6.4**	**6.4**	**6.5**	**6.6**	**6.8**	**32.8**
Sand/gravel								
Gwynedd/Anglesey	2.6	0.2	0.2	0.2	0.2	0.2	0.2	1.0
Flints/Denbs	4.6	0.3	0.3	0.3	0.3	0.3	0.3	1.5
Wrexham	8.5	0.6	0.6	0.6	0.6	0.6	0.6	3.0
Total S/G	**15.7**	**1.1**	**1.1**	**1.1**	**1.1**	**1.1**	**1.1**	**5.5**
Total Aggs	**100**	**7.5**	**7.5**	**7.5**	**7.6**	**7.7**	**7.9**	**38.3**

a) 2005 figure rebased using 2003-5 average
NB figures in total rows are base don the sums of the columns above (i.e. not directly calculated as 1%pa growth).

Table: A19.7 North Wales Aggregates Production using 2003-5 Average MPA split applied to 2003-5 average as base: 1% growth to 2010, constant thereafter

M Tonnes	%	2003-2005 average (a)	2011-25 (b)	Cum. 06-10	Cum. 11-15	Cum. 16-20	Cum. 21-25	Cum. (c) 07-21
Crushed rock								
Anglesey/Gwynedd	8.7	0.7	0.7	3.5	3.5	3.5	3.5	10.5
Conwy	18.4	1.4	1.5	7.2	7.5	7.5	7.5	22.3
Denbighshire	13.4	1.0	1.1	5.1	5.5	5.5	5.5	16.2
Flintshire	43.7	3.3	3.5	17.0	17.5	17.5	17.5	52.2
Total rock	**84.3**	**6.4**	**6.8**	**32.8**	**34.0**	**34.0**	**34.0**	**101.2**
Sand/gravel								
Gwynedd/Anglesey	2.6	0.2	0.2	1.0	1.0	1.0	1.0	3.0
Flints/Denbs	4.6	0.3	0.3	1.5	1.5	1.5	1.5	4.5
Wrexham	8.5	0.6	0.6	3.0	3.0	3.0	3.0	9.0
Total S/G	**15.7**	**1.1**	**1.1**	**5.5**	**5.5**	**5.5**	**5.5**	**16.5**
Total Aggs	**100**	**7.5**	**7.9**	**38.3**	**39.5**	**39.5**	**39.5**	**117.7**

a) see table A19.6
b) annual figures
c) i.e. 15 years
small differences are due to rounding

Table A19.8 North Wales Primary Aggregates Projections Method A: Summary of Cumulatives

M Tonnes	(a)	(b)	(c)	(d)	Permitted Reserves (e)(f)
Crushed rock					
Anglesey/Gwynedd	9.0	10.5	9.0	10.5	25.85
Conwy	21.0	21.0	22.3	22.3	69.99
Denbighshire	15.0	15.0	16.2	16.2	25.14
Flintshire	48.0	49.5	50.7	52.2	127.70
Total rock	**93.0**	**94.5**	**98.2**	**101.2**	**248.66**
Sand/gravel					
Gwynedd/Anglesey	3.0	3.0	3.0	3.0	0.98
Flints/Denbs	15.0	4.5	16.2	4.5	14.21
Wrexham		9.0		9.0	
Total S/G	**18.0**	**18.0**	**19.2**	**16.5**	**15.18**
Total Aggs	**111.0**	**112.5**	**117.5**	**117.7**	**263.84**

See Appendix 19 for details
a) 2003-5 average MPA split applied to 2005 – constant to 2010 (table A19.2)
b) 2003-5 average MPA split applied to 2003-5 – constant to 2010 (table A19.3)
c) 2003-5 average MPA split applied to 2005 – 1%pa growth to 2010 constant thereafter (table A19.5)
d) 2003-5 average MPA split applied to 2003-5 – 1%pa growth to 2010 constant thereafter (table A19.7)
e) permitted reserves at end 2005 NWaRAWP Annual Report (excludes dormant reserves)
f) includes in Gwynedd, slate in ground (3.5 Mt) but not slate in tips.

