

ENVIRONMENTAL PROTECTION AGENCY

**ENVIRONMENTAL MANAGEMENT IN THE
EXTRACTIVE INDUSTRY
(NON-SCHEDULED MINERALS)**

FINAL PROJECT REPORT

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By

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Project Team

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1 INTRODUCTION

1.1 General

The value of the construction industry in Ireland was €23.7 billion, in 2003, representing approximately 21% of GNP, almost double the European average of 10%. The estimated value of the construction industry for 2004 is €28.2 billion (DKM, 2004). Currently, over 250,000 people are directly employed in the construction sector.

Construction aggregates and dimension stone have a wide range of uses within the construction industry, and a continuous adequate supply of these products is essential to the continued ability of the construction industry to supply the social and economic infrastructure essential for the modern mixed open economy in Ireland. These construction materials are essential for development, and through that they are a key element for contributing to our quality of life and for creating sustainable communities. Construction aggregates are predominantly supplied from land – based sources: pits and quarries.

The Environmental Protection Agency (EPA), while not the regulator for the quarrying sector, considered that it is appropriate that a review of environmental management practice (and related issues) within the sector be carried out.

1.2 Project Objectives

The project was carried out under a number of work packages. A report has been prepared for each work package and these reports are provided in Volumes 2 to 5 of the Final Project Report.

The main objectives are to:

- Provide an inventory of commercial pits and quarries in Ireland.
- Assess aggregate supply and demand
- Review environmental management and restoration practice within the sector
- Review the current planning and environmental framework
- Prepare environmental management guidelines for operators and regulators
- Consider the future development of the sector (planning & environmental context)

1.3 Definition – ‘Minerals’

In Ireland, minerals are defined in two different Statutes. In the Minerals Development Act, 1940, minerals are defined as *‘All substances (other than the agricultural surface of the ground and other than peat or turf in, on or under the groundbut without prejudice to the generality of the foregoing, the said word includes all scheduled minerals’*. A list of 72 minerals is defined in the Schedule under the Act. These minerals known as ‘Scheduled Minerals’ include metalliferous and industrial minerals, and hydrocarbons. The Minerals Development Act, 1979, further clarified this issue and stated that the definition of ‘minerals’ *shall not include stone, gravel, sand or clay except to the extent that any such substance falls within the list of minerals mentioned in the Schedule to the Act of 1940’*.

The planning code has a wider definition of minerals. Viz., under the 2001 Planning & Development Regulations (S.I. No. 600) minerals are defined as meaning *‘all minerals and substances in or under the land of a kind ordinarily worked by underground or by surface working for the removal but does not include turf’*.



Extraction of dimension stone (McKeon Stone, Threecastles, Co. Kilkenny)

1.4 Pits & Quarries

A review of the Irish construction materials sector indicates that over 120 million tonnes of aggregates are used annually (Refer to Chapter 2 of this report and ICF 2005a). This

includes aggregates used in the production of concrete products, bituminous mixes and asphalt, and fill materials. At present, there are over 500 operating quarries within Ireland, producing sand & gravel and crushed rock aggregates, and dimension stone for the construction industry.



Concrete batching plant (Shay Murtagh Ltd., Raharney, Co. Westmeath)

In addition, Irish dimension stone operators produce approximately 250 thousand tonnes of cut stone annually (Irish Dimension Stone Producers Association, 2000). There is a significant export market in northern Europe for these products and up to 50% of the dimension stone produced in Ireland is exported to Belgium, Holland and Germany.



*Use of dimension stone at East Point Business Pk.
(Feelystone Ltd., Co. Kilkenny)*

For the purposes of these guidelines construction aggregates are sub-divided into two main categories:

- **Primary aggregates:** naturally occurring rock and sand & gravel extracted directly from land or from marine sources

- **Secondary / recycled aggregates:** previously used materials that are capable of substituting for primary aggregates. These include waste materials arising from demolition of buildings and road surface planings etc.



Extraction of sand and gravel (Keohane Readymix, Innishannon, Co. Cork)

Currently, in Ireland, all primary aggregates are sourced from land based quarries. There is currently no commercial extraction of aggregates from marine sources. The use of secondary / recycled aggregates is at a relatively low level but it is envisaged that this will increase over the next few years, particularly with the recent introduction of the Landfill Levy, the establishment of the National Construction and Demolition Waste Council (www.ncdwc.ie) and the recent development of a number of construction and demolition (C & D) waste recycling facilities at major urban centres, and the greater acceptance of the use of secondary / recycled aggregates. A number of these C & D waste recycling facilities have been located at existing quarry developments and complement the normal ongoing activities. However, due to the relatively low volume of C & D waste available for recycling in comparison to the overall demand for aggregates, land based resources will remain as the principal future source of aggregates in Ireland.

1.5 Current Planning & Environmental Framework: An Overview

Local authorities are responsible for the planning and environmental regulation of quarry developments (extracting non-scheduled minerals) and ancillary facilities (including concrete and asphalt / macadam manufacturing facilities). The current planning and

environmental regulatory framework requires these developments to comply with the Planning and Development Act (2000) and related regulations. The local authorities and An Bord Pleanála attach conditions relating to environmental management of these developments to planning permissions granted.

In addition to obtaining planning permission the following licences / permits may be required from local authorities where discharges, emissions or waste activities are carried out:

- Under the Water Pollution Act (1977), discharge of trade effluent (such as excess treated washwater from settlement lagoons) to surface water is subject to obtaining a Water Discharge Licence.
- Since 1988, newly erected asphalt / macadam plants have been subject to the Air Pollution Act, 1987 and (Licensing of Industrial Plant) Regulations, 1988 (S.I. No. 266 of 1988).
- Since 1998, the use / recovery of imported inert soil material for quarry restoration works and the production of secondary aggregates (by the recycling of imported construction and demolition waste) are subject to obtaining a waste permit under the Waste Management (Permit) Regulations, 1998 (S.I. No. 165 of 1998). The relevant local authority is the regulatory agency for such permit. These regulations do not specify any upper limit on the volumes of such materials recovered / produced by such activities.

It should be noted that even where an operation is not required to have a permit or single media licence there remains an obligation to comply with the provisions of the relevant Acts.

At present, there is no national planning policy or strategy in Ireland for construction aggregates or dimension stone. Local authorities consider the land use and planning issues associated with quarries and the extractive industry in their County Development Plans. A recent review of these development plans indicates that there is a requirement for a more consistent approach to land use planning for provision of aggregates and dimension stone. (refer to Section 2.5).

The general objective in planning for provision of these materials is to ensure that the aggregate supply is managed in a sustainable way so the best balance is obtained between environmental, economic and social considerations.

2 AGGREGATE DEMAND & SUPPLY IN IRELAND

2.1 General

This Chapter provides an assessment of the historical and future aggregate demand in Ireland. As there are no formal statistics available on historical / current demand, this assessment is based on available information at the time of the study. Future supply of primary aggregates (land-based and marine) and secondary (recycled) aggregate is discussed in the context of the future demand.

2.2 Historical Aggregate Supply

2.2.1 Historical Aggregate Supply 1997 - 2002

Based on available information, the supply of aggregates in the Republic of Ireland increased by over 50% between 1997 and 2002, from approximately 50 million tonnes in 1997 to approximately 110 million tonnes in 2001 (KPMG, 2000).

The historical increase in aggregate supply is shown in Figure 2.1.

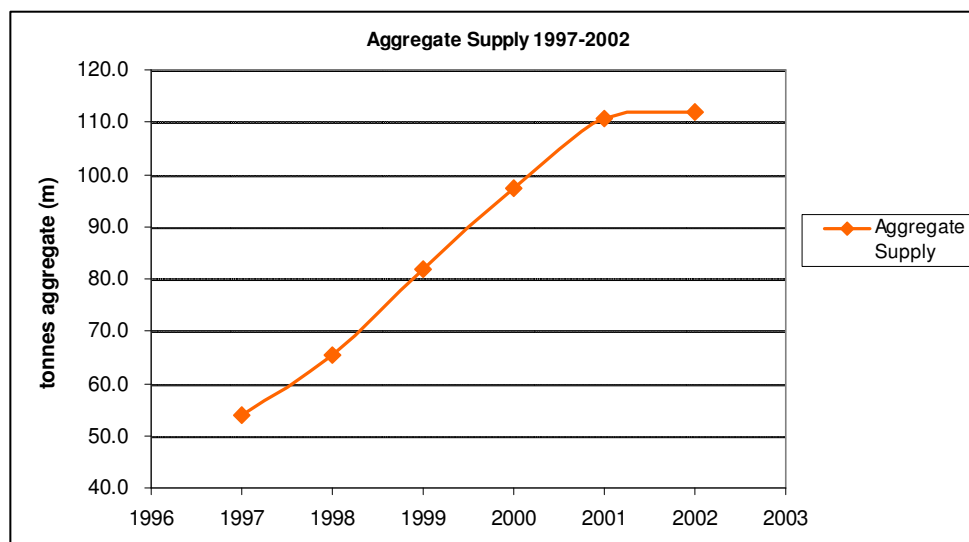


Figure 2.1 *Historical Aggregate Supply 1997-2002: Back-calculated from Construction O/P figures*

In 2001 the total aggregate supplied to the construction sector was approximately 110 million tonnes.

For the purposes of assessing the historical aggregate supply (1997 to 2001) the aggregate supply for 2001, 110 million tonnes, was correlated to construction output for 2001. In 2001 construction output was €20 billion (Table 1.2, Construction Industry Review 2001, DoELG (2002a) which divided by aggregate supply gives a figure of 1 tonne aggregate for every €181 of construction output. The aggregate supply for preceding years 1997 to 2000 was calculated retrospectively from 2001 based on this value. The assessment of aggregate supply in 1997 was approximately 50 million tonnes, suggesting a good correlation between aggregate supply and construction output based on 1 tonne = €181.

Figure 2.1 shows a levelling of aggregate supply between 2001 and 2002 with an increase of only 1.2 million tonnes, compared with an increase of 13.3 million tonnes between 2000 and 2001 and an increase of 15.5 million tonnes between 1999 and 2000, see Table 2.1

	1997	1998	1999	2000	2001	2002e
Construction Output (bn€) ¹	9.7	11.83	14.84	17.65	20.06	20.28e
Aggregate Supply (m tonnes)	53.9	65.4	81.9	97.5	110.8	112e
Increase Aggregate Supply (m tonnes)		11.4	16.6	15.5	13.3	1.2e
Growth Aggregate Supply		21.3%	25.4%	18.9%	13.7%	1.1%e
e - estimated values						
¹ Construction Industry Review 2001, Outlook 2002-2004 (DoELG 2002a)						

Table 2.1 *Historical Aggregate Supply 1997-2002: Back-calculated from Construction O/P figures*

A similar historical increase in aggregate demand occurred in England in the 1980's, with a 50% increase in demand for construction aggregates (UK DoE, 1994), with annual

consumption of 300 million tonnes in England and Wales in 1989. Aggregate consumption declined sharply after 1989 and by 1991 annual consumption in England and Wales was 240 million tonnes. Historically the consumption of aggregates in England and Wales between 1960 and 1991 may be described as cyclical with an overall trend for an increase in aggregate consumption.

2.3 Future Aggregate Demand 2001 - 2021

2.3.1 Future Aggregate Demand

This section of the report outlines forecast changes in aggregate demand from 2001 to 2021. The forecast period 2001-2021 was used as it is considered a realistic time frame necessary for national and regional spatial planning (DoELG, 2002b).

The Central Statistics Office (CSO) published projections of future population trends in Ireland to 2031 for eight regions (Regional Population Projections 2001-2031, CSO 2001). The regions used by the CSO in making predictions are based on the NUTS2 (Nomenclature of Territorial Units 2) regions which are also used by Eurostat.

The projected population is based on the M1F2 scenario which is considered by the CSO as the most likely scenario considering current trends. Projected population trends are shown in Table 2.2. The population projection for the Dublin region in 2021 is c. 1.5 million, the next highest region is the South-West with a projected population of c. 0.59 million followed by the Mid-East region with a projected population of c. 0.503 million. The total projected population for the Dublin and Mid-East region in 2021 is c. 2m.

Potential aggregate demand has been calculated using two different methodologies based on a number of assumptions. The two methodologies were based on:

- Aggregate supply in 2001 and projected population figures up to 2021, and
- Aggregate supply in 2001 indexed to projected construction output (as a percentage of GDP)

2.3.2 Method 1 – Based on Projected Population

The first method of forecasting aggregate demand in 2021 is based on the NUTS2 regions and shows geographical variations in forecast aggregate demand, see Figure 2.2. The forecast is based on population and mean aggregate supply by county in 2001 and the 2021 population projection (M1F2 Scenario, CSO 2001). The tonnage of aggregate per a head of population for the 8 NUTS2 regions was calculated for 2001

based on the population and 2001 aggregate supply figures (This equates to an average figure of 28 tonnes per head of population). It was assumed that the same tonnage per head of population would exist in 2021, and therefore the projected population in 2021 was used to calculate the forecast aggregate demand, refer to Tables 2.2 and 2.3 below.

	2006	2011	2016	2021
Border	426.1	432.2	435.1	435.3
Dublin	1,267.2	1,364.2	1,445.6	1,519.5
Mid-East	411.1	439.3	463.4	485
Midland	209.2	208.4	205.5	200.5
Mid-West	344.5	356.2	364.9	370.6
South-East	410.5	414.1	413.8	410.3
South-West	577.4	587.7	593.4	594.8
West	385.2	399.6	410.07	419.5
State	4,031.4	4,201.8	4,332.4	4,435.5

Table 2.2 *Projected Population, NUTS2 Regions (M1F2 scenario, CSO, 2001)*

	Population 2001	Total aggregate demand 2001	Aggregate demand per head pop. 2001	Projected population 2021²	Forecast aggregate demand 2021
	Thousands	tonnes (m)	tonnes	thousands	tonnes (m)
Border	417.3	16.5	38.36	435.3	16.7
Dublin and Mid-East¹	1,535.2	23.8	15.5	2,004.5	31.13
Midland	208	6.4	36.9	200.5	7.4
Mid-West	331	13.6	39	370.6	14.4
South-East	402.4	12.2	29.5	410.3	12.1
South-West	563	19.6	33.7	594.8	20.1
West	368.9	16.6	43.7	419.5	18.3
State	3,833.9	110.8	28.3	4,435.5	120.25
¹ Dublin and Mid-East regions have been combined as the aggregate demand is principally in the Dublin region and the aggregate supply is primarily from the Mid-East region.					
² Projected population based on M1F2 scenario (CSO, 2001)					

Table 2.3 *Aggregate demand 2001 and forecast aggregate demand 2021*

Based on aggregate supply and projected population, Table 2.3 shows a forecast increase in aggregate demand in Ireland would increase from 110.8 million tonnes in 2001 to 120.25 million tonnes in 2021, representing an increase in the annual aggregate demand of 9.45 million tonnes over the 20 year projected period. Over the period 2001-2021 the total aggregate demand for Ireland is forecast at between 2.21 billion tonnes assuming a supply of 110m tonnes a year, and 2.4 billion tonnes assuming a supply of

120m tonnes a year. The main increase in demand for aggregates will occur in the Dublin and Mid-East region (Dublin, Meath, Kildare and Wicklow), other urban centres (e.g. Cork, Galway, Waterford and growth areas designated under the 2002 – 2020 National Spatial Strategy).

2.3.3 Method 2 – Based on Projected Construction

The second method used for forecasting aggregate demand was to correlate aggregate supply in 2001 with construction output as a percentage of GDP. The aggregate demand was forecast annually for the period 2001 to 2021 for three scenarios and the results are shown in Figure 2.3. The forecast demand for aggregates using this methodology is on a national basis only, unlike Method 1 which shows forecast demand on a regional, or geographic basis.

Figure 2.3 shows historical aggregate supply 1997-2001, and forecast aggregate demand for the period 2001-2021. The aggregate demand was forecast for three different scenarios. A number of assumptions were made for the forecasting of aggregate demand and also for each scenario.

In 2001 construction output in Ireland was €20.06 billion, which equated to 17% of GDP (DoELG, 2002a). Aggregate supply in 2001 was 110.8 million tonnes nationally. Therefore, 1 tonne of aggregate was supplied for every €181 spent nationally in construction output, providing an index link for the two values.

Construction output in Ireland in 2001 as a percentage of GDP was significantly higher than the western European average which was 10% GDP (DoELG, 2002a). In the forecasting of aggregate demand it has been assumed that construction output in Ireland will, at some point in the future, reach an average of 10% GDP, in line with the western European average in 2001. For the purposes of this forecast it has been assumed that in Scenarios 1 and 2 Irish construction output will be 10% of GDP after 7 years from 2001, and in Scenario 3 construction output will be 10% GDP after 14 years.

Percentage growth GDP	1998	1999	2000	2001	2002 (f)	2003 (f)	2003 (f)
Ireland	9	10.8	11.5	5.9	3.5 ¹	5.8 ²	5.3 ²
EU¹	-	-	3.4	1.7	1.5	2.8	-
(f) Forecast							
¹ Economic review and Outlook 2002 (CSO, 2002)							
² Construction Industry Review 2001 Outlook 2002-2004 (DoELG, 2002a)							

Table 2.4 *Historical and estimated increases in GDP in Ireland and the EU for the period 1998-2003.*

During the period 2000-2002 the growth in Irish GDP was significantly higher than the EU average, see Table 2.4. The forecast growth in GDP for Ireland in 2002 and 2003 is more than double that forecast for the EU.

Assuming a correlation between GDP, construction output and aggregate supply, the forecast aggregate demand in aggregate between 2001 and 2021 has been calculated for three different scenarios assuming different growth rates in GDP. The results of the three scenarios are shown in Figure 2.3, and were calculated as follows:

Scenario 1. Assumes that Irish construction output will decrease by 1% per annum to 10% of GDP in 2008 after which it will remain at 10% GDP, and assumes an average GDP growth rate between 2001-2021 will be 2% year on year. The resultant trend in forecast aggregate demand is shown in Figure 6. The graph forecasts that annual aggregate demand in 2021 will be c. 94.6 million tonnes and that the total forecast demand in aggregate between 2001-2021 will be c. 1.62 billion tonnes. The forecast demand in aggregate in 2021 is 16.2 million tonnes less than in 2001.

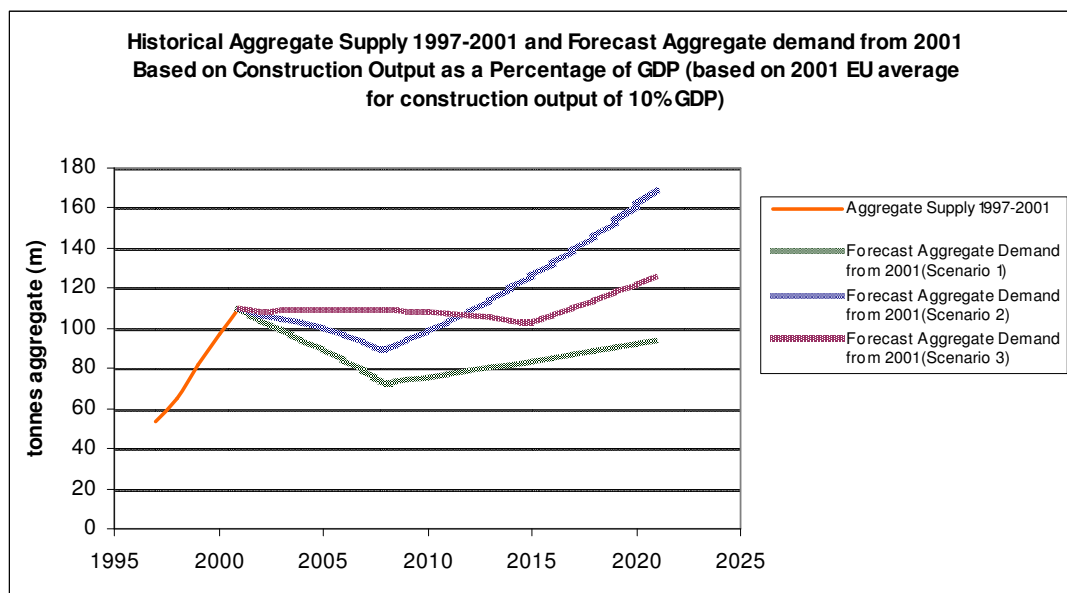


Figure 2.3 *Historical aggregate supply and forecast aggregate demand 2001-2021*

Scenario 2. Assumes that Irish construction output will decrease by 1% per annum to 10% of GDP in 2008 after which it will remain at 10% GDP, and assumes an average GDP growth rate between 2001-2021 will be 5% year on year. The resultant trend in forecast aggregate demand is shown in Figure 2.3. The graph forecasts that annual aggregate demand in 2021 will be c. 169 million tonnes and that the total forecast demand in aggregate between 2001-2021 will be c. 2.36 billion tonnes. The forecast annual demand for aggregates in 2021 is 59 million tonnes more than was supplied in 2001.

Scenario 3. Assumes that Irish construction output will decrease by 0.5% per annum to 10% of GDP in 2014 after which it will remain at 10% GDP, and assumes an average GDP growth rate between 2001-2021 will be 3.5% year on year. The resultant trend in forecast aggregate demand is shown in Figure 2.5. The graph forecasts that annual aggregate demand in 2021 will be c. 126.7 million tonnes and that the total forecast demand in aggregate between 2001-2021 will be c. 2.21 billion tonnes. The forecast annual demand for aggregates in 2021 is 15.9 million tonnes more than was supplied in 2001.

	Scenario 1	Scenario 2	Scenario 3
Forecast annual aggregate demand 2021	94.6 m tonnes	169 m tonnes	126.7 m tonnes
Forecast total aggregate demand 2001-2021	1.62 bn tonnes	2.36 bn tonnes	2.21 bn tonnes

Table 2.5 *Forecast aggregate demand calculated by the three scenarios.*

The forecast aggregate demand linked to population change or construction output and GDP indicate a future annual aggregate demand ranging from 100 to 160 million tonnes per year, with total forecast aggregate demand for the period 2001-2021 ranging between 1.6bn tonnes and 2.4bn tonnes.

2.4 Future Supply of Aggregates

2.4.1 Primary Aggregates – Land Based Sources

The land-based sources of primary aggregates are hard rock quarries and sand & gravel pits. Future supply of land-based primary aggregates will be sourced from existing pits and quarries; future extensions to these developments; and future new 'greenfield' pits and quarries.

In order to secure this future aggregate supply it is critical that aggregate resource assessments are carried out at a regional and county level to identify resource areas. These resource areas should be protected (within a land-use planning context) for future extraction.

A preliminary assessment of the land take required in order to meet the forecast demand for aggregate during the period 2001-2021 was undertaken in order to determine the relative impact on national and regional land-use planning.

Estimate of Future Required Land-Take : Assumptions

- i) Supply split: Crushed Rock (70%), Sand & Gravel (25%) and Secondary (Recycled) (5%)
- ii) Future Demand: 2.4 billion tonnes (2001-2021)

Sand & Gravel

Based on an average pit depth of 10m and a material density of 2 tonnes per cu. metre, the total land take (excavation area) required to meet forecast demand would be approximately 2,400 hectares.

Crushed Rock

Based on an average quarry depth of 40m and a material density of 2.6 tonnes per cu. metre, the total land take (excavation area) required to meet forecast demand would be approximately 1,730 hectares.

It is estimated that a total land take (excavation area) of approximately 4,100 hectares would be required in order to meet the forecast demand for construction aggregates over the period 2001-2021.

Comparative Land-Use

The total land surface of Ireland is 70,280 sq km and the estimate of land take (excavation area) required to meet forecast aggregate demand would be approximately 4,100 hectares, which is 41 sq km or 0.06% of the total land surface of Ireland.

For comparative purposes the total area under forestry in 2002 was c. 4,121 sq km, or 5.8% of the total land surface. The total area under peat production in 2002 was c. 800 sq km, or 1.13% of the total land surface. In comparative land-use terms the future land take required to secure supply of construction aggregates (0.06%) is relatively small compared to other natural resource based activities.

2.4.2 Primary Aggregates - Marine Sources

A number of studies have confirmed that there are significant areas around the Irish coastline where marine sediments are suitable for extraction and use as marine aggregates (Marine Institute, 2000)

Currently there is no commercial extraction of marine aggregates in Ireland. Harbour dredging operations result in marine sediments being extracted, but it is general practice that this material is 'dumped' at sea. One exception to this is at Drogheda Port where marine sediments arising from dredging operations have been stored on a temporary basis on land adjacent to the harbour. This material is being processed and used as construction aggregates by a local quarry operator on a lease basis. It is recommended that future assessment of the reuse of dredged materials should be carried out by port / harbour authorities prior to proceeding with the offshore disposal option. This will identify possible opportunities for reuse of the marine sediments as secondary aggregates.

In the UK, where the marine aggregates sector has been developed proactively over the past 30 years extraction rates have remained relatively stable at 20-24 million tonnes per annum (DETR, 2001) of which c. 16 million tonnes per annum is for the UK market with the balance exported to Europe. Marine dredged aggregates are landed at over 70 wharves in the UK predominantly in the South East and London areas. Marine aggregates account for 8% of consumption of primary aggregates in the UK (BGS, 2003).

Currently, marine aggregates contribute less than 1 million tonnes to the supply of aggregates in Ireland (e.g. < 1% of the overall demand for construction materials). With the current lack of an appropriate regulatory framework and competing uses of a number of the key marine aggregate resources areas (breeding grounds for fish / shellfish; offshore wind energy developments etc.) it is not envisaged that marine aggregates will contribute more than (10 million tonnes) over the next twenty years. For the foreseeable future primary land won aggregates will remain the main source of supply.

It is recommended that a regulatory framework for marine aggregates is developed and implemented to increase the potential use of marine sediments as construction aggregates. Such a framework should be developed in consultation with the relevant stakeholders.

2.4.3 Secondary (or Recycled Aggregates)

Available information indicates that the volume of construction and demolition (C & D) waste collected and recovered in 2004 was 11.2 million tonnes and 9.5 million tonnes, respectively indicating an overall recovery rate of approximately 85% (EPA, 2005a).

In 2004 the collected C & D waste stream typically comprised 76% soil & stones (8.5 million tonnes) and 24% concrete / rubble, wood, glass, metal and plastic (2.7 million tonnes). The estimated rate of recovery for soil and stone fraction of C & D waste stream was approximately 90%. The recovery rate for the non soil and stone fraction was approximately 69%.

It should be noted that not all of this recovered soil and stone material would have been suitable for use as construction aggregates, and a significant portion of this material is used in the restoration of poorly drained lands to beneficial agricultural use.

If conservatively (from the aggregate supply perspective) 50% of the recovered C & D waste stream (9.5 million tonnes) is considered suitable for reuse as secondary aggregates (i.e. 4.75 million tonnes per year) this would represent less than 5% of the projected demand for construction aggregates. The key limiting factor is the relatively small volume of C & D Waste stream (concrete / rubble etc.) available for recycling into secondary aggregates compared to the overall demand for construction aggregates. There is potential for urban regeneration projects such as the regeneration of Ballymun and Fatima Mansions in Dublin to provide significant sources of construction and demolition waste for recycling and reuse as secondary aggregates.

In the UK, secondary aggregates contribute approximately 23 % (50 million tonnes) to the overall supply of construction aggregates (WRAP, 2002). It is anticipated that this would increase to c. 57 million tonnes per annum over the period 2001 to 2016 according to the revised guidance prepared by the UK Office of the Deputy Prime Minister (ODPM, 2003).

The reuse / recycling of C&D waste for use as secondary aggregates provides some significant benefits including reducing the volume of waste going to landfill, thereby saving significant costs on waste disposal / landfill levy, and allowing primary land won aggregates to be used for higher value products.

A particular difficulty in the reuse of recycled aggregates has been reluctance in the construction industry to use recycled aggregates in construction projects due to the lack of an appropriate standard and / or experience in the use of such materials. Most current concrete specifications for example refer to BS 882 “Specification for Aggregates from Natural Sources for Concrete” for guidance on the acceptable properties of aggregates for use in concrete. However the new European Standard for aggregates in concrete BS EN 12620 “Aggregates for Concrete” does permit the use of recycled aggregates in the making of concrete. This should go some way to encouraging the use of recycled aggregates in concrete. In a similar manner, the NRA Design Manual for Roads and Bridges also now permits recycled concrete to be used for roadbase and subbase materials.

However, while the use of secondary aggregates is an important contribution to the sustainable supply of construction aggregates / materials, the relatively small volumes of construction and demolition waste currently available for recycling (as secondary aggregates) in relation to the overall demand for construction aggregates confirms that primary aggregates from land based sources (or marine aggregates, if they become available) will remain the main source of aggregate supply for the next twenty years.

It is recommended that the measures provided for in the B4 Task Force report on C & D waste recycling (FCI, 2001) are reviewed and updated to ensure that the proposed recycling targets for C & D waste will be achieved.

2.5 Planning Policy

2.5.1 DoEHLG Quarries & Ancillary Activities: Guidelines for Planning Authorities

Section 1.3 of the DoEHLG (2004) guidelines sets out the economic importance of quarries. Advice in relation to policies and strategic objectives for aggregate resources is provided in Section 2.3 of the guidelines.

Current policies relating to the extractive industries within the county development plans vary widely. The Regional Planning Guidelines offer the opportunity to introduce consistency to the minerals planning and development policies of local authorities within the regions.

2.5.2 DoEHLG Guidance on the Preparation of Regional Planning Guidelines

The Government (DoEHLG, 2003) issued guidance on the preparation of regional planning guidance in February 2003. The guidance document requires that “environmental objectives of relevance to the regional planning guidelines such as air, water quality, waste management” etc be included during the development of the regional strategy. Given the nature of minerals as finite resources it is considered that the protection and sustainable use of mineral resources is a planning and environmental objective of relevance to the regional planning guidelines.

The guidance document sets out a number of “Proper Planning and Sustainable Development Principles” which regional authorities may refer to in Section 4 of regional planning guidelines. These include “Natural resource protection and sustainable development”. It is therefore considered that there is scope within the guidance document to provide for policies in relation to minerals within regional planning guidelines.

The Government’s guidance, notes that “strategic refers to those policy directions which transcend the boundaries of individual planning authorities and which relate to the role of the region in delivering the National Spatial Strategy”. The nature of mineral deposits (including aggregates) means that such resources are not spread evenly between counties and while one area or county may be rich in mineral deposits another may not or may be rich in a different type. Hence, there is a strong argument for a strategic approach to mineral planning and development that operates at regional level in order to better co-ordinate the land use planning of the various county councils within a region.

2.5.3 Regional Planning Guidelines

The policies within the various regional planning guidelines vary, but in principle they generally recognise the strategic importance of mineral resources and as such this requires local authorities to have a policy that acknowledges this importance at county level. The policies provide for the protection and sustainable development use of these mineral resources. Such policies acknowledge that an adequate and continuous supply of minerals is an integral element in the overall future sustainable development of the regions.

A number of examples of these regional policies are provided below:

Midland Region: Laois, Longford, Offaly & Westmeath (Midland Regional Authority, 2004)*'Extractive Industries'*

Quarrying for aggregates is well developed through out the region due to the presence of large amounts of glacial deposits in the form of eskers. These consist of sorted deposits of sand and gravel which are particularly prized by the aggregates industry due to the ease with which materials can be harvested with a minimum of processing. Eskers predominate in Westmeath and Offaly, however, other deposits are found through out the regional and include stone and other quarries.

Extractive industries are based on a finite resource that needs to be managed in a sustainable manner taking account of the following aspects:

- *Extractive industry should be monitored in line with best practice guidelines issued by the industry.*
- *The importance of the aggregates industry to ensure an adequate supply of aggregates to implement infrastructure under the NDP is acknowledged as is the need to protect this non-renewable resource.'*

South East Region : Carlow, Kilkenny, S. Tipperary, Waterford & Wexford - (South East Regional Authority, 2004)*'6.5.4 Mineral Exploitation*

It is recognised that the managed exploitation of mineral and aggregate deposits is necessary for the continued economic development of the region. Local planning authorities shall, through the development plan process, assess the potential of their functional areas with regard to the economic exploitation of mineral and aggregate deposits having regard to the environmental and social impact of such operations. Planning authorities will then adopt appropriate policies to safeguard viable unworked deposits for future extraction.

Control of existing operations and the assessment of new proposals shall be carried out by local planning authorities having regard to any Guidelines for Planning Authorities issued by the Department of the Environment, Heritage and Local Government in accordance with Section 261 of the Planning and Development Act, 2000, as may be amended.'

Greater Dublin Area : Dublin, Kildare, Meath & Wicklow - (Dublin Regional Authority / Mid East Regional Authority, 2004)*'Recommendation 10.2*

Instigate a review of aggregate resources in and close to the Greater Dublin Area and of planning policies affecting their extraction with a view to ensuring that adequate supplies of aggregates are available to meet the needs of the strategy.

The supply of aggregates has been identified as a potential 'bottle-neck' to the provision of the required number of housing units and other developments in the Greater Dublin Area. It would be prudent to assess the situation and identify measures to ensure that adequate supplies of aggregates are available to meet the needs of the strategy '

2.6 Planning Framework for Quarries & Ancillary Facilities

The Planning & Development Regulations, 2001, (S.I No. 600 of 2001) are the current planning regulations that apply to new quarry developments and ancillary facilities. The following parts of the regulations are particularly relevant to quarries and ancillary facilities:

- Plans & Guidelines: Part 1
- Control of Development: Part 4
- Environmental Impact Assessment: Part 10

2.6.1 Planning Applications & Environmental Impact Statements

An application for a quarry with an extraction area greater than 5 hectares requires an Environmental Impact Statement (EIS).

Schedule 5, Part 2 Class (2(b) *Extraction of stone, gravel, sand or clay, where the area of extraction would be greater than 5 hectares.*

Where the extraction area is less than 5 hectares the local authority has discretionary powers to require an EIS to be submitted if they consider that there will be *likely significant environmental effects* arising from the development (Section 103 of the Planning & Development Regulations: *Requirement to submit EIS with sub-threshold planning application*). Schedule 7 of the regulations defines the criteria for determining whether a development would or would not be likely to have a significant effect on the environment.

The information to be contained in an EIS is outlined in Schedule 6 of the regulations. The regulations also provide a mechanism for the Applicant to request the local authority to provide a written opinion on the information to be contained in an EIS. Further advice and guidelines on the information to be contained in an EIS is provided by the Environmental Protection Agency, EPA (2002) and the Institute of Geologists of Ireland (IGI, 2002).

2.6.2 Section 261 – Control of Quarries

The Planning & Development Act, 2000, *Section 261 – Control of Quarries* refers specifically to quarry developments and provides for further regulation of the sector. This section of the Act commenced on the 28th April 2004.

Sub-section (12) provides for guidelines to be prepared by the Minister in relation to implementation of this section of the Act, and for these guidelines to be issued to, and implemented by the planning authorities. The '*Quarries and Ancillary Activities: Guidelines for Planning Authorities*' were published by the Department of the Environment, Heritage & Local Government in April 2004. (DoEHLG, 2004). Chapters 4 and 5 of these guidelines provide advice to planning authorities in relation to the 'Assessment of planning applications and Environmental Impact Statements' and 'Implementation of Section 261 of the Act', respectively.

2.7 Future Planning Policy & Development Control Issues

National Aggregates Policy

Ireland is one of the few remaining countries in Western Europe that does not have a National Aggregates Policy. This is despite having a substantially higher aggregate demand per head of population than any other EU state. It is recommended that a National Aggregates Policy be developed to give clear guidance to Regional and County Planning Authorities on the need secure future aggregate supply while protecting our national heritage and landscape.

Regional Planning Guidelines

The regional planning guidelines include advice on planning policy and development control for the extractive industry. However, there is a requirement to provide and implement consistent regional planning policies and guidelines to ensure protection and sustainable development of proven aggregate resources.