METHOD B

In applying Method A, data had to presented using both a 2005 and an average 2003-5 base in order to produce a more detailed breakdown at MPA level. This resulted in different base figures being set. To enable direct comparisons to be made, both bases are used here also.

Although neither geological resources of aggregate nor consumption is evenly distributed throughout the region, it was suggested in the EMAADS Report [1] that a more equitable distribution of operations may be gained by allying production points more closely to consumption, and to do this by applying the average consumption per capita to population distribution.

As noted in Section 3 (Domestic Consumption), unlike South Wales, the 2005 survey (reported in the National Collation) provided a reasonably complete and closely correlated picture of regional consumption in N Wales (subject to the caveats noted at the beginning of this Appendix). The details are shown below.

Table A19.9 North Wales Primary Aggregates – Surveyed Consumption 2005
'000 tonnes

Sub Region	MPA	Surveyed consumption		
		Rock	S/G	All Aggregates (a)
N West Wales	Anglesey Gwynedd	963	277	1240
North East Wales	Conwy Denbighshire Flintshire Wrexham	1557	534	2091
	Total Aggs	**2520**	**811**	**3331**

a) i.e. including imports from other regions
Source: National Collation 2005

[1] Establishing a method for Assessing Aggregates Demand and Supply Arup Environmental 2003.

Table A19.10 North Wales Primary Aggregates Average per capita-based consumption estimates: 2005 **'000 tonnes**

Sub Region	MPA	Population X 1000 (a) (c)	%	Consumption Primary Aggs 2005 (b)	(d)
N West Wales	Anglesey	68.7	10.2	340	923
	Gwynedd	117.7 (e)	17.5	583	
North East Wales	Conwy	111.0 (f)	16.5	550	2408
	Denbighshire	95.8	14.2	473	
	Flintshire	150.1	22.3	742	
	Wrexham	130.2	19.3	643	
	Total Aggs	**673.5**	**100.0**	**3331**	**3331**

a) Population in thousands from mid-year estimates for 2005 (takes into account recent boundary changes (2003/2005)
b) Total from regional consumption (National Collation 2005); average per capita consumption on this basis is 4.9 tpa.
c) Snowdonia National Park population (26,250 in 2005) is distributed to all the relevant local authority areas otherwise listed but most of the population is resident in Gwynedd – see notes (e) and (f). Small differences in total due to rounding
d) Sub-regional consumption as in National Collation 2005. See also Domestic Consumption (main text).
e) of which in 2001, 21,000 (i.e. 18%) was in Snowdonia NP
f) of which in 2001, 4,500 (i.e. 4%) was in Snowdonia NP

Average consumption of primary aggregates per head in the region is 4.9 tpa. Theoretical consumption base figures using this per capita rate are displayed below.

Table A19.11 North Wales 2005 Primary Aggregates comparison of surveyed consumption, per capita consumption and production **'000 tonnes**

Sub Region (g)	MPA	Production (a, h)	Surveyed Consumption (b)	Difference (a - b)(c)	Per capita Consumption (d)	Difference (a - d) (e)	Difference (b-d)(f)
N West Wales	Anglesey	815	1240	-425	923	-108	+317
	Gwynedd						
North East Wales	Conwy	1370	2091	+4424	2408	+4107	-317
	Denbighshire	5145					
	Flintshire						
	Wrexham						
Total Aggs N Wales		**7330**	**3331**	**+3999**	**3331**	**+3999**	**0**

a) from tables 8 and 9 (see also footnote (g) below)
b) from table 15 (from National Collation 2005)
c) "Apparent" surplus/deficit (i)
d) from table A19.10
e) Apparent surplus/deficit (ii)
f) Apparent surplus/deficit (iii)
g) Sub region defined in National Collation 2005.
h) NB the figure for 2005 is higher than that given in the National Collation report for that year. It relates to an under-recording of limestone in Denbighshire of 431,000 tonnes in the National Collation.