County Development Plans

The policies within county development plans should provide for the protection and sustainable development of proven aggregate resources. These policies should be consistent across all planning authorities.

The guidelines for preparation of county development plans should be amended to provide a consistent approach to planning policy and development control for the extractive industry.

Where the extent of aggregate resources within lands have been proven, and where these lands are within the ownership (or under the control) of a quarry operator, then these lands should be considered for zoning within the county development plan for the purposes of future aggregate extraction, taking into account other landuse and environmental issues.

Planning authorities should consult with the relevant industry organisations, quarry operators, the Geological Survey of Ireland, and other stakeholders in relation to the location of existing quarries and aggregates resources within their area, during future revisions of the county development plans.

Development Control

There is a requirement to provide a standard format for environmental conditions attached to planning permissions, and to provide advice on appropriate emission limit values. This will facilitate a more consistent approach to the drafting of conditions attached to planning permissions for quarry developments.

3 ENVIRONMENTAL MANAGEMENT PRACTICE

3.1 General

A review of environmental management practice within the sector has been undertaken. This chapter describes the work undertaken as part of this review including inspections of existing pits and quarries, voluntary industry initiatives, the EIA / EIS process, and restoration practice for pits and quarries. The findings from the review have been incorporated into the environmental management guidelines presented in Chapter 4.

3.2 Consultations

During the course of the project a consultation process was carried out in two stages, Stage 1 being initial consultation during the project initiation and Stage 2 being public consultation in relation to the environmental management guidelines (refer to Chapter 4.)

Stage 1 – Initial consultation during Project Initiation

The Stage 1 consultation process consisted of issuing a questionnaire to 70 stakeholder organisations, requesting their views on environmental issues within the extractive industry. The list of consultees included:

- Local authorities
- Fisheries Boards
- Health Boards
- Industry bodies, including the Irish Concrete Federation, the Irish Asphalt Producers, the Architectural & Monumental Stone Association.
- Government agencies including Duchas, the Geological Survey of Ireland, the Department of the Marine & Natural Resources, the Department of the Environment, the Environmental Protection Agency, the Heritage Council
- Professional bodies including the Institution of Engineers of Ireland, the Irish Planning Institute, the Institute of Geologists of Ireland.
- Non-governmental bodies including An Taisce, Irish Wildbird Conservancy, Earthwatch Ireland, Irish Peatland Conservation Council
- Farming organisations including the IFA and ICMSA

Responses were returned by 35 organisations representing a 50% response rate. The responses received were reviewed and collated. Issue arising from the consultation were addressed in the preparation of the environmental management guidelines for the sector, refer to Chapter 4.

3.3 Environmental Inspections

Inspections of over 20 operating pits and quarries were carried out during 2001 and 2002 to assess environmental practice. The pits / quarries selected covered a broad distribution of size, type and geographical location. Each quarry had planning permission or pre – 1964 planning status.

The following key environmental management issues were noted and are listed below in no particular order of priority:

- Noise, vibration and dust management was generally satisfactory, and compliant with emission limit values where specified in planning conditions
- There was a general lack of bunding to fuel / bitumen storage facilities
- Companies are generally pro-active in managing community relations and dealing with complaints
- Those quarry operations with an Environmental Management System in place or in preparation addressed environmental issues in a proactive manner
- In a number of cases, mainly relating to pre-1964 developments, some ecological, archaeological and visual / restoration issues needed further review to mitigate existing or potential impacts
- Management of unsuitable rock is an issue that requires further consideration by dimension stone quarries. In this respect it is noted that some dimension stone quarries are processing unsuitable rock into construction aggregates.

A copy of the inspection report was provided to each quarry operator for their records and action.

3.4 Voluntary Industry Initiatives

Since 1996, the Irish Concrete Federation (ICF) have developed and implemented an Environmental Code for the Aggregate and Concrete Product Industries (Irish Concrete Federation, 2005b). This voluntary self-regulatory code sets out environmental

management practice and guidelines for ICF member companies, and covers all of the relevant environmental issues. An Environmental Code Checklist has been developed for member companies to use as a basis for environmental audits (Irish Concrete Federation, 1997). In parallel to the Environmental Code, the ICF has also initiated an Environmental Award Scheme that assesses and recognise good environmental management practice. A number of the ICF Award winning entries have been used as examples of good practice in Section 3 of these Guidelines. An ICF / Department of the Arts, Heritage, Gaeltacht and the Islands joint initiative led to the implementation of a joint Code of Practice for the Protection of Archaeological Heritage in 2002.

3.5 Review of the EIA / EIS Process for the Sector

Environmental Impact Assessment (EIA) can be defined as:

‘The process of examining the environmental effects of development – from consideration of environmental aspects at design stage through to preparation of an environmental impact statement (EIS), evaluation of the EIS by a competent authority and the subsequent decision as to whether the development should be permitted to proceed, also encompassing the public response to that decision’. (EPA, 2002).

3.5.1 Relevant European Directives

A number of key European Directives form the basis of the EIA process in Ireland. These directives include:

85/337/EEC – ‘Assessment of the Effects of Certain Public & Private Projects on the Environment’

The EU Directive 85/337/EEC for the assessment of the effects of certain public and private projects on the environment came into force in Europe on the 27th June 1985. This Directive contains fourteen Articles and three Annexes. Annex I and II contain a list of projects to which the assessment applies to and Annex III lists the information required for the assessment.

97/11/EC – ‘Amendments to directive 85/337/EEC on the Assessment of the Effects of Certain Public & Private Projects on the Environment

The EC Directive 85/337/EEC was implemented in Ireland on 3rd July 1988. The European Communities (EIA) Regulations 1989 provided for the Directive to be incorporated into Irish Law (Environmental Impact Assessment, Internet). The Local Government (Planning and Development) Regulations, 1990 contained the required information needed for Environmental Impact Assessment in respect of applications for planning permission. This Directive was amended by Directive 97/11/EC which expands, sub-divides and better defines the nine categories of projects listed in Annex I and II.

2003/85/EC – ‘Public Participation in respect of Drawing Up of Certain Plans and Programmes relating to the Environment and Amending with Regard to Public Participation and Access to Justice Council Directives 85/337/EC and 96/61/EC

On the 25th June 1998 the European Community (EC) signed the UN / ECE Convention on Access to Information, Public Participation in Decision Making and Access to Justice in Environmental Matters (known as the ‘Aarhus Convention’). This directive ensures that the principles agreed in the Aarhus Convention are transposed in EU law.

The directive notes that: ‘Effective public participation in the taking of decisions enables the public to express, and the decision-maker to take account of, opinions and concerns which may be relevant to those decisions, thereby increasing the accountability and transparency of the decision-making process and contribution to public awareness of environmental issues and support for decisions taken.’

A copy of these directives can be obtained at www.europa.eu.int/comm/environment/eia.

3.5.2 EIA / EIS Regulations In Ireland – Quarry Developments

Planning & Development Regulations, 2001: Part 10

In a planning context the EIA / EIS process is regulated under Part 10 – Environmental Impact Assessment, Planning & Development Regulations, 2001 (S.I. No. 600 of 2001).

A copy of these regulations can be obtained from www.irishstatutebook.ie. The classes of development to which Part 10 of the regulations apply are stated in Schedule 5 of the regulations. Schedule 5, Part 2, Class 2 (d) is defined as:

‘Extraction of stone, gravel, sand or clay, where the extraction area would be greater than 5 hectares’.

Therefore, any planning application for a quarry development with an extraction area greater than 5 hectares must be accompanied by an EIS that complies with the requirement of Part 10 of the regulations. An outline of the information to be contained in an EIS is stated in Schedule 6 of the regulations.

Under Article 103 of the regulations the planning authority has discretionary powers to require the Applicant to submit an EIS, where the extraction area is below 5 hectares (i.e. for ‘sub-threshold’ development), and where the planning authority considers that the proposed development would be likely to have significant environmental effects on the environment. Schedule 7 of the regulations stated the criteria for determining whether a development would or would not be likely to have significant effects on the environment.

The current regulations allow for an optional formal EIS scoping exercise through the planning authority, refer to Article 95.

The public planning notices (both newspaper and site notices) for such developments must clearly state that the planning application is accompanied by an EIS and that a copy of the EIS is available for inspection or can be purchased at the offices of the planning authority, refer to Article 105 of the regulations. This statutory requirement ensures that the general public or interested third parties can review the EIS and participate in the planning process for the proposed development. There is a fee of €20 charged by the planning authorities to the public and third parties in respect of any submissions that they want to make in respect of a planning application. There is a fixed time period – five weeks from receipt of the application, within which the public and third parties must make these observations / submissions. Where the planning authority requests significant further information on a particular application there is a requirement to re-advertise the newspaper notice and in this case any member of the public and third parties can also make observations / submissions at this time.

Under Article 107, where a planning authority receives an application for a quarry development accompanied by an EIS, the authority must notify certain prescribed bodies in accordance with Article 28 of the regulations. These prescribed bodies may include:

- An Taisce
- Bord Failte Eireann
- Department of the Environment, Heritage & Local Government
- Regional Fisheries Board
- Waterways Ireland
- Irish Aviation Authority
- National Roads Authority
- Dublin Transportation Office
- Department of the Arts, Gaeltacht, and the Islands
- Department of Communications, Marine & Natural Resources
- Health Board

3.5.3 EIS / EIA Process – Published Guidance

There is a significant body of published guidance in relation to the EIS / EIA process. This guidance covers the full range of EIA / EIS issues from screening through scoping, preparation of EIS's to the review of EIS's. Key published EIA / EIS published guidance documents include:

EU Guidance:

- i) Guidance on EIA – Scoping (June 2001, www.europa.eu.int/comm/environment/eia)
- ii) Guidance on EIA – EIS Review (June 2001, www.europa.eu.int/comm/environment/eia)

Irish Guidance:

- i) Guidelines on the Information to be contained in Environmental Impact Statements (EPA, 2002) www.epa.ie

- ii) Geology in Environmental Impact Statements – A Guide (IGI, 2002)
www.igi.ie

3.5.4 Review of EIS Documents

Under the current regulations the planning authorities are responsible for reviewing the adequacy of EIS documents. Table 3.1 outlines the stages in this evaluation process and the related decision making process.

PREPARATION	FACTS			INTERPRETATION
Initial steps	Information to be supplied	Information relating to the start-up phase	Information relating to operation of the facility	EIS Evaluation Questions asked
Evidence of reference to legal requirements and County Development Plans for the contents of the EIS Evidence of consultation with the parties likely to be concerned Explanation of the scope of the study, technical difficulties and lack of data	Description of the proposed development and the need for the quarrying proposal Description of existing environment (landscape, topography, surface/ground water, soils, land use, geology, flora/fauna and cultural heritage) Description of likely significant impacts (noise,	Extent and location of operations Nature and duration of main processes Off-site developments (new or upgraded roads, power, utilities etc) Description of the sequence and duration of major phases	Size, design & layout of major structures & developments Location & extent of all major land uses & processes Magnitude, character and duration of major activities Type, quantity and condition of all residues and emissions Associated	Is the impact compatible with the existing regulations, standards or objectives? Have the full extent and significance of the impacts been identified? Is the impact prediction reliable? Are there proposals to eliminate, mitigate and reduce potential adverse environmental impacts?

Definition of Terms/Glossary	blasting, dust, atmospheric/water pollution)		developments (roads, electricity, water, waste treatment facilities	Can the commitments to mitigate adverse environmental impacts be enforced?
Exposition of Methodologies	Description of mitigation measures		Monitoring and mitigation measures	Can the mitigation be sustained?
	Non-technical summary		Decommissioning and rehabilitation proposals	Are acceptable alternative mitigation measures available?
<i>DECISION</i>				
SEEK ADDITIONAL INFORMATION	IMPOSE CONDITIONS		WITHOLD CONSENT	
The start-up phase, secondary developments and the quantities of residues and emissions	Undertakings to mitigate adverse impacts		Irreversible change to or permanent loss of significant environmental characteristics	
The character and significance of the existing environment	Financial sureties to ensure that funding will be available for mitigation, monitoring or remedial action in the event of adverse impacts exceeding prediction		Significant residual impacts which threatened health, life communities or properties	
The level, significance, character and duration of specific impacts			Significant uncertainty about the extent of major impacts or how such impacts could be contained	

Table 3.1 Stages in the LA EIA/EIS Evaluation Process (IPA and CAAS)

As part of this project twelve pit / quarry EIS's were reviewed by the Centre for Environmental Research, University of Limerick. The reviews are carried out using the Lee and Colley (1992) Review Package.

Based on this review, it is clear that the quality of all aspects of the EIS's improved substantially between 1989 and 2001. The first four EIS's reviewed were prepared during the period 1989-1991. All of these statements were found to be unsatisfactory

and in spite of this it was found that all projects were granted planning permission and the development went ahead.

Three of the EIS's reviewed were prepared in 1999. These statements contain significantly more of the relevant information and met far more of the criteria in the Review Package than the earlier EIS's. Of the 12 EIS's reviewed, it was found that 4 did not meet the minimum requirements. These were the earlier EIS's and those prepared later were found to meet many more of the criteria laid down in the Review Package.

3.6 Quarry / Pit Restoration Practice

Land-based extraction of primary aggregates and dimension stone involves the temporary use of land for extraction purposes. Upon permanent cessation of extraction the land can be restored to beneficial after-use.

Most of the land take in Ireland for extraction of aggregates / dimension stone is in agricultural use prior to extraction. Whilst, agriculture / forestry is a common after-use for many sand & gravel pits, other uses such as some form of amenity including nature conservation is often more appropriate for rock quarries. The selection of the appropriate after-use of a quarry / pit should be determined on a site specific basis.

Restoration and aftercare should be considered as an integral part of the overall site development. If properly planned and implemented it is technically feasible to restore mineral workings to a beneficial after-use. The following section of the report provides guidance on the general planning and implementation of a restoration scheme.

3.6.1 Restoration Schemes

A restoration scheme should be a requisite of any planning application for mineral working. For most new quarry developments an Environmental Impact Statement (EIS) will have to be prepared. Many of the potential significant impacts that might be identified for a quarry operation can be avoided, reduced or mitigated through careful planning and design. Restoration related issues are assessed and considered under a number of EIS topics, for example:

<i>Flora & Fauna</i>	Increased biodiversity through protection and enhancement of existing habitats, habitat creation
<i>Noise / Air Quality</i>	Reinforcement of boundary hedgerows, placement and landscaping of screening bunds
<i>Water</i>	Creation of wetland areas, flood protection
<i>Landscape</i>	Creation of interesting landforms that can encourage and protect rare flora and fauna and geological formations.

It is important to undertake a baseline surveys to identify any existing features that could be incorporated into the restoration scheme. There are many factors to take into account and each particular project has its own “local operating factors” that influence the choice of restoration / after use.

As part of the resource assessment a soil survey should be undertaken to assess the quantity and quality of soils/overburden present which are likely to be incorporated into the scheme. A site hydrology/hydrogeology survey should also be undertaken as this can have a significant bearing on the type of restoration scheme applicable.

Consideration should be given to consultation with the Local Authority, Local Community and other interested stakeholders as to restoration of the site to a beneficial after-use.

Planning applications for extraction of minerals should be accompanied by a working plan and final restoration plan. These plans should be of sufficient detail to enable the Planning Authority and statutory stakeholders to make a determination as to its feasibility and should generally include the following stages:

- i) Stripping and placement of soils – topsoil and overburden soils (either direct replacement or storage within the site).
- ii) Landscaping and landform objectives for the site including backfilling operations if required, on cessation of extraction.
- iii) Restoration, including soil placement, relief of compaction and provision of surface drainage
- iv) Aftercare provisions, where required.

The restoration scheme including phasing, timing and direction of working should be considered during the project planning stage. It maybe appropriate to allow for review of the restoration scheme during the life of the development and submission of revisions to the restoration and aftercare scheme, for agreement, from time to time as appropriate. The objective of restoration conditions is to the replacement of soils on landforms and levels which accord with the agreed scheme so as to ensure that the land is restored to the required standard for the proposed after-use envisaged.

It is expected that Applicants will make provision for full restoration and, where relevant, long term aftercare. However, the type of restoration that will be appropriate in any particular case will depend on a number of factors: in particular the nature and extent of existing workings and the availability of suitable restoration materials.

3.6.2 Progressive Restoration

Where possible, progressive restoration should be carried out to minimise the area of land occupied at any one time by extraction, unless to do so would be likely to adversely affect the standard of restoration achieved, or would be impracticable to achieve due to the nature of the site or type of operation. In general, progressive restoration is more appropriate for sand & gravel pits rather than hard rock quarries.

Where progressive restoration is adopted, the phasing of the development should normally indicate the area of extraction at any one time and relate it to the rate of restoration of earlier phases of the operation, refer to Figure 3.1. It must be appreciated that operational considerations may dictate the duration of each phase (i.e. Working area required, rate of soil/overburden removal) and as such it is not generally advisable to specify actual dates for phasing. Particularly, in the case of long term workings it maybe more appropriate to attach conditions which allow for a process of review with respect to progress of the restoration scheme and appropriate after-use of the site.

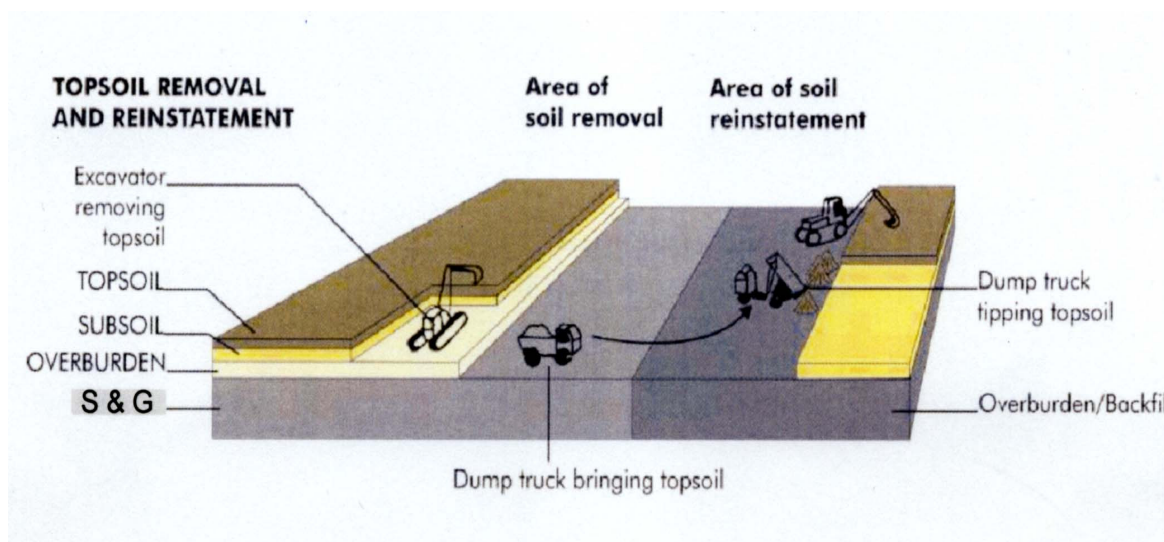


Figure 3.1 Sand & Gravel Pit: Principle of Phased Restoration (DoE, 1996(a)).

3.6.3 Soil Handling & Storage

It is now accepted practice that soil resources are retained on site for restoration purposes. It is important that as part of the mineral resource assessment that a soil survey should be undertaken to assess the quantity, form and quality of soils/overburden present. The results of the survey will enable the operator to effectively manage the stripping and placement of soils/overburden materials (either direct replacement or storage within the site). Depending on the nature of the soil/overburden material it maybe desirable to require separate stripping (and storage and restoration) of these materials. The sequencing and placement of soils should be carried out as per the final restoration plan in such a manner as to minimise damage to soil structure and to other characteristics important for growth of vegetation. Consideration also needs to be given to remedial soil treatment so as to facilitate the use of cultivation, harvesting and drainage equipment for the aftercare period and the long-term management of the land. In some instances, particularly where some form of nature conservation is proposed the use of nutrient poor soils may be preferable to permit natural colonisation by rare species leading to an increase in bio-diversity in the area.

3.6.4 Landform and Landscape

Storage and placement of topsoil / overburden can give rise to significant visual impact on the landscape. In preparing any working scheme for a quarry / pit consideration should be given to minimising any adverse impact on the landscape through proper planning and design:-

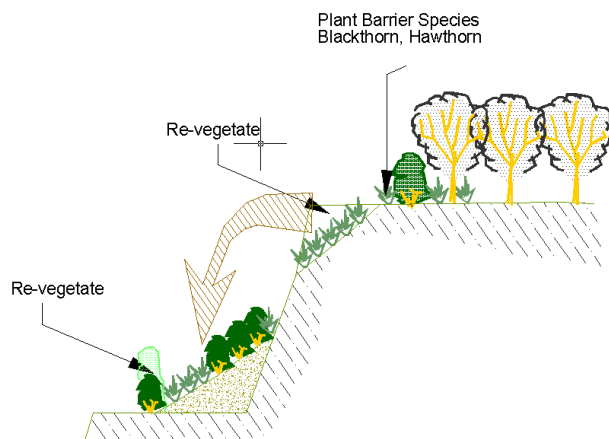
- Identify the key landscape opportunities and constraints
- Identify areas of lands to be retained for natural screening, the direction of workings, and sensitivity of views
- Identify areas requiring additional screening during extraction
- Proposed after-uses and preferred character for the restored landscape.

Where practicable, a key objective may be to avoid breaking through the natural skyline from particular viewpoints. Co-ordination of phasing, direction of working, face treatment, location of tips and stockpiles and haul roads, provision of temporary or permanent screening and progressive restoration can together minimise the visual impact and the impact on the landscape quality.

Final landforms should be suitable for the intended after-use, generally compatible in nature and scale with the natural landform of the area and not liable to slope instability or other ground movement.

3.6.5 Quarry Face Restoration

Where practical and safe to do so the natural gradients and rock features of the surrounding landscape should be mimicked when forming screening banks, overburden mounds and final faces. Quarry Restoration schemes can also give rise to opportunities to provide new and attractive landscape and landform features.



Face Treatment on upper bench

Figure 3.2 Rock Quarry – Restoration of Upper Benches

The final gradients of quarry slopes will affect the total mineral resource which can be extracted. Therefore, it is important to consider the final gradient of the quarry slopes in view of site specific considerations. e.g. in the case of a deep quarry, the upper benches from one particular aspect may be open to views. In this case particular consideration may be given to landscaping/restoration of the site perimeter and upper quarry benches to mitigate any significant visual impact on the landscape, refer to Figure 3.2.

3.6.6 Infilling Extraction Void

The restoration of quarries / pits may involve the infilling of the voids left by extraction, using indigenous topsoil / overburden / imported materials, up to or above the original ground level. In such cases, it is important to ensure that adequate precautions are taken to protect groundwater or surface waters. The infilling of quarry / pit voids should be carried out in a controlled manner in accordance with an agreed management plan. Where imported materials are required as part of the infilling scheme, this activity may be subject to a waste permit.

3.6.7 Final Restoration

It is usually desirable to require buildings, plant and machinery used in connection with the quarry operations are removed as soon as they are no longer required in connection

with the relevant planning permission. The areas concerned may then be incorporated in schemes for restoration and aftercare.

In order to minimise the potential impacts, that may arise at the end of extraction, the following measures should be carried out as part of the final restoration works:

- Removal of all equipment (mobile plant and built structures).
- Removal of fuel tanks and toilet facilities
- Cleaning of the site of residual stocks and storage mounds.
- Complete the landscape integration of the quarry landform.
- Secure the access to the site.

3.6.8 Aftercare

The after-care provisions, where and if required, will be dependent on the intended after-use. For example, where lands are being restored to beneficial agricultural after-use there may also be the need for soil cultivation and treatment for a number of years after the initial restoration has been carried out in order to improve the structure and stability of the soil and to bring it to a satisfactory standard. It also provides an opportunity to provide site infrastructure such as drainage and the initial establishment and management of vegetation.

3.6.9 Development Control – Restoration

It is considered that properly worded and relevant planning conditions which are complied with, should be able to secure the restoration, after-care (if appropriate), and beneficial after-use of worked out quarries and pits.

Ongoing and continued improvements by the industry will ensure continued improvements in standards of restoration. The use of progressive restoration (where practical) limits the area of disturbed land at any one time, would also greatly reduce the potential environmental impact caused by any failure to adequately restore the lands.

Responsibility for the restoration and aftercare of quarries and pits lies with the operator and, in the case of default, with the landowner. Applicants, should therefore, demonstrate with their applications what likely financial and material budgets for

restoration, after-care and after-use will be, and how they propose to make provisions for such work during the operational life of the site. This is important to avoid the possibility that the costs of restoration might have to be borne by other public or private sources.

There is a need to ensure that restoration provisions are implemented by the operator. It is recommended that quarry operators include restoration as part of their environmental management plan / system (EMS).

Planning authorities generally attach a financial surety condition to planning permissions in order to ensure that restoration work will be carried out and completed. The type and amount of this surety is determined on a site specific basis. In general, financial sureties may comprise restoration bond; letter of guarantee or cash deposit.

3.6.10 After-use Options

This section outlines some of the types of restoration scheme / after-use options that can be implemented at quarries / pits. Examples of good restoration practice are provided from Ireland and the UK. In this regard the use of examples from the Irish Concrete Federation 'Green Aggregates' Award Scheme and the UK Quarry Products Association (QPA, 1999) 'Directory of Restoration' is acknowledged.

Agriculture

Restoration of sand & gravel pits to agricultural use is one of the more common adopted after-use schemes for these type of workings. Guidance on the restoration of mineral workings to agriculture published by the UK Department of the Environment (UK DoE 1996(a) & (b)) provides useful information in relation to the planning and implementation of such schemes.

Plates 4.1.1 and 4.1.2 below show Irish examples of restoration of former sand & gravel workings to beneficial tillage and grazing after-use.



Plate 3.1 Sand and Gravel Pit restored to Agricultural Use (Tillage)
Dan Morrissey (Ireland) Ltd., Bennekerry, Co. Carlow



Plate 3.2 Sand and Gravel Pit restored to Agricultural Use (Grazing)
Dan Morrissey (Ireland) Ltd., Ardristan, Co. Carlow

Forestry / Woodland

Forestry / woodland can meet a range of objectives which include improving the appearance of the landscape presenting opportunities for recreation and for public access to the countryside, and providing wildlife habitats as well as timber production. Today, forestry is seen as a land-use offering many benefits besides timber production, including the enhancement of the landscape, and the provision of important habitats for Flora and Fauna.

It is relatively rare to have a whole quarry / pit site restored only to forestry / woodland, the use of tree planting is commonly incorporated into the overall restoration scheme for many quarries / pits.

Restoring land to forestry, or a mixed use including woodland, provides the ideal opportunity to plan and create important wildlife habitats. The tree species commonly chosen as suitable for reclaimed land can also add to its value for wildlife. On sites without topsoil, alders, birch, willows and rowan are usual first choice for a planting scheme. These trees attract many birds. Coniferous woodland, too, can support important number of both common and rarer species of bird.

Forestry / woodland can form a multi-functional land use combining timber production with recreation, nature conservation and visual amenity.

Amenity

Quarry / pit sites are often suitable for restoration to 'amenity use'. This can encompass a wide range of subsequent uses e.g. meadows, country park, informal recreational areas, conservation of landscape, natural features and wildlife, sports facilities, amenity woodland and water areas. In many instances a number of after-uses including agriculture, forestry and water maybe integrated on a single site.

Guidance on the use of land for amenity purposes published by the UK Department of the Environment (UK DoE, 1992) provides useful information in relation to the planning and implementation of such schemes.



Plate 3.3.1 Restoration of sand & gravel pit to amenity use: Co. Westmeath

Shay Murtagh Ltd. – Ratharney, Co. Westmeath



Plate 3.4 Restored of sand & gravel pits – ‘Wet’ Workings (Amenity (Fishing) & Nature Conservation

Tarmac Quarry Products Ltd. Scorton Quarry, Wyre Valley, Lancashire

Nature Conservation / Natural Habitat

Quarries present significant opportunities to create and sustain habitats and species of nature conservation value within a framework of sustainable development.

Baseline studies should be undertaken as part of the planning process to identify habitats worthy of protection and opportunities to increase biodiversity through implementation of sensitive working schemes, restoration and aftercare programmes. Where quarries are adjacent to existing habitats of ecological significance there is the possibility to contribute to its biodiversity.

It is important to recognise the nature conservation context in which the operations take place or are proposed. Habitats exist in a pattern connected by networks of linear features (hedgerows) and intermediate 'stepping stones' (e.g. ponds) along which wildlife – from mammals to seeds – can travel. Quarries can offer opportunities for enhancement of these features through proper design and phasing of the workings.

If a habitat of natural heritage interest cannot be avoided, mitigation should then be considered. Stripping of topsoil's and seed banks may help in mitigation through restoration. Provision of alternative sites might also be considered. Methods such as translocation, under the supervision of a qualified ecologist, may be possible to secure the future of valued habitats.

The working phase can create valuable interim habitats e.g. nesting sand martins in pit faces, water fowl on silt lagoons and natural re-colonisation of worked areas. These areas can also provide templates for the type of habitat which might be most suitable/valuable in after-use plans. Phasing of operations can therefore play an important role in retaining biodiversity interest.

The preparation of Local Biodiversity Action Plans is part of an overall process that the government has initiated to address heritage concerns and to fulfill international obligations under the Convention on Biological Diversity and Agenda 21 through the publication of the National Heritage Plan and the National Biodiversity Plan. The Local Biodiversity Action Plans are a complementary component of the Local Heritage Plans, a process that has already commenced in many local authority areas, under the guidance of the Heritage Council.

It is generally recognised that quarries and pits can contribute significantly to overall biodiversity. In this regard, many former quarries sites have been incorporated within designated areas for their nature conservation value and / or geological heritage.



Plate 3.5 Limestone Quarry – Local Nature Reserve (SSSI Site)

Tarmac Quarry Products Ltd. – Silverdale, Lancashire, UK

Infilling – Restoration to Original Ground Level

Quarry / pit developments create void space and in some cases it may be practical to infill this void to original ground level. As the volume of topsoil / overburden soils stripped and retained on site during the extraction stage will not be sufficient to infill the void to original ground level, importation of suitable infill material is required. Importation of suitable infill material for such restoration work requires a waste permit.

Guidance on the infilling and restoration of such lands has been published by the Environmental Protection Agency (EPA, 1999a) and this provides useful information in relation to the planning and implementation of such schemes.



Plate 3.6 Limestone Quarry – Restoration in Progress (Infilling with Recovered Soil)

Roadstone Dublin Ltd. – Huntstown Quarry, Co. Dublin

Built Development

Where quarries and pits are located close to urban centres and as these centres expand, worked out quarries and sand & gravel pits can be restored / re-development as part of the surrounding built environment (subject to appropriate planning permission).

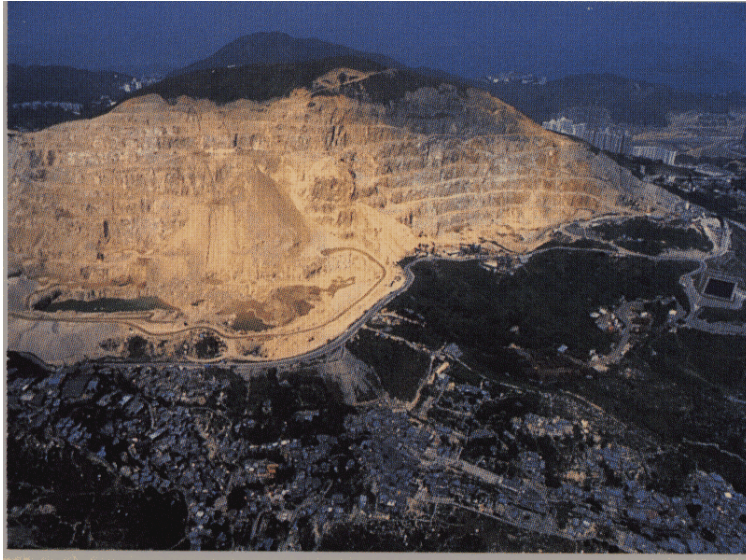


Plate 3.7 Granite Quarry – Restoration to Built Environment

Anderson Quarries Ltd. – Hong Kong



4 ENVIRONMENTAL MANAGEMENT GUIDELINES

4.1 General

The main deliverable arising from the project is a set of environmental management guidelines for the sector.

A public consultation was carried out in relation to these guidelines. A public notice was issued in the three national newspapers in December 2003 to invite individuals and organisations to review the proposed Environmental Management Guidelines – Draft for Consultation (November 2003) and submit comments / observations to the Project Team. The issues raised in these submissions were reviewed and considered by the Project Team during the finalisation of the Environmental Management Guidelines (issued under Work Package 9 of the project). The guidelines are principally aimed at surface developments within the extractive industry, other than those working minerals as they are defined in the Mineral Development Acts, 1940 to 1999. They apply to surface developments that are extracting and processing construction aggregates and dimension stone (i.e pits, quarries and ancillary facilities).

These guidelines should be read in conjunction with, and are complementary to the DoEHLG (2004) – *Quarries & Ancillary Activities: Guidelines for Planning Authorities*.

4.2 Benefits of Good Environmental Management Practice

There are a number of key benefits to organisations that adopt good environmental management practice and EMS. These include:

- Increased business competitiveness
- Ensuring regulatory compliance
- Reduced corporate liabilities
- Enhanced public and community relations

4.3 Environmental Management Systems (EMS)

The purpose of an Environmental Management System (EMS) is to enable an organisation to establish procedures to set an environmental policy and objectives,

achieve compliance with them, ensure continuous improvement through regular updating of knowledge and demonstrate such competence to others (Bouchier et al. (1998). There are international standards relating to EMS, refer to ISO14001 (1996) and EU EMAS (1993).

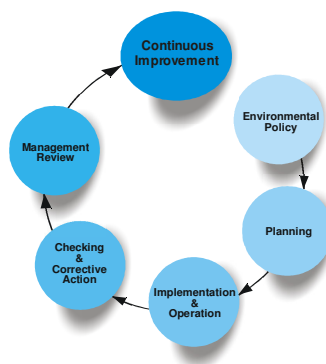
In many cases it is possible to integrate EMS requirements into an existing management system framework. In particular, for operations where a Quality Assurance System such as ISO9000 is in place, it is not a major undertaking to develop and implement an EMS. For sites where an Environmental Impact Statement has been carried out this will have generated all of the necessary environmental information for an EMS.

The main components of an EMS should include the following elements:

1. Organisational commitment.
2. Environmental policy statement.
3. Environmental audits and site assessments
4. Environmental Monitoring
5. Operational and emergency procedures.
6. Responsibility and reporting.
7. Training and awareness.

Guidelines for the requirements of an EMS are provided in Appendix A. It should be noted that these guidelines are general in nature and will need to be reviewed during the development of an organisation specific EMS. An operator should develop an EMS that is appropriate to the scale of the operation, and that covers the key objectives outlined in Appendix A.

To be fully effective, an EMS must be fully integrated into the everyday operation of the quarry development and activities. An EMS requires periodic internal and external review to refine and optimise its operation and benefits.



Environmental management audits are an inherent part of the EMS. The audits assess the use and application of the environmental management system; progress in relation to achievement of the stated environmental objectives, and compliance with regulatory issues.

It is considered that implementation of an EMS will assist quarry operators and producers of construction materials in achieving and maintaining good environmental management practice. In addition, it will promote compliance with environmental conditions that are attached to planning permissions, discharge licences, air pollution licences and waste permits and assist in community relations.

4.4 Environmental Guidelines

The following sections describe and summarise good environmental management practice guidelines under key environmental issues.