The three "Apparent" surpluses/deficits noted above offer a very crude theoretical indication of the extent to which parts of the region are self sufficient. It should be noted that (c) and (e) do not take into account the very large amount of exports (hence the high level of surplus in N E Wales) and the minor level of imports. The figures in (f) however indicate that the imbalance (at 317,000 t) between the per capita theoretical consumption and surveyed consumption is remarkably small.

Table A19.12 North Wales Primary Aggregates Estimation of MPA consumption based on 2003-5 average split M tonnes

Sub Region (g)	MPA	Production (a)		Total	Exports (b) %	Exports 000 t (c)	Interim Consumption (d)	Imports (e)	Residual Consumption (f)
		Rock	S/G						
N West Wales	Anglesey	0.7	0.2	0.7	-	-	0.7		0.7
	Gwynedd			0.2	20	-	0.2	0.1	0.3
North East Wales	Conwy	1.4	-	1.4	59	0.8	0.6		0.6
	Denbighshire	1.0	0.3	1.0	50	0.5	0.5		0.5
	Flintshire	3.3		0.3 3.3	65 71	0.2 2.3	0.1 1.0	0.1	1.2
	Wrexham		0.6	0.6	46	0.3	0.3	0.1	0.4
	Total Aggs	**6.3**	**1.2**	**7.5**	**-**	**4.1**	**3.4**	**0.3**	**3.7**

a) 2003–2005 average see table A19.1. Figures do not total due to rounding – (see original table).
b) exported from the region based on table 9K of National Collation 2005
c) 2003-5 Average x 2005 Export percentage
d) total sales minus exports
e) total imports are taken from National Collation 2005 table 5K and allocated according to general market intelligence based on type of material, size of market and source of imports.
f) based on total 2003-5 average sales (a), minus exports (c), plus imports (e).
g) sub regional division as defined as National Collation 2005.
NB totals in columns vary from National Collation because (i) they are based on the average for 2003-5 and (ii) the 2005 input figures include 0.4Mt omitted from the Denbighshire data in the National Collation.

Table A19.13 North Wales Primary Aggregates: per capita proportions applied to 2003-5 average

Sub Region	MPA	Population % (mid 2005)	2003-5 K tonnes
N West Wales	Anglesey	10.2	377
	Gwynedd	17.5	648
North East Wales	Conwy	16.5	611
	Denbighshire	14.2	525
	Flintshire	22.3	825
	Wrexham	19.3	714
	Total Aggs	**100**	**3700**

Table A19.14 (below) compares for the base year (2003-5) and the theoretical consumption based on the per capita approach (now adjusted for exports) with the consumption calculated from 2003-5 average based on surveys. Although a theoretical calculation, it suggests that most MPAs were remarkably close to sustainable balance as far as production of aggregates being made available to meet consumption based on an average uptake per capita. The notable exception is the mismatch in Flintshire (in surplus) and Wrexham (in deficit). These two ± figures are both of same order. It would be logical for net rock sales to flow from Flintshire to Wrexham and this theoretical difference would appear to endorse this.

Table A19.14 North Wales Primary Aggregates: Theoretical Surpluses and Deficits
'000 tonnes

Sub Region	MPA	Per Capita Consumption 2005 (a)		Percentage rebased average of 2003-5 (b)	Residual Consumption 2003-5 (c)	Difference (d)
N West Wales	Anglesey	340	923	377	1000	-25
	Gwynedd	583		648		
North East Wales	Conwy	550	2408	611	600	-11
	Denbighshire	473		525	500	-25
	Flintshire	742		825	1200	+375
	Wrexham	643		714	400	-314
	Total Aggs	**3331**	**3331**	**3700**	**3700**	**0**

a) from table A19.10
b) from table A19.13
c) from table A19.12
d) (c) minus (b); figures of less than 0.1Mt should be ignored as this is below the level of rounding

Table: A19.15 North Wales Primary Aggregates 2003-5 Per capita x population consumption, plus exports: base calculations **'000 tonnes**