4.4.1 Ecology

Quarry developments by their nature are resource based and result in removal of soil and rock. This results in disturbance and removal of original habitats. With sensitive and effective restoration the original habitat can be replaced by another new and often more ecologically diverse habitat that attracts new species of flora and fauna.



The biodiversity associated with quarry developments is recognised in the designation, as conservation areas, of a number of disused quarry developments (English Nature, Quarry Products Association and Silica & Mouldings Sands Association, 1999). One notable success story is the increase in the peregrine falcon population, which are often found to roost in quarries.

In some cases where protected species cannot be retained in situ, conservation techniques such as translocation / relocation may be the best available means of

mitigating the loss of the ecosystem. Where required, such measures should be undertaken in consultation with the National Parks and Wildlife Service (DOEHLG) and under expert ecological supervision.

Restoration schemes for quarry developments can provide a mechanism for enhancing biodiversity of local areas.

Ecology – Guidelines:

- Carry out ecological baselines studies and understand the ecological environment within and in the vicinity of the quarry
- Mitigation measures:
 - provide a minimum buffer zone of 10 metres width (from edge of habitat to edge of extraction area) to designated ecological habitats defined under National and European legislation. The actual width will depend on the type of development and the habitat to be protected.
 - use translocation / relocation techniques, where necessary and appropriate
- Link to restoration and after-use: natural habitats, wetland areas
- Protect and enhance existing habitats where appropriate as part of the landscaping and restoration scheme.
- Comply with regulations in relation to protected species, habitats and designated conservation areas.
- Planning for restoration at design stage of a quarry, and updating / reviewing the restoration scheme regularly during the life of the development.
- Retention of topsoil and overburden materials on site to facilitate operational landscaping and restoration.

4.4.2 Surface Water

This section addresses issues relating to the surface water environment. It should be read in association with Section 3.3 on groundwater. The key objectives are to protect existing surface water courses and to optimise the requirements for water abstraction through best water management practice. Discharges of effluent to surface waters are regulated under the Local Government (Water Pollution) Acts. The associated

regulations also specify water quality standards. There is an obligation for operators to comply with the provisions of these Acts.



Surface Water - Guidelines

- Consult the relevant Local Authority, Fisheries Board and where applicable Waterways Ireland about any alterations to existing surface water courses, nearby river corridors and any discharges /abstractions
- Consult with the Department of Communications, Marine and Natural Resources in relation to discharges to the foreshore.
- Obtain a discharge licence for discharges of effluent to surface water courses
- Where a discharge licence is required, undertake a surface water quality baseline study to assess water quality in the receiving surface waters.
- Undertake an aquatic survey where discharge of effluent is to Salmonid surface waters.
- Provide an appropriate drainage system to minimise surface water run-off into the quarry workings
- Adopt an integrated approach to water management, including:
 - control of suspended solids by settlement in sumps and lagoons
 - Ensure all surface run-off from hardstanding areas used for refuelling is directed to an appropriately sized hydrocarbon interceptor prior to discharge
 - Optimise use of water in processing plant and treatment of effluent including vehicle washing water
 - Where practical provide closed water systems to reuse process and wheelwash water, and conserve water resources by abstracting water for 'top-up' only

- optimise use of water in dust suppression / control systems
- use of appropriate water recharge or other practical measures, where it is demonstrated that the quarrying activities have impacted on surface water levels in nearby streams, rivers, or lakes.
- regular cleaning and maintenance of the water management system
- Limit erosion by:
 - rapidly vegetating exposed areas
 - vegetating the surfaces of overburden and topsoil mounds
 - progressively restoring worked out areas, where practical
 - limit areas of topsoil / overburden stripping exposed at any one time
- Design sumps and lagoons to cope with all reasonable anticipated conditions, by ensuring that:
 - they are adequately sized
 - scouring is avoided
 - the retention time is adequate, and if necessary, enhancing settlement by use of flocculants or mechanical means
 - lagoons are adequately sealed with an impermeable material
 - regular cleaning and maintenance can be carried out
 - Establish surface water monitoring stations both down and upstream of the site
- Leave adequate margins/buffer zones around water courses, and other sensitive areas
- Control surface water run-off: e.g. minimise obstruction of flood flows by inappropriate placing of mounds of overburden or waste
- Provide pollution control measures in relation to fuel and chemical storage.
- Where high concentrations of suspended solids are generated (e.g. in the processing of dimension stone) and where space limitations prevent the use of settlement lagoons, mechanical means of removal of suspended solids should be adopted.

Surface Water – Recommended Emission Limit Values

Where there are discharges of treated effluent from quarry developments to surface water courses, the following emission limit values are generally recommended:

- i) pH less than 9.
- ii) Biochemical oxygen demand (BOD): 25mg/litre
- iii) Total suspended solids (TSS): 35 mg/litre
- iv) Nitrate (NO₃): 50 mg/litre
- v) Chemical Oxygen Demand (COD): 100 mg/litre O₂
- vi) Total Hydrocarbons: 1 mg/litre

It is noted that the specific emission limit values will be determined by the nature of the treated effluent to be discharged and the receiving surface waters. These limits will be specified in the conditions attached to the associated Discharge Licence.

4.4.3 Groundwater

Groundwater is a significant natural resource in Ireland providing between 20% and 25% of drinking water supplies (GSI, 1999). In rural areas where there is no public water supply or group water scheme, groundwater is usually the only source of water. It is estimated there are over 100,000 wells / springs in use around the country.

At present groundwater resources are protected through the Local Government (Water Pollution) Acts (1977 & 1991), at national level, and through the EU Groundwater Directive (80/68/EEC). These regulations control the discharge of specified substances to groundwater.

The Geological Survey of Ireland has prepared groundwater protection plans for a number of counties. These plans classify aquifers and aquifer vulnerability on a county basis, and some counties have incorporated this information into their county development plans.

Quarry developments by their nature remove topsoil and overburden materials within the extraction area and these activities may change aquifer recharge characteristics and increase the aquifer vulnerability. Depending on the depth of the quarry relative to the surrounding groundwater regime, groundwater control or dewatering measures may also have to be incorporated into quarry operations. The impact of these activities, if any, on

the groundwater resource can be mitigated by appropriate quarry planning and design, together with the operational practices outlined below.

Groundwater - Guidelines

Groundwater Control

- Where applicable assess the hydrogeological regime around the quarry and its environs.
- Optimise the location and extent (plan area and depth) of the workings to ensure that there is no significant impact on groundwater resources.



- Implement groundwater monitoring where applicable, within EMS
- Provide for recharge of surface water regimes and aquifers, where such measures are necessary and practical.
- Provide replacement water supplies, where quarrying activity is found to adversely affect local water supplies.
- Provide appropriate location for discharge of groundwater (where this is being abstracted and not re-used)
- Obtain a discharge licence for any discharge of treated effluent to groundwater
- Provide an appropriate buffer zone to ecological habitats that would be affected by any significant change in the groundwater regime.

Protection of Groundwater (& Surface Water)

- Provide bunding to all fuel / chemical storage tank areas (refer to EPA IPPC Guidance Note (EPA, 2005b)): 110% of the capacity of the largest tank within the area or 25% of the total volume of the substance which could be stored within the area, whichever is

greater). Covering of bunded areas should be considered to minimise the requirement to dispose of contaminated rainwater collecting in the bund.



Bunded Fuel Tanks (Tarmak Ove Arkil, Rathangan, Co. Kildare)

- Use spill pallets to store drums of chemicals and oils (including waste oils)
- Assess and monitor the integrity and watertightness of all bunding structures
- Provide spillage control equipment on site (booms and suitable absorbent materials etc.) to contain any accidental spillage
- Ensure blasting practice minimises the risk of occurrence of nitrate / ammonia residues by proper blast design and implementation; appropriate disposal of any excess explosives; and selection of the appropriate type of explosives (particularly in some limestone environments where significant karst features such as open cavities have been observed/encountered).
- Infiltration drainage (e.g. soakaways) should be designed in accordance with the principles outlined in CIRIA Report 156 (1996).
- Effluent treatment systems should be designed, constructed and maintained in accordance with the EPA Guidelines on Wastewater Treatment Systems (1999b).

Groundwater – Recommended Emission Limit Values

Where there are point discharges of treated effluent from quarry developments to groundwater, the emission limit values should be based on an assessment of the existing groundwater quality and the interim Guideline Values for the protection of groundwater in Ireland issued by the Environmental Protection Agency (EPA, 2003).

The specific emission limit values will be determined by the nature of the treated effluent to be discharged and the receiving aquifer. These limits will be specified in the conditions attached to the associated Discharge Licence.

4.4.4 Air Quality

Quarrying activities and ancillary facilities, by their nature, generate dust. The dust arises predominantly from inert soil and rock materials.

The main potential sources of dust include processing plant, stockpiles, traffic on internal haul roads, stripping and overburden storage. They are generally dispersed sources rather than specific point sources, and this dictates the measures required to mitigate potential dust related impacts.

The Air Quality Standards Regulations (2002 S.I. No 271 of 2002) sets limit values for sulphur dioxide, nitrogen oxide, particulate matter and lead in ambient air. These regulations apply to ambient air quality in the local vicinity of landuse / development types including quarries and concrete / asphalt manufacturing facilities.

Air Quality - Guidelines

Minimise the creation of dust by planning and design:

- Consider use of conveyors rather than internal haul roads, where practical
- Locate fixed / mobile processing plant within the quarry area, where practical
- Locate haul – roads, tips and stockpiles away from sensitive receptors and take into account prevailing wind directions
- Layout and construct stockpiles, tips and mounds to minimise dust creation
- Use of screening berms
- Use crushing and screening plant within its design capacity



Vacuum Road Sweeper (Frank Harrington Ltd., Co. Mayo)

Control the escape of dust from plant:

- Enclose fixed conveyors and processing plant
- Where applicable, provision of dust removal system for the plant
- Use water sprays and mists as dust suppression measures
- Carry out regular maintenance on all plant
- Use appropriate dust filter systems on asphalt and readymix plants

Minimise wind-blown dust:

- Compact, grade and maintain internal haul – roads
- Fit dust extractors, filters and collectors on drilling rigs
- Use screening bunds to shelter plant and storage areas
- Limit drop of falling material
- Reduce speeds and limit movement of vehicles, use upswept exhausts
- Use water bowzers, sprays or vapour mists
- Spray exposed surfaces e.g. unsurfaced haul-roads, stockpiles
- Vegetate exposed surfaces e.g. topsoil and overburden storage mounds



Wheelwash Facility (Loughnane Concrete, Birr, Co. Offaly)

- Carry out road sweeping, where appropriate
- Provide vehicle / wheel washing facilities and surface the road between the washing facility and the quarry entrance
- Use covered (closed or sheeted) vehicles, or spraying, for the transport of dry fine materials
- clean-up any accidental spillages on public roads, as soon as such a spillage arises or is notified.

New fixed or mobile asphalt plants constructed on or after 1st November 1988, require a licence under the Air Pollution Act, 1987, (Licensing of Industrial Plant) regulations, 1988. This licence is issued by the relevant local authority and enables specific conditions in relation to air emissions to be applied to asphalt plants. The use of low sulphur fuels is recommended where practical. Regular maintenance of vehicles should be carried out to control exhaust emissions.

Air Quality – Recommended Emission Limit Values

The impact of dust is usually monitored by measuring rates of dust deposition (DoE, 1995). There are currently no Irish statutory standards or EPA guidelines relating specifically to dust deposition thresholds for inert mineral dust. There are a number of methods to measure dust deposition but only the German TA Luft Air Quality Standards (1986) relates a specific method of measuring dust deposition with dust nuisance. The Bergerhoff method is the only enforceable method available. Where this method is deemed unsuitable for use, and only in these circumstances, an alternative method may be agreed with the local authority.

On this basis it is recommended that the following TA Luft dust deposition limit value be adopted at site boundaries associated around quarry developments:

- Total dust deposition (soluble and insoluble): 350 mg/m²/day (when averaged over a 30 day period)
- The following ELV's are recommended for emissions to air arising from asphalt plants regulated under the Air Pollution Act, 1987:

Sulphur Dioxide	500 mg/Nm ³
Nitrogen Oxide	450 mg/Nm ³
Dust	50 mg/Nm ³

4.4.5 Noise & Vibration

Noise and vibration are present in many normal everyday activities. The following tables describe the noise and vibration levels associated with these activities.

Description of Activity	Noise Level (dB(A))
Absolute silence	0
Very quiet room	25
Rural night time setting (No wind)	35
Day time, busy road 0.5 km away	55
Busy restaurant	70
Very busy pub, voice has to be raised to be heard	85
Disco or rock concert	100
Uncomfortably loud, conversation impossible	120
Noise causes pain in ears	140

People, property and animals are regularly exposed to vibration, both groundborne and airborne. The table provided below gives typical vibration levels generated by everyday activities. This shows that a foot stamp or door slam results in comparable vibration to that arising from blasting operations. In addition, winds of Beaufort scale 3 and 4 result in comparable air pressures to those arising from blasting.

Vibration Level	Description of Activity
1.0 – 2.5 mm/sec	Walking measured on a wooden floor
2.0 – 5.0 mm/sec	Door slam, measured on a wooden floor
12 – 35 mm/sec	Door slam, measured over doorway
5 – 50 mm/sec	Footstamp, measured on wooden floor
30 – 70 mm/sec	Daily changes in temperature and humidity
120 dB	Constant wind of 5 m/sec: Beaufort Scale 3, Gentle Breeze
130 dB	Constant wind of 8 m/sec: Beaufort Scale 4, Moderate Breeze

(Source: DETR, 1998)

Noise & Vibration - Guidelines

The following practical measures can be adopted to reduce noise and vibration levels at quarry sites:

Noise Control

- Design of the workings and ancillary facilities: layout, sequence of working
- Selection of locations for processing, storage and loading
- Screening by bunds and working face
- Screening of haul roads and provision of suitable gradients
- Consider noise characteristics as part of the overall assessment when purchasing new plant and equipment



- Internal traffic routing: optimise vehicle reversing requirements (to minimise noise associated with reversing alarms)

- Use of rubber linings on chutes and transfer points
- Minimise height which material drops from plant and machinery
- Enclosure and cladding of processing plant, where applicable
- Regular maintenance for plant and machinery

Vibration Control

Efficient blasts ensure as much of the explosive energy as possible is utilised for rock fragmentation, and by implication ground vibration and air overpressure is inefficient use of this energy. Air overpressure values arising from blasting operations fluctuate depending on the weather conditions, a factor outside the control of operators. The emission limit value is specified with a 95% confidence limit to address this issue. The following measures should be considered to reduce the effects of blasting:-

- Optimise blast design
- Monitor blasts and revise blast design, as required
- Limit groundborne vibration and minimise air over pressure by:
 - taking care in unusual situations e.g. corners
 - including geological considerations in blast design
 - Air overpressure is minimised through proper blast design, avoiding detonation of large unconfined charges, and by consideration of atmospheric conditions before blasting.
 - A blast must be carried out on a specified day as concerns over security does not allow for explosives to be stored on site. In exceptional circumstances or unforeseen circumstances (e.g. late delivery, security, meteorological conditions, etc.) a blast may be delayed or brought forward. Where possible the operator should endeavour to inform the public of the revised blasting timetable.
 - Adequate stemming of holes
 - Ensure the correct blasting ratio is obtained. The blasting ratio is a measure of the amount of work expected per unit volume of explosives i.e. tonnes/kg.
 - Notify nearest residences prior to the blast

Noise & Vibration – Recommended Emission Limit Values

The Environmental Protection Agency (EPA) have produced a guidance note for noise in relation to Scheduled Activities (EPA, 1996). It deals in general terms with the approach to be taken in the measurement and control of noise, and provides advice in relation to the setting of noise emission limit values and compliance monitoring.

In relation to quarry developments and ancillary activities it is recommended that noise from the activities on site shall not exceed the following noise emission limit values at the nearest noise sensitive receptor.

Daytime: 08.00 – 20.00 hrs LAeq (1 hour) = 55 dBA

Night time: 20.00 – 08.00 hrs LAeq (1 hour) = 45 dBA

(Note: 95% of all noise levels shall comply with the specified limit value(s). No noise level shall exceed the limit value by more than 2 dBA).

On site activities should be permitted during night-time hours where they comply with the noise emission limit values (e.g. heating up of asphalt plants, loading of materials).

Where existing background noise levels are very low, lower noise emission limit values may be appropriate. Audible tones or impulsive noise should be avoided at night.

It is also appropriate to permit higher noise emission limit values for short-term temporary activities such as construction of screening bunds etc., where these activities will result in a considerable environmental benefit.

In relation to blasting activities within quarry development it is recommended that the following vibration and air overpressure emission limit values are adopted and applied at the nearest vibration sensitive location (e.g. a residential property):

Groundborne vibration: Peak particle velocity = 12 mm per second (mm/sec), measured in any of the three mutually orthogonal directions at the receiving location (for vibration with a frequency of less than 40 hertz).

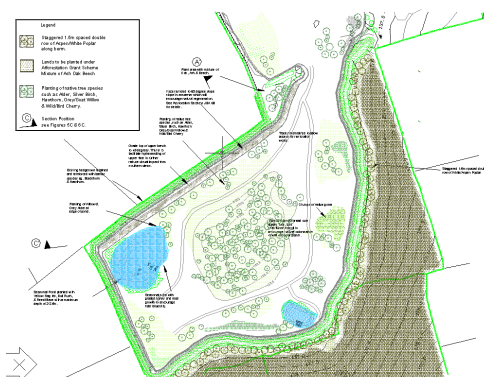
Air overpressure: 125 dB (Linear maximum peak value), with a 95% confidence limit.

Normal hours of blasting should be defined (e.g. 09.00 – 18.00 hrs Monday to Friday), and provision should be included to permit blasting outside these hours for emergency or safety reasons beyond the control of the quarry operator.

It is recommended that quarry operators provide advance notification of blasting to nearby residents through use of written notes, signage at site entrance, telephone, or warning sirens (or a combination of these methods).

4.4.6 *Landscape, Restoration & Afteruse*

Landscape change and visual intrusion are one of the key environmental issues associated with quarry developments. Because of the diversity of local landscapes, the potential impacts vary considerably in nature. The method of extraction and associated restoration scheme, where properly planned and implemented, can eliminate and / or minimise these potential impacts. The Landscape Institute / Institute of Environmental Management and Auditing have provided useful guidelines for landscape and visual assessment (IEMA, 2002).

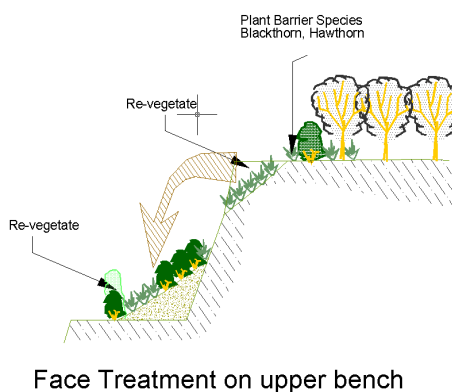


There are a number of publications providing guidelines for the restoration of quarry developments and these are provided in the Reference list below. (CTP, 2000; DoE, 1992; and DoE, 1996a & b). In addition, the EPA Landfill Manual – Landfill Restoration and Aftercare (EPA, 1999a) provides useful information on the principles of restoration and on issues such as soil handling and afteruse options.

Landscape & Restoration / Afteruse - Guidelines

- minimise impact on the landscape through proper planning and design:
 - direction of working and phasing of extraction
 - implement progressive restoration, where possible

- location of processing plant and stockpiles
- use of screening bunds
- use of pre-planting, where possible, to minimise the impact of future phases of extraction
- operational landscaping around site perimeter and at site entrance, where appropriate
- suitable choice of colours / finishes for plant and buildings
- retain and / or reinstatement of boundaries and boundary features where practical
- use of directional lighting, as appropriate during hours of darkness
- restoration and afteruse:
 - consider and develop restoration scheme at the earliest possible stage in the planning of quarry developments
 - consult with interested parties regarding afteruse/restoration options
 - these are some of the afteruses that can be considered:
 - agricultural
 - forestry
 - amenity (fisheries; golf courses)
 - natural habitat (lake, wetland - nature conservation)
 - landfill – waste disposal
 - implement progressive restoration, where possible
 - maximise soil recovery during stripping operations, and store topsoil and overburden materials separately.
 - retain topsoil and overburden to ensure the materials can be re-used in restoration
 - provide an appropriate programme of maintenance and aftercare



4.4.7 Waste Management

Quarrying and related value added activities result in a number of waste streams. These may include waste associated with plant / vehicle maintenance and on site canteens. The management of waste within quarries is regulated under the Waste Management Act, 1996, and associated regulations.

A waste permit under the Waste Permit Regulations, 1998, may be required where overburden materials are imported to site pending future recovery for restoration purposes.

In the past some quarries have been subjected to illegal fly-tipping and disposal of waste by third parties. The industry is addressing this issue by providing improved security around site boundaries and entrances.

The guidelines provided below cover the management of waste in quarry developments.



Segregated storage of wastes in a designated area
(Roadstone Provinces Ltd., Bunratty, Co. Clare)

Waste Management - Guidelines

- eliminate and minimise the production of waste
- re-use and recycle unsuitable materials (such as poor quality rock arising from dimension stone quarries, and clay / silt materials arising from settlement processes)
- re-use and recycle rejected products from block making, concrete and asphalt production operations
- ensure appropriate disposal of excess / unused explosives, in accordance with the manufacturers guidelines and health & safety regulations.

- use designated storage areas for particular waste types and ‘authorised’ waste contractors for the collection, re-use and disposal of waste oils, batteries, tyres, domestic waste and scrap metal (in compliance with current waste management legislation)
- no burning, disposal or mixing of waste materials, or use of waste materials in boilers should take place without prior consent of the local authority.
- appropriate security and signage around entrance(s) and boundaries to deter and prevent illegal fly-tipping of waste materials by third parties.
- particular waste materials such as oils, oil filters, batteries, empty oil drums, fluorescent lamps, printer cartridges are classified as hazardous waste materials. These materials should be stored on site in designated areas and collected and recycled or disposed of, by an ‘authorised waste contractor.

4.4.8 Archaeological Heritage

As archaeological heritage is a non – renewable resource the presence of known archaeological sites or the anticipation of potential sites is a major consideration in the extension of existing quarries and the selection of sites for new quarry developments.

The Irish Concrete Federation, and the Department of Arts, Heritage, Gaeltacht and the Islands (DoAGHI) have developed a Code of Practice in relation to archaeological heritage (ICF / DoAGHI, 2002).



Trial excavation under supervision of licensed archaeologist
(Harrington Concrete (Sligo) Ltd., Ballysadare, Co. Sligo)

The purpose of the Code is to:

‘Provide a framework within existing legislation and policies to enable members of the Irish Concrete Federation to expand their operations whilst carrying out appropriate archaeological mitigation having regard to a set of principles and actions agreed by both parties.’

The guidelines summarised below are based on information contained in the Code. It is understood that the Code of Practice will be reviewed by both parties one year after its adoption, and at regular intervals thereafter.

Archaeological Heritage - Guidelines

- Undertake archaeological investigations at initial site selection and planning stages (for both new ‘greenfield’ developments and quarry extensions) to minimise the impact on known archaeological sites or areas of established significant archaeological potential.
- Preserve by record all known sites being removed by development works.
- Notify the National Monuments Section of the Department of Environment, Heritage and Local Government of, and preserve by record any other monument or archaeological site of archaeological significance, deemed worthy of preservation, that may be uncovered during the operational phase of a quarry development.



Archaeological excavation at Brownstown, Kilcullen, Co. Kildare
(Kilsaran Concrete Products Ltd.)

4.4.9 Transport & Traffic

Construction materials have to be transported to the market place. In Ireland, the predominant mode of transport used is road via the use of heavy goods vehicles including trucks, concrete lorries, and container lorries for dimension stone. Where quarries are adjacent to, or adjoin existing railway lines, rail transport is sometimes adopted for transport of aggregates used in track maintenance.

Construction aggregates are typically relatively low value materials and it is generally only economic to use road transport for delivery to the market place within a 50 km radius from the quarry. For higher value materials such as concrete and asphalt / bitumenous mixes products, and dimension stone the market can stand higher transport costs and therefore greater haulage distances.



Splayed site access with landscaping

(Loughnane Concrete, Birr, Co. Offaly)

On site traffic within quarry developments typically arises from activities including stripping of topsoil and overburden materials; haulage of fragmented rock, cut stone or sand & gravel; and movement of site personnel and finished materials / value added products.

Off site traffic associated with quarry developments typically arises from transport of finished product / value added products to the market; deliveries to the quarries (e.g. fuel; cement, bitumen, sand, and explosives); and personnel movements.

The potential impacts of traffic associated with quarry developments can be mitigated by implementation of the guidelines outlined below and other guidelines related to on site and off site traffic in Sections 4.4.4 and 4.4.5.

Transport & Traffic - Guidelines

- Consider, where appropriate, alternatives to internal road haulage from excavation to processing plant or depot e.g. conveyors
- careful design and layout of the site entrance, providing adequate visibility
- regular maintenance and servicing of vehicles
- agree main traffic routes, where appropriate, to avoid sensitive areas and the use of large vehicles in narrow winding roads
- require drivers and others to use agreed routes
- use vehicle / wheel washing facilities and sheet vehicles (when transporting dry fine materials), where appropriate
- provide on site truck parking to avoid queuing of trucks outside quarry entrances.

4.4.10 Energy

Quarry developments and associated ancillary facilities are large users of energy (fuel and electricity). There are significant environmental and financial benefits from ensuring that the use of energy is optimised.

Energy consumption is associated with processing plant (crushing, screening and washing activities), on site and off site vehicles; asphalt, readymix concrete and concrete block / pipe manufacturing plants; and cutting / finishing processes used within the dimension stone sector.

The following guidelines outline measures to optimise energy consumption.

Further advice on energy issues can be obtained from the Irish Energy Centre (www.irish-energy.ie).



*Energy efficient asphalt plant incorporating insulated bitumen tanks and aggregate bins
(Roadstone Provinces Ltd., Bunratty, Co. Clare)*

Energy - Guidelines

- carry out energy efficiency audits
- identify opportunities and implement appropriate measures for energy use reduction and efficiency e.g. Use of Variable Speed Drives
- Consult with the electricity supplier in relation to tariff management and use of off-peak electricity.
- provide regular maintenance for processing plant, pumps, and boilers, etc.
- use photosensors to control and optimise use of outside lighting
- provide insulation to storage bins: asphalt / tarmadam plants
- Consider using off-peak electricity for certain operations e.g. Pumping of water, heating of bitumen tanks, etc
- optimise layout and design of internal haulage routes and processing plant
- use automatic controls to ensure idling or shutdown of plant when not in use.
- Use float operated pumping systems

4.5 Suggested Standard Format for Conditions (Environmental) Attached to Planning Permissions for Quarry Developments

Currently, there is no standard format for conditions attached to planning permissions for quarry developments and ancillary facilities. An Foras Forbartha (1980) did publish a Development Control Manual for *'The Extraction of Aggregates'* and this document contained a list of conditions based on a review of planning permissions granted at that time. The Department of the Environment (DoE, 1982) published advice and guidelines in relation to development control, including advice relating to conditions attached to planning permissions. However, this document does not specifically address quarry development and ancillary facilities. Section 4.7 – 'Possible planning conditions' in the DoEHLG (2004) guidelines provides advice to planning authorities in relation to planning conditions, including environmental conditions. This advice is written in a general descriptive manner and does not include typical wording of conditions. It is considered that the use of standard format conditions would be, on balance, beneficial to all stakeholders within the sector.

The suggested standard format for conditions set out in Appendix B may need modification to address the circumstances of particular applications / developments. The standard conditions are formulated in relation to proposed quarry developments and may not necessarily be appropriate for existing quarry developments.

Where a quarry is subject to environmental impact assessment, conditions attached to a grant of planning permission should incorporate mitigation measures proposed in an environmental impact statement.

5 FUTURE DEVELOPMENT OF THE SECTOR

5.1 General

This chapter considers the future development of the quarrying sector in the context of the implementation of National Sustainable Development Policy (DoELG, 1997); the National Development Plan 2000 – 2006 (DoELG, 1999a) and forthcoming national development plans; and the National Spatial Strategy 2002 – 2020 (DoELG, 2002b) – www.environ.ie

Based on the work outlined in the previous chapters, conclusions and recommendations related to the future development of the sector are presented.

5.2 Sustainable Development

Comhar, the National Sustainable Development Partnership, was set up in 1999 with the objective of advancing the national agenda for sustainable development. The organisation works in partnership to encourage sustainable development across Irish economy and society, and advises Government on policies which promote and support sustainable development. www.comhar-nsdp.ie

The traditional definition of sustainable development is the Brundtland definition:

‘Development that meets the needs of the present without compromising the ability of future generations to meet their own needs’.

In 2002 Comhar set out a set of principles for sustainable development which can be used to determine whether policies, existing or future, are likely to lead to sustainable development in Ireland. The principles aim to balance economic, environmental and social issues in an integrated manner.

The twelve Comhar Principles for Sustainable Development are as follows:

- 1 The use of non-renewable resources should be minimised
- 2 Use of hazardous / polluting substances should and wastes created should be minimised: waste management should be environmentally sound.

- 3 Renewable resources should be used within the capacity for regeneration
- 4 The quality of soils and water resources should be maintained and improved.
- 5 The diversity of wildlife, habitats and species should be maintained and improved.
- 6 Air and atmosphere should be protected and human induced effects on climate minimised.
- 7 The development of resource potential in one region should not compromise the ability of other regions to achieve their own potential.
- 8 Social inclusion should be promoted to ensure an improved quality of life for all.
- 9 Sustainable development depends on co-operation and agreement between states.
- 10 The quality of landscapes, the heritage of the man-made environment and historic and cultural resources should be maintained and improved.
- 11 Decision-making should be devolved to the appropriate level.
- 12 Stakeholder participation should be promoted at all levels of decision-making.

5.3 Sustainable Development – A Strategy for Ireland (1997)

The ‘Sustainable Development – A Strategy for Ireland’ document was published by the Department of the Environment and Local Government in 1997 (DoELG, 1997). The purpose of the document was to “provide a comprehensive analysis and framework, which will allow sustainable development to be taken forward more systematically in Ireland”. The Strategy reviews a number of key sectoral areas and discusses initiatives that will be undertaken in order to promote sustainability in these sectors. Sectors addressed include Transport, Agriculture, and Industry. Extracts from the strategy relevant to the quarrying and construction materials industries are noted below.

5.3.1 Industry - Quarrying

Quarrying is discussed under Chapter 9, Industry. The Strategy notes that,

“quarrying for stone, gravel, sand, crushed rock, etc., is ... based on an ultimately finite resource ... its products used mainly in the construction industry”.

However the document goes on to note that,

“while the raw materials for the quarrying industry are not in short supply, the environmental impacts ... require greater consideration”.

In addition the Strategy states that

“In many cases, demand for aggregates for use by the construction industry could be adequately met by the recycling and reuse of construction/ demolition (C & D) waste, which has been estimated to amount to some 2.5 million tonnes annually”.

While the Strategy acknowledges that construction aggregates are a finite resource, no policy is proposed to use these resources in a sustainable manner or to protect such resources from sterilisation.

The issue of demand and supply of construction aggregates has been addressed in Chapter 2 of this report. This assessment notes that current demand for construction aggregates is running at over 120 million tonnes per year and that the future aggregate demand will range between 100 and 160 million tonnes per year in the medium term (2001 to 2021).

In 2004, approximately 11 million tonnes of construction and demolition (C & D) waste was collected in Ireland (EPA, 2005a www.epa.ie). Of this, approximately 9.5 million tonnes was recovered (comprising Soil & Stones: 7.7 million tonnes and Concrete, Rubble, Wood, Metal, Glass and Plastic: 1.8 million tonnes).

Even allowing optimistically for 50% of C & D waste being recycled for use as secondary aggregates, this represents less than 5% of the overall demand for construction aggregates. It is therefore incorrect to state that the demand for aggregates could be adequately met by recycling and reuse of C & D waste, as referred to in the above extract from ‘Sustainable Development – A Strategy for Ireland’.

Currently, marine aggregates contribute less than 1 million tonnes to the supply of aggregates in Ireland (e.g. < 1% of the overall demand for construction materials). With the current lack of an appropriate regulatory framework and competing uses of a number of the key marine aggregate resources areas (breeding grounds for fish / shellfish; offshore wind energy developments etc.) it is not envisaged that marine aggregates will contribute more than (10 million tonnes) over the next twenty years.

5.3.2 Transport

Transport is discussed under Chapter 10 of the Strategy, which notes under Freight Traffic that,

“Freight traffic is concentrated on the roads [and] there is no real alternative to road transport for the vast bulk of goods movements”.

In relation to Roads Infrastructure it is noted that,

“With a high proportion of internal transport dependent upon the roads network, significant investment has been made and continues to be made in improving road infrastructure. This is particularly important from an economic point of view, to overcome competitive disadvantages caused by delays, congestion, etc. Addressing transport deficiencies and costs is of critical importance to meeting the objectives of Government policy regarding the growth and equitable distribution of income, facilitated by increased opportunity and mobility for economic development”

Construction aggregates are a major component in road construction. The low unit value and bulk nature of construction aggregates in general means that the proximity principle applies, i.e. sources of such material must be located within c. 30 to 40 km of potential markets. Furthermore the siting of facilities producing construction aggregates close to markets can assist in reducing transportation by road as advocated by the Strategy.

At present road transport is the main mode of transport used to bring aggregates and construction materials to the market place. Limited rail transport is used where construction materials are required for maintenance of the rail network and associated infrastructure.

5.3.3 Built Environment

The Built Environment is dealt with in Chapter 15 of the Strategy where the HABITAT Agenda is quoted,

“The design of the built environment is recognised as having an impact on people’s well-being and behaviour and, thereby, on people’s health. Good design in new housing and in upgrading and rehabilitation is important for the creation of sustainable living conditions”.

Construction aggregates and aggregate products come in a wide variety of forms and textures such as brick, concrete, dimension/ architectural stone, slate etc. In addition there is a history in different geographical areas of the country of the use of different products, usually those found occurring close by. Examples of this are the traditional use of brick in Dublin or the use of limestone blocks in Kilkenny. Construction aggregates

therefore are essential to the achievement of a high quality built environment with a sense of place.

The Strategy sets out a number of criteria that sustainable building should incorporate including;

- Optimisation of energy efficiency and a reduction in CO₂ emissions
- Increased use of renewable materials

It is estimated that embodied energy (that is the energy required to produce, manufacture and transport construction materials) accounts for up to a quarter of the lifetime energy requirements of building. Furthermore embodied energy can account for between 10 and 20% of the total CO₂ emissions associated with one typical new house (LGMB et al 1995). Transportation of construction materials, aggregates, timber, synthetic materials etc accounts for a major component of embodied energy. As discussed above traditionally construction materials were sourced close to the point of demand. Sustainable development can be promoted by the extraction of construction aggregates close to potential markets.

Construction aggregates are by their nature well suited to reuse at various levels. At the highest level brick, stone, tiles, ceramics etc can be reused intact, while at a lower level construction aggregates can be recycled for reuse in place of primary aggregates. However, as discussed above use of recycled construction aggregates is limited by the relatively low volume of construction and demolition waste available compared to current and predicted future aggregate demand.

The sustainable use and management of construction aggregates can contribute to the achievement of sustainable development as set out in the Strategy document through providing the raw materials for the provision of housing and infrastructure while potentially assisting, if managed properly, in a reduction in energy usage and the production of CO₂ emissions.

5.4 National Development Plans (2000 – 2006) and Beyond

The National Development Plan (NDP) 2000 – 2006 was published by the government in late 1999 (DoELG, 1999a) and sets out a programme for the upgrading of the nation's physical, economic and social infrastructure over a 6 year period.