Sub Region	MPA	Per Capita Consumption x populatn 2003-5 (a)	Exports (b)	2003-5 Average annual requirement (c)	Rounded 2003-5 base (d)
N West Wales	Anglesey	377	-	377	400
	Gwynedd	648	-	648	700
North East Wales	Conwy	611	800	1411	1400
	Denbighshire	525	500	1025	1000
	Flintshire	825	2500	3325	3300
	Wrexham	714	300	1014	1000
	Total Aggs	**3700**	**4100**	**7800**	**7800**

a) from table A19.13
b) i.e. exports to other regions from table A19.12
c) (a) plus (b)
d) rounded with 7,800000 as control total

This approach assumes that each MPA should make contribution to “local needs” (per capita consumption being a proxy for these) together with a continuing contribution to exports at current levels.

Table A19.16 North Wales Primary Aggregates: Based on 2003-5 totals and per capita base plus exports – constant throughout M tonnes

Sub Region	MPA	Base 2003-5 (a)	Cum. 06-10	Cum. 11-15	Cum. 16-20	Cum. 21-25	Cum. 07-21 (b)
N West Wales	Anglesey	0.4	2.0	2.0	2.0	2.0	6.0
	Gwynedd	0.7	3.5	3.5	3.5	3.5	10.5
North East Wales	Conwy	1.4	7.0	7.0	7.0	7.0	21.0
	Denbighshire	1.0	5.0	5.0	5.0	5.0	15.0
	Flintshire	3.3	16.5	16.5	16.5	16.5	49.5
	Wrexham	1.0	5.0	5.0	5.0	5.0	15.0
	Total Aggs	**7.8**	**39.0**	**39.0**	**39.0**	**39.0**	**117.0**

a) i.e. consumption from table A19.15 column (d)
b) i.e. 15 years

N.B Regional totals are summed from columns which include rounded data; actual totals are 0.1 Mt higher by direct calculation.

Table A19.17 North Wales Primary Aggregates – using 2003-5 average and per capita plus exports; calculations of 2006-2010 growth at 1% M tonnes

Sub Region	MPA	2005/ 2003-5 Base (a)	2006	2007	2008	2009	2010	Cum. 2006-2010
N West Wales	Anglesey	0.4	0.4	0.4	0.4	0.4	0.4	2.0
	Gwynedd	0.7	0.7	0.7	0.7	0.7	0.7	3.5
North East Wales	Conwy	1.4	1.4	1.4	1.4	1.5	1.5	7.2
	Denbighshire	1.0	1.0	1.0	1.0	1.0	1.1	5.1
	Flintshire	3.3	3.3	3.4	3.4	3.4	3.5	17.0
	Wrexham	1.0	1.0	1.0	1.0	1.0	1.1	5.1
	Total Aggs	**7.8**	**7.8**	**7.9**	**7.9**	**8.0**	**8.3**	**39.9**

a) i.e. average of 2003-5 used for 2005 base; i.e. derived from consumption in table A19.15 column (d)

Table A19.18 North Wales Primary Aggregates – using 2003-5 average base and per capita consumption plus exports – 1% growth to 2010; constant thereafter M tonnes

Sub Region	MPA	Base 2003-5 (a)	Cum. 06-10	Cum. 11-15	Cum. 16-20	Cum. 21-25	Cum. 07-21 (b)
N West Wales	Anglesey	0.4	2.0	2.0	2.0	2.0	6.0
	Gwynedd	0.7	3.5	3.5	3.5	3.5	10.5
North East Wales	Conwy	1.4	7.2	7.5	7.5	7.5	22.3
	Denbighshire	1.0	5.1	5.5	5.5	5.5	16.2
	Flintshire	3.3	17.0	17.5	17.5	17.5	52.2
	Wrexham	1.0	5.1	5.5	5.5	5.5	16.2
	Total Aggs	**7.8**	**39.9**	**41.5**	**41.5**	**41.5**	**123.4**

a) consumption from table A19.15 column (d)
b) i.e. 15 years

Table A19.19 North Wales Primary Aggregates – Summary of per capita estimates 2007 – 2021 M tonnes