The foreword to the plan notes that;

“The Plan will lay the foundation for Ireland’s continuing economic and social development into the next Millennium. It sets out an ambitious and coherent development strategy supported by a fully quantified multi-annual investment commitment in the key areas of infrastructural development, education and training, the productive sector and the promotion of social inclusion. The Plan also contains a commitment and accompanying framework for the promotion of more balanced regional development.”

Chapter 4 of the NDP entitled “Economic and Social Infrastructure Operational Programme” sets out proposals for the upgrading of the State’s physical infrastructure including roads, public transport (Greater Dublin Area), housing etc.

5.4.1 Transport

The plan set out an ambitious programme for the upgrading of the State’s national roads infrastructure, which involves spending almost €6,000 million with over €2,000 million earmarked for non-national roads. The primary road transport objectives set out in the plan include, improvement of the reliability of the system through increasing capacity and reducing journey times, improvement of roads infrastructure between regions and to achieve the objectives of the governments road safety strategy. Construction aggregates have and continue to play a key role in the achievement of this objective. Construction aggregates are utilised in almost every aspect of the construction of roads including;

- Concrete for the construction of bridges, overpasses, piles, kerbs etc
- Graded aggregates for filling areas of poor ground, drainage, roadbase etc.
- Asphalt products (i.e. construction aggregates bound with bituminous products) to provide high skid resistant surfacing

Within the Greater Dublin Area construction aggregates have and continue to be required for the implementation of the Dublin Transportation Initiative (DTI) which provides for major transport projects including the Luas, the Dublin Port Tunnel, the network of bus and cycle lanes and, the proposed Metro and extension of the suburban rail network. Uses for construction aggregates include;

- Concrete for the construction of bridges, sub stations, kerbs etc
- Aggregates for track ballast
- Asphalt products for surfacing of cycle and bus lanes etc.

5.4.2 Social Infrastructure

The NDP also sets out ambitious targets for the upgrading of social infrastructure such as housing, schools, hospitals etc. Aggregates are an essential component in the construction of the physical infrastructure associated with social infrastructure. Housing in particular requires an adequate and continuous supply of construction aggregates in order that the deficit of affordable housing in the State be addressed.

The Plan notes that;

“The inclusion of housing in the National Development Plan for the first time reflects the Government’s commitment to addressing the infrastructural deficit in the size of the national housing stock”.

The Plan estimates that approximately 500,000 new dwellings will be required over the period 2000 to 2010. It has been estimated that between 300 and 400 tonnes of aggregates are required in the construction of an average dwelling (DOELG 1999b).

Based on the above it is clear that the provision of a secure and economic supply of construction aggregates and related materials is essential for the successful implementation of the National Development Plan 2000 – 2006.

The proposed new Infrastructure Bill will provide a basis to improve and optimise the planning and construction of major infrastructure projects such as motorways and the Dublin Metro. It is envisaged that the Bill will include measures that will allow for continuous 24hr construction. Such measures will result in a continuous demand in construction materials over a 24 hour period. In addition, maintenance of roads in urban areas is often required to be carried out at off-peak times (early morning / at night).

On this basis provision should be made to allow construction materials companies to produce and supply construction aggregates, concrete products and asphalt / tarmacadam outside typical normal working hours 07.00 to 19.00 hrs Monday to Friday and 07.00 to 16.00 hrs on Saturdays.

5.5 National Spatial Strategy 2002 - 2020

The purpose of the National Spatial Strategy (NSS) 2002 – 2020, (DoELG, 2002b) is essentially to ensure that the social and economic growth of the nation happens in a more balanced manner with more even distribution between the regions.

The NSS notes that;

“much of Ireland’s recent prosperity has been generated in the Greater Dublin Area (GDA). The performance of the GDA will remain pivotal to the economic well being of Ireland. However, Ireland also needs to build up other places and areas to be similarly strong on a national and international scale – generating benefits closer to where people live”.

The Strategy uses a number of “key concepts” that are to be used in order to develop “the full potential of each area to contribute to the optimal performance of the State as a whole – economically, socially and environmentally”. Such “key concepts” involve designating existing town and cities as “gateways” and “hubs” by developing the “potential” of such areas with good communications and transport “linkages” between these areas.

The objective of more balanced regional development as set out in the NSS will require the consolidation of existing services and infrastructure within the relatively well developed regions, notably the Greater Dublin Area, while investing significantly in the economic and social infrastructure of the less developed regions.

Given the wide range of use of aggregates and the need for sources of aggregates to be located close to areas of demand due to the proximity principle, an adequate and continuous supply of construction aggregates is required throughout the regions in order that the objectives of the NSS can be achieved.

5.6 Conclusions & Recommendations

Based on the above assessment the following conclusions and recommendations are presented.

5.6.1 Conclusions

- Currently, the demand for construction aggregates is over 120 million tonnes per year. Over 95% of this demand is supplied from land-based pits and quarries.
- The use of recycled or secondary aggregates (such as processed construction & demolition waste) has increased over the past 5 years. However, contrary to the assertion in ‘Sustainable Development – A Strategy for Ireland’ demand for aggregates for use by the construction

industry will not be adequately met by the recycling and reuse of construction/ demolition (C & D) waste.

- The relatively small volume of construction and demolition waste arising within the country, together with a perceived reluctance to specify and use secondary aggregates, are constraints in increasing the volume of recycled C & D materials available for use as construction aggregates.
- There is virtually no commercial use of marine aggregates at the current time. Future use of marine aggregates is particularly constrained by the lack of an appropriate regulatory framework.
- In the absence of an increase in the sources of secondary and marine aggregates it is likely that land-based deposits will continue to be the main source of construction aggregates in Ireland over the next twenty years. It is therefore critical that the issue of protection and sustainable development of aggregate resources is incorporated in land-use planning at a regional, county and local level.
- The future demand for construction aggregates over the period 2001 to 2021 will range from 100 to 160 million tonnes per year. The highest demand will occur in the Greater Dublin region (including Meath, Kildare and Wicklow); around other major urban centres – Cork, Limerick, Waterford and Galway; and at the locations of major infrastructure projects.
- An adequate, economic supply of construction aggregates and related materials (concrete, concrete products, asphalt / tarmacadam etc.) is essential for the successful implementation of the National Development Plan 2000 – 2006 (and future national development plans), and the National Spatial Strategy 2002 – 2020.
- These construction materials are essential for development, and through that they are a key element for contributing to our quality of life and for creating sustainable communities.

- The regional planning guidelines and the county development plans, together with the DoEHLG (2004) planning guidelines, are the current basis for setting out policies for the sustainable development of these construction materials.
- There is some variation in the environmental management practices adopted at pit / quarry locations within the sector. Those pits / quarries with an environmental management system in place were observed to be more pro-active in addressing environmental management issues.
- Voluntary industry initiatives are contributing to improved environmental management and restoration practices within the sector. Such initiatives are a key aspect of the sector's future development.

5.6.2 Recommendations

Sustainable Development

The sustainable development of proven land based primary aggregates resources should take into account the following key issues that are consistent with the principles of sustainable development (Comhar, 2002):

- Protect primary aggregate resources and optimise the use of these resources, while ensuring an adequate and continuous supply to meet the need for economic growth and sustainable development.
- Only permit development of quarries within designated European sites (Special Protection Areas, Special Areas of Conservation and Natural Heritage Areas) if they would not have a significant effect on the integrity of the sites in ecological terms (i.e. no loss of biodiversity and appropriate mitigation measures including transplantation / translocation of flora and fauna implemented where required), or unless there are particular reasons relating to the public or national interest (including those of a social or economic nature).

- Encourage the recycling of construction & demolition waste for use as secondary aggregates, thereby minimising the extraction of primary aggregates, where practicable.
- Ensure proper environmental management and monitoring of quarries so that the potential environmental impact of extraction and transportation of aggregates are minimised.
- Where extraction of aggregates has permanently ceased, ensure that these quarries are restored to beneficial afteruse. Such restoration will protect the long term potential of the land and in some cases will contribute to biodiversity.
- Minimise the production of waste materials within quarries (e.g. waste oils, tyres, batteries etc.) by implementing recycling and reuse procedures.

The development and use of sustainability indices for the quarrying sector should be considered as these may provide a useful tool for assessing the sector's compliance with sustainable development principles.

Aggregate Resources

Aggregate Resource Assessment

- There is a requirement to identify land-based aggregate resources on a county and regional basis. Such an assessment would provide the basis for using landuse planning to protect and manage these resources in a proper and sustainable manner.

Aggregate Supply and Demand

- There is a need to implement a framework for the collation of regional statistics on the supply and demand for construction aggregates in Ireland. These figures could be used in future to check and review the current assessment of supply and demand, and to assist in the sustainable development of aggregate resources. Any such methodology

for the collation of supply and demand figures would have to recognise the commercial sensitivity of such information. The regional statistics would have to be recorded and presented to ensure confidentiality on this matter.

Alternatives to Land-Based Primary Aggregates

- Further measures should be implemented to promote and provide alternative sources of aggregates – secondary and marine aggregates:
 - The recommended measures provided for in the B4 Task Force report on the recycling of construction and demolition waste (FCI, 2001) should be reviewed and updated to ensure that the proposed recycling targets for C & D waste will be achieved.
 - In the short-term all port / harbour authorities should be instructed as a matter of policy to ensure future assessment of the reuse of dredged materials is carried out prior to proceeding with an offshore disposal option. This will identify potential opportunities for reuse of the marine sediments as secondary aggregates, thereby enabling possible savings on disposal costs and contributing to sustainable supply of aggregates.
 - Port / harbour authorities should recognise the potential need to land marine aggregates, and make provision for suitable areas for this activity in their harbour development plans.
 - Carry out a review of the potential marine aggregate resources within the Irish territorial waters.

Planning Policy and Practice

National Aggregate Policy

- Ireland is one of the few remaining countries in Western Europe that does not have a National Aggregates Policy. This is despite having a substantially higher aggregate demand per head of population than any other EU state. It is recommended that a National Aggregates Policy be

developed to give clear guidance to Regional and County Planning Authorities on the need secure future aggregate supply while protecting our national heritage and landscape.

Regional Planning Guidelines

- There is a requirement to provide and implement consistent regional planning policies and guidelines to ensure protection and sustainable development of proven aggregate resources.

County Development Plans

- The policies within county development plans should provide for the protection and sustainable development of proven aggregate resources. These policies should be consistent across all planning authorities.
- The guidelines for preparation of county development plans should be amended to provide a consistent approach to planning policy and development control for the extractive industry.
- Where the extent of aggregate resources within lands have been proven, and where these lands are within the ownership (or under the control) of a quarry operator, then these lands should be considered for zoning within the county development plan for the purposes of future aggregate extraction, taking into account other landuse and environmental issues.
- Planning authorities should consult with the relevant industry organisations, quarry operators, the Geological Survey of Ireland, and other stakeholders in relation to the location of existing quarries and aggregates resources within their area, during future revisions of the county development plans.

Marine Aggregates – Policy and Regulatory Framework

- Develop a policy and a new regulatory framework for marine aggregates to facilitate, where appropriate, the potential use of marine sediments as construction aggregates.

Standard Format for Conditions (Environmental) Attached to Planning Permissions

- There is a requirement to implement a standard format for environmental conditions attached to planning permissions, and to ensure implementation of consistent emission limit values. This will facilitate a more consistent approach to the drafting of conditions attached to planning permissions for quarry developments.

Section 261 – Control of Quarries

- The deadline for the registration of quarries was the 27th April 2005. Planning authorities should assess the registration submissions on a consistent basis, in accordance with the DoEHLG (2004) guidelines and such further advice as may be issued by the Department.

Transport

- At present, heavy goods vehicles (HGV's) are the predominant mode of transporting construction aggregates and materials to the marketplace. Consideration should be given to assessing alternative modes of transport (such as rail) where such modes are demonstrated to provide a practical alternative in economic, environmental and social terms.

Environmental Management Practice

EIA / EIS for Pits & Quarries

- A key stage in the EIA / EIS process is the scoping of the EIA. More attention to the scoping aspect of the EIA process would assist in improving the standard and quality of EIS's.
- As the purpose of an EIS is to identify, reduce and mitigate the environmental impacts of developments the accuracy of the predictions made in the EIS as well as the effectiveness of the mitigation measures need to be audited. It is recommended that an environmental audits be conducted post development and at regular intervals during the life cycle of the quarry development. These audits (as part of an environmental management system, see below) will assess the effectiveness of the mitigation measures and the accuracy of predictions made within the EIS.

Implementation of Environmental Management Systems (EMS)

- Every quarry and pit should implement an environmental management system, appropriate to the scale and nature of the operation. The environmental management guidelines published as part of this project contain advice in relation to the structure, content and implementation of such systems.

Environmental Management Guidelines for Operators

- There is a requirement to provide guidelines to operators to ensure a consistent approach to the environmental management of quarry developments and ancillary facilities. The Irish Concrete Federation environmental code (ICF, 2005), the DoEHLG (2004) guidelines, and the environmental management guidelines prepared under this project provide basis for addressing this issue.

Environmental Management Guidelines for Regulators

- There is a requirement to provide guidelines to regulators so that a consistent approach to planning policy and development control issues in

the extractive industry can be adopted across the country. The DoEHLG (2004) guidelines and guidelines prepared under this project provide a basis for addressing this issue.

- It is recommended that the standard format planning conditions (environmental) prepared under this project be adopted for use by the planning authorities to ensure a more consistent approach to planning permissions within the sector. Such an approach has been successfully implemented by the Environmental Protection Agency for integrated pollution control licences and waste licences.

Education and Training

- While there are industry initiatives in place to provide environmental awareness / management education and training it is recommended that a more integrated approach would be beneficial to improving the overall environmental management within the sector. Such an approach would include provision of a suitable module within third level planning courses; in-service training for planners and environmental staff within the planning authorities; development / continuation of environmental awareness training for staff within quarry companies; and continued professional and development (CPD) training for engineering, environmental, geological, planning and surveying professionals working within the sector.
- A programme for dissemination of the guidelines arising from this project should be implemented, and should include all stakeholders within the sector. Such guidelines should be incorporated in the future education and training initiatives for the sector, recommended above.

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Glossary of Terms

A-weighting	Normal hearing covers the frequency (pitch) range from about 20 Hz to 20,000 Hz but sensitivity is greatest between about 500 Hz and 5,000 Hz. The “A-weighting” is an electrical circuit built into noise meters to mimic this characteristic of human being.
Admixtures	Chemicals which, except in special cases, are added to a concrete or mortar in quantities no larger than 5% by mass of cement in order to modify the normal properties of concrete or mortar.
Aggregates	Granular material used in construction. Aggregates may be natural, manufactured or recycled.
Aggregate resource	A concentration of naturally occurring aggregates in such form that economic extraction is currently or potentially feasible.
Air Overpressure	A pressure wave in the atmosphere produced by the detonation of explosives. Consists of both audible (noise) and inaudible (concussion) energy. It is generally expressed as dB (Lin).
Aquifer	A permeable geological formation which is capable of storing and yielding water.
Asphalt	A dense, gap-graded mixture of aggregate, sand and fines (filler) coated with a bituminous binder.
Bench	A working level in a quarry.
Bench height	The height of the rock face between two benches in a quarry.
Bitumen	A viscous liquid or a solid consisting essentially of hydrocarbons and their derivatives; it is substantially non-volatile and softens gradually when heated. It is black or brown in colour and possesses waterproofing and adhesive properties. It is obtained by refinery processes from petroleum and is also found as a natural deposit or as a component of naturally occurring asphalt, in which it is associated with mineral matter.
Bituminous mixtures	A paving material, such as asphalt, macadam or other mixture consisting of a combination of mineral aggregates coated with a bituminous binder.

Blasting	Fragmentation of rock by the use of explosives
Blast vibration	Energy released by an explosion and transmitted through the ground.
Bund	An extended mound of soils, overburden or structure erected as a barrier to sight, sound or water.
Cement	A building material made by grinding calcined limestone and clay to a fine powder, which can be mixed with water to set as a solid mass or used as an ingredient in making mortar or concrete.
Clay	(i) A specific group of layered silicate minerals. (ii) Particles of size less than 2 micrometres forming rock.
Concrete	A strong, hard building material composed of coarse and fine aggregates, cement and water. May also contain additives and admixtures.
Crusher	A device used to reduce rock to particle sizes suitable for their end-use. Crushers vary in type and can apply large amounts of force to the material while providing size reduction in stages.
Decibel (dB)	The logarithmic measure of sound level. 0dB is the threshold of normal hearing, 140dB is the threshold of pain. A change of 1dB is detectable only under laboratory conditions.
dB (A)	Decibels measured on a sound level meter incorporating a frequency weighting (A-weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB (A) broadly agree with people's assessments of loudness. A change of 3 dB (A) is the minimum perceptible under normal conditions, and a change of 10dB (A) corresponds roughly to doubling or halving the loudness of a sound.
dB (Lin) _{max peak}	Instantaneous Maximum Peak sound pressure level measured in decibels on a sound level meter, without the use of a frequency weighting system. It is the parameter used to quantify air overpressure.
Dimension stone	A natural stone product that has been cut or processed to a particular size and shape.
Fines	Material finer than a 63 µm sieve.

Flyrock	The projection of material from the blast site to any area beyond the designated danger zone.
Fragmentation	A term associated with hard rock quarrying to describe the degree of mechanical breakdown produced by blasting.
Gravel	Non-cohesive granular material that results from natural disintegration of rock consisting of particles between 2mm and 60mm in size.
Hertz (Hz)	Unit of frequency (pitch) of a sound. Formerly called cycles per second.
Impulsive noise	A noise which is of short duration (typically less than one second), the sound pressure level of which is significantly higher than the background.
L_{AeqT}	The equivalent continuous sound level – the sound level of a steady sound having the same energy as a fluctuating sound over a specified measuring period (T). Used to describe many types of noise, and can be measured directly with an integrating sound level meter.
L_{arT}	The equivalent continuous sound level corrected for tonal or impulsive character where these are present.
Lagoon (silt)	A contained volume of water providing time for the sedimentation of silt and, perhaps, clays to permit re-use or discharge of clean water.
Wet-mix Macadam	Roadbase material that consists of graded crushed rock, usually pre-mixed with a controlled amount of water suitable for compaction.
Marine aggregate	Sand and gravel, which is excavated by dredger from the sea-bed and processed.
Minerals	Means all minerals and substances in or under land of a kind ordinarily worked by underground or by surface working for the removal but does not include turf (Planning & Development Regulations 2001, S.I. No.600 of 2001).
Noise	Unwanted sound. Any sound which has the potential to cause disturbance, discomfort, or psychological stress to a subject exposed to it.
Noise Sensitive Receptor	Any dwelling house, hotel or hostel, health building, educational establishment, place of worship or entertainment, or any other facility or area of high amenity

	which for its proper enjoyment requires and absence of noise at nuisance levels.
Overburden	Soil overlying aggregate to be extracted.
Pavement	The whole constructed thickness of a road whether of concrete, asphalt, macadam, stabilized soil etc.
Peak Particle Velocity	A measure of ground vibration magnitude which is the maximum rate of change of ground displacement with time, usually measured in millimetres/second. It is the parameter usually used to describe ground vibration in relation to blasting activities.
Precast Concrete	Term used to describe concrete products that have been manufactured off-site in specialist precast production plants.
Primary blasting	Describes the initial blast, where more than one stage of blasting is needed to obtain the required fragmentation.
Quarry	An excavation or system of excavations made for the purpose of, or in connection with, the getting of minerals (whether in their natural state or in solution or suspension) or products of minerals, being neither a mine nor merely a well or bore-hole or a well and bore-hole combined.
Sand	Non-cohesive granular material that results from natural disintegration of rock, consisting of particles between 0.06mm and 2mm in size.
Scheduled Minerals	Minerals defined in the Schedule attached to the Minerals Development Act, 1940. The 72 minerals listed include metalliferous and industrial minerals, and hydrocarbons.
Screen	A particle sizing device like a sieve, consisting of a surface (usually flat) which is perforated by apertures of characteristic size and shape. Screening is a sizing operation effected by means of a screen.
Secondary Blasting	The blasting of rock which has not been adequately fragmented by the primary blast. Also called plaster blasting.
Settling pond	A reservoir of still water in which very fine material is allowed to settle (see lagoon).
Silt	A deposit which has the average grain size between that of sand and clay (i.e. 0.06mm and 0.002mm).

Soil	In engineering geology: all unlithified material overlying the bedrock. In soil science: the natural medium for the growth of land plants and classifiable into soil types and soil horizons on characteristic physical properties such as structure, texture, colour and chemical composition including organic content, acidity, alkalinity etc.
Toe	The base of a quarry face or the base of a slope of an accumulation of material. A remnant 'toe' comprising a mass of solid, unbroken rock at the base of the face projecting into the quarry, may result from poor blast design. Also sometimes used to refer to the base of natural slopes where an abrupt change of gradient occurs.
Tonality	The degree to which a noise contains audible pure tones. Broad-band noise is generally less annoying than noise with identifiable tones (noise with a narrow frequency composition). A pure tone is a sound in which the pressure varies regularly, at a single frequency over time.
Vibrograph	An instrument to measure vibration, e.g. blasting vibration.
Water Bowser	Equipment incorporating a water tank used to spray water onto the surface over which it is towed.
Wet Suppression	Control of dust levels during processing operations by the use of water sprays into crushers, onto screens or conveyor belt transfer points.
Wet screening	Separation of granular particle sizes employing water sprays directed onto the screening deck.

APPENDIX A

GUIDELINES ON REQUIREMENTS FOR AN ENVIRONMENTAL MANAGEMENT SYSTEM (EMS)

Guidelines on Requirements for an Environmental Management System

Environmental management system (EMS)

The system must provide for the preparation and implementation of documented system procedures and instructions.

A programme for achieving environmental objectives and targets needs to be established and maintained. This, in part, is achieved through the definition of corporate environmental policy.

Environmental Policy

Definition and documentation of an organisation's environmental policy. The policy should be in the form of a public statement of the company's intentions with respect to the environment. It should also inform the company's own employees with regard to environmental goals and the level of performance the company intends to maintain.

Organisation and personnel

Responsibility, authority and resources

Definition and documentation of the responsibility, authority and interrelations of key personnel who manage, perform and verify work affecting the environment.

Verification resources and personnel

Identification of in-house verification requirements and procedures, provision of adequate resources and assignment of trained personnel for verification activities.

Management representative

Appointment of a management representative who has defined authority and responsibility for ensuring that the requirements of the environmental standard are implemented and maintained. This appointment should normally take place at a senior level.

Personnel, communication and training

Establishment and maintenance of procedures to ensure that employees are aware of:

- the importance of compliance with environmental policy and objectives,
- the potential environmental effects of their work activities and the benefits of improved environmental performance,
- their roles and responsibilities in achieving compliance with the environmental policy and objectives,
- the potential consequences of departure from agreed operating procedures.

Environmental effects

Register of legislative, regulatory and other policy requirements

Establishment and maintenance procedures to record all legislative regulatory and other policy requirements relating to the environmental aspects of the organisation's activities, products and services.

Communications

Establishment and maintenance of procedures for receiving, documenting and responding to communications from relevant interested parties concerning its environmental effects and management (e.g. complaints).

Environmental impact assessment

Establishment and maintenance of procedures for examining and assessing the environmental effects, both direct and indirect, of activities, products and services the production of an environmental impact assessment (EIA). The EIA is an essential component of company strategy with respect to minimising environmental impacts arising from its operations.

Environmental objectives and targets

The objectives and targets should be consistent with the environmental policy and should quantify, wherever practicable, the commitment to continual improvement in environmental performance over defined time-scales, relative to data collected during the EIA and associated audits.

Definitions

- (a) Environmental objectives: The goals, in terms of environmental performance, which an organisation sets itself to achieve and which should be quantified wherever practicable, e.g:
- performance levels specified in the EIA;
 - compliance with regulatory limits;
 - reduction of environmental impacts;
 - public satisfaction with company responses to complaints or inquiries.
- (b) Environmental targets: Detailed performance requirements, quantified wherever practicable, applicable to the organisation or parts thereof, which rise from the environmental objectives and which need to be met in order to achieve those objectives, e.g. :
- compliance with recommendations from site audit or regular checklist inspections;
 - internal waste reduction;
 - internal savings targets.

Environment Management Plan

The Environment Management Plan should be designed to illustrate how the company will achieve its objectives and targets. It should also set out the environmental performance indicators that will be used to measure progress. Environmental performance indicators are defined by the International Standards Organisation as “ a type of environmental indicator used in relation to the organisation's management and operations”.

Environmental management manual and documentation

Manual

Establishment and maintenance of a manual to:

- collate the environmental policy, objectives, targets and programme;
- document the key roles and responsibilities of personnel;
- describe the interactions of system elements, and
- provide direction to related documentation and describe other aspects of the management system, where appropriate.

Document control

Establish and maintain procedures for controlling all environmentally related documents.

Environmental management records

Establishment and maintenance of a system of records in order to demonstrate compliance with the requirements of the environmental management system.

*Operational control**General (management responsibilities)*

Management responsibilities should be defined.

Control

Identification of functions, activities and processes that affect, or have the potential to affect, the environment. These functions and activities should be planned to ensure that they are carried out under properly controlled conditions.

Verification, measurement and testing

Establishment and maintenance of procedures for verification of compliance with specified requirements and for establishing and maintaining records.

Non-compliance and corrective action

The responsibility and authority for initiating investigation and taking corrective action in the event of non-compliance with specified requirements shall be defined.

*Environmental management audits**General*

Establishment and maintenance of procedures for audits to be carried out in order to determine:

- whether or not the environmental management activities conform to the environmental management programme, and are implemented effectively,
- the effectiveness of the environmental management system in fulfilling the organisation's environmental policy.

For this purpose, an audit plan should be established and maintained.

Audit plan

The audit plan should deal with the following points:

- the specific activities and areas to be audited;

- the frequency of auditing of each activity area based on the nature and environmental importance of the activity concerned, and the results of the previous audit;
- who has the responsibility for auditing each activity area;
- personnel requirements;
- the protocol for conducting the audits, which may involve the use of questionnaires, checklists, interviews, measurements and direct observations, depending on the nature of the function being audited;
- the procedures for reporting audit findings to those responsible for the activity area audited and who shall take action on reported deficiencies;
- the procedures for publishing audit findings if the organisation has undertaken such a commitment.

Environmental management reviews

At appropriate intervals the environmental management system adopted needs to be reviewed to ensure it satisfies the organisation's requirements and to ensure its continuing effectiveness. Management reviews should include an assessment of the results of environmental management audits, which are a systematic, documented and objective evaluation of the performance of the organisation, environmental management and control systems currently in place with the aim of protecting the environment.

APPENDIX B

**STANDARD FORMAT PLANNING CONDITIONS
(ENVIRONMENTAL)**

GENERAL

G1 Implementation of Proposed Mitigation Measures

The development shall be carried out in accordance with the information and provisions contained in the planning application, Environmental Impact Statement and further information submitted to the planning authority on [dates to be added], and in particular, the Developer shall ensure all mitigation measures contained in the Environmental Impact Statement are implemented, except as may otherwise be required in order to comply with the following conditions.

Reason: In the interest of proper planning and development, and protection of the environment.

WATER

W1 Water Management – Surface Water Control

No surface water shall be allowed to flow from the site onto the public road, during the construction or operational phases of the development.

Reason: In the interest of traffic safety.

W2 Water Management – Pollution Prevention

The developer shall construct and commission the proposed settlement lagoons /silt ponds, during the initial development phase at the commencement of development.

All surface water from vehicle re-fuelling areas shall pass through adequately sized and located hydrocarbon interceptors before any discharge to surface water drainage. The developer shall submit full details of the hydrocarbon interceptors for agreement to the planning authority prior to the commencement of development.

All fuel tank and drum storage facilities shall be rendered impervious to the materials stored therein. Drums shall be stored on appropriate spill pallets. The tank storage areas shall, as a minimum be bunded, to a volume not less than the greater of the following:

- i) 110% of the capacity of the largest tank or drum within the bunded area*
- ii) 25% of the total volume of substance that could be stored within the bunded area.*

Drainage from the bunded areas shall be collected and disposed of in a safe manner. The integrity and watertightness of the bunded areas shall be assessed on a regular basis and a report on such assessment shall be made available for inspection by the planning authority.

The developer shall take precautions to ensure that oils, fuels and additives used in the operations are stored in secure areas. All waste oil shall be removed from the site and disposed of to the satisfaction of the planning authority.

The developer shall have on site an adequate supply of containment booms and suitable absorbent material to contain and absorb any spillage.

Reason: To provide for the protection of surface water and groundwater.

W3 Water - Effluent Treatment from Offices / Toilet Facilities

The proposed proprietary system and associated percolation area, for the treatment of sewage arising from offices, canteen and washrooms shall be designed in accordance with the Environmental Protection Agency guidelines having regard to the results of the site characterisation assessment.

The system shall be installed and maintained in accordance with the recommendations of the manufacturer, to the satisfaction of the planning authority.

The developer shall enter into a maintenance contract with the manufacturer/authorised supplier of the proposed proprietary effluent treatment system. A copy of this agreement shall be submitted to the planning authority and the results of all maintenance reports shall be made available routinely to the planning authority.

Reason: In the interest of public health and for the protection of groundwater.

W4 Requirement for a Discharge Licence under the Water Pollution Act (1977)

As the development includes provision for discharge of trade effluent to surface waters, the developer shall apply for, and obtain, a discharge licence from the planning authority, prior to the commencement of the development..

Reason: In the interest of proper planning and development and to provide for the protection of surface waters.

W5 Existing Groundwater Wells & Water Supply

In the event of quarrying activities having an adverse impact on the existing private wells in the vicinity, the developer shall undertake appropriate remedial measures agreed with the local authority at his own expense. In the event of disruption of water supplies, the developer shall cease any operations causing such disruption until the affected water supply has been restored or replaced.

Reason: In the interest of proper planning and development of the area and public health.

W6 Monitoring & Reporting

Where applicable, the developer shall carry out monitoring of surface water and groundwater in the vicinity of the site. The monitoring locations, sampling procedure, and suite of water quality parameters to be tested for shall be agreed in advance with the planning authority. Monitoring shall be carried out on a quarterly basis and the monitoring shall commence on commencement of the development. The results of the monitoring shall be submitted to the planning authority four weeks after the end of the quarter being reported on.

Reason: To provide for ongoing monitoring of groundwater and surface waters in the vicinity of the development.

AIR QUALITY**AQ1 Dust Mitigation Measures**

The developer shall put in place appropriate measures to control dust arising within the development, having regard to good environmental management practice. These documented measures shall be agreed with the planning authority, and be available on-site for inspection by the planning authority.

AQ2 Dust Deposition – Emission Limit Value

The activities on site shall not give rise to total dust (soluble and insoluble) deposition values that exceed 350 mg/m²/day (averaged over a 30 day period) when measured at agreed monitoring locations on the site boundary.

AQ3 Monitoring & Reporting

The developer shall install, commission, operate and maintain dust deposition gauges to measure dust deposition rates at the site boundary. The monitoring locations shall be agreed in advance with the local authority and shall be established prior to commencement of the development. The measurement technique shall be the VDI Method 2119 – Part 2 (Bergerhoff Gauge). Dust monitoring shall be carried out annually on a continuous basis during the period April to September inclusive. The results of the monitoring shall be available to the planning authority four weeks after the end of the month being reported on.

(Note: Reason below applies to each of AQ1, AQ2, and AQ3 above)

Reason: To protect the environment and amenities of properties in the vicinity of the site, by control and monitoring of dust.

AQ4 New Macadam / Asphalt Plants - Requirement for Licence Under the Air Pollution Act, 1987

The developer shall apply for, and obtain, a licence under the Air Pollution Act, 1987, for the proposed new macadam / asphalt plant, prior to erection and commencement of operation of the plant.

Reason: In the interest of proper planning and development and to provide for the protection of air quality.

NOISE & VIBRATION**Noise****N1 Noise Mitigation Measures**

The developer shall put in place appropriate measures to control noise arising within the development, having regard to good environmental management practice. These documented measures shall be agreed with the planning authority, and be available on-site for inspection by the planning authority.

N2 Noise – Emission Limit Value

The activities on site shall not give rise to noise levels at the nearest noise sensitive location which exceed the following sound pressure limits:

Daytime (08.00 – 20.00 hrs): 55dB(A) Leq (1hour)
Nighttime (20.00 – 08.00hrs): 45 dB(A) Leq (1hour)

95% of all noise levels measured shall comply with the specified limit value(s). No individual noise measurement shall exceed the limit value(s) by more than 2 dB(A).

N3 Monitoring & Reporting

The developer shall carry out noise surveys to measure noise levels at the nearest sensitive locations. The monitoring locations shall be agreed in advance with the planning authority and shall be established prior to commencement of development. The noise survey shall be carried out in accordance with Environmental Noise Survey – Guidance Document (EPA, 2003). Noise monitoring shall be carried out on a quarterly basis, unless otherwise agreed in writing with the planning authority. The results of the monitoring shall be available to the planning authority four weeks after the end of the quarter being reported on.

(Note: Reason below applies to each of N1, N2, and N3 above)

Reason: To protect the environment and amenities of properties in the vicinity of the site, by control and monitoring of noise.

Blasting & Vibration

V1 Blasting Times & Notification

The developer shall only carry out blasting during 09.00 – 18.00 hrs., Monday to Friday, except in emergencies or for health & safety reasons beyond the control of the developer. The developer shall put in place a procedure for notifying local residents of the date(s) of blasting. This documented procedure shall be agreed with the planning authority, and be available on-site for inspection by the planning authority.

V2 Groundborne Vibration – Emission Limit Value

No blast or combination of simultaneous blasts shall give rise to a groundborne vibration level at the nearest noise sensitive location which exceeds a peak particle velocity of 12 mm/ second, as measured in any of the three mutually orthogonal directions about a fixed point.

V3 Air Overpressure – Emission Limit Value

No blast shall give rise to an air overpressure level at the nearest noise sensitive location which exceeds 125 dB (Lin) maximum peak..

95% of all air overpressure levels measured at the nearest noise sensitive location shall confirm to the specified limit value. No individual air overpressure value shall exceed the limit value by more than 5 dB(Lin).

V4 Monitoring & Reporting

The developer shall carry out blast monitoring (groundborne vibration and air overpressure) for each blast. The monitoring locations shall be agreed in advance with the planning authority and shall be established prior to the commencement of development. Blast monitoring shall be carried out for each blast, unless otherwise agreed in writing with the planning authority. The following information shall be recorded for each blast: date; time; location of blast within the quarry; amount of explosives used; maximum instantaneous charge; vibration and air overpressure results. The results of the monitoring shall be submitted to the planning authority four weeks after the end of the quarter being reported on.

(Note: Reason below applies to each of V1, V2, V3 and V4 above)

Reason: To protect the environment and amenities of properties in the vicinity of the site, by control of noise and vibration.

LANDSCAPING & RESTORATION

Landscaping

L1 Operational Landscape Scheme

The developer shall implement the operational landscaping scheme as set out in the planning application (and accompanying Environmental Impact statement).

Reason: In the interest of proper planning and development, and the visual amenity of the area.

Restoration

R1 Restoration Scheme

Upon permanent cessation of quarrying activity at the site, the developer shall implement the restoration scheme as set out in the planning application (and accompanying Environmental Impact Statement).

R2 Financial Provision for Restoration

Prior to commencement of development, the developer shall lodge with the planning authority a bond of an insurance company, or other security to secure

satisfactory reinstatement of the site, coupled with an agreement empowering the planning authority to apply such security or part thereof to the satisfactory completion of the reinstatement. The form and amount of the security shall be as agreed between the planning authority and the developer or, in default of agreement, shall be determined by An Bord Pleanála.

(Note: Reason below applies to each of R1 and R2 above)

Reason: To ensure satisfactory reinstatement and restoration of the site.

ARCHAEOLOGICAL