Sub Region	MPA	(a)	(b)	Permitted reserves (c)		
				Rock	Sand/gravel	Total
N West Wales	Anglesey	6.0	6.0	16.9	-	16.9
	Gwynedd	10.5	10.5	5.4	1.0	9.9
North East Wales	Conwy	21.0	22.3	69.9	-	69.9
	Denbighshire	15.0	16.2	25.1	- (d)	25.1 (d)
	Flintshire	49.5	52.2	127.7	5.3 (d)	133.0 (d)
	Wrexham	15.0	16.2	-	8.9 (d)	8.9 (d)
	Total Aggs	**117.0**	**123.4**	**245.0**	**15.2**	**263.7**

a) 2003-5 average based per capita consumption plus exports: constant throughout (table A19.16)
b) 2003-5 average based per capita consumption plus exports: 1% growth to 2010; constant thereafter (table A19.18)
c) Permitted reserves as at 31/12/05 – N Wales RAWP Annual Report (includes 3.5 Mt virgin slate reserves in Gwynedd)
d) In 2005, sand and gravel reserves were grouped for Denbighshire, Flintshire and Wrexham. The reserves in Denbighshire were very small. The 2005 figures for Wrexham (62.5%) and Flintshire/Denbighshire (37.5%) were therefore divided by applying 2004 proportions; Denbighshire was assumed to have no permitted reserves.

APPENDIX 20 POLICY SETTING FOR AGGREGATES PROVISION IN NATIONAL PARKS AND AONBs

MPPW (2000 para m21.22) states that mineral working in National Parks and AONBs should only take place in exceptional circumstances and indicates a set of related criteria. Similarly paras 23-24 refer to protection given to European protected sites. Referring specifically to aggregates, MTAN1 (paras 51-53) indicates clearly that plan allocations or approval of proposed working in National Parks and AONBs should only take place where no alternative environmentally acceptable sites are available and where other exceptional circumstances prevail. MTAN1 goes on to require that the RTS process should discuss and record the agreement of other areas (ie other MPAs) in taking on board the contribution which National Parks ands AONBs are unable to make. Paragraphs 54-69 refer to the need to give particular protection to other natural and cultural assets, most of which although no less significant, relate to much smaller areas than National Parks or AONBs. Those last two categories however, have a regionally strategic significance.

The former extensive permitted reserves in the Snowdonia National Park first made their transition into the dormant category (very few areas having been worked seriously since the 1970s) and more recently their residual planning status as reserves has been removed by the application of Prohibition Orders, leaving only very small and insignificant (but unquantified dormant reserves). Quarrying stopped altogether in 1998. The former large coastal quarries in the Llŷn AONB and the generally smaller former operations in the Anglesey Coast AONB have reached a similar situation. The position in the Clwyd AONB is rather more varied; some sites have been removed by Prohibition Orders, but other large operations continue.

It is known that AONBs in N Wales produced 503,000 t of aggregates and had permitted reserves of 7.2 Mt in 2005. As the recent survey data is presented this information only at regional level rather than by statutory designation for specific designated areas it is not possible to be any more precise, but the situation should be investigated further over the next 5 years.

Whereas neither sets of policies above state categorically that aggregates should not be worked in such areas, nor do they insist that current operations should be closed or planning permissions relinquished (except by implication, in the case of dormant sites via Prohibition Orders), it is clear that where feasible, there is a general underlying desire to reduce the level of production in these designated areas.

There is probably therefore an implied obligation (coupled with applying the proximity principle) that the RTS should at least explore the extent to which other areas, are able to meet the demand currently met from AONBs.

The section on Guidance to MPAs considers in broad terms the sustainability of these protected areas in terms of the permitted reserves but will also examine the feasibility of the share presently being contributed by such areas, being covered by neighbouring areas.

Whereas this could take many years to effect, with the cooperation of MPAs and industry over the next five years a much more rapid outcome may be achievable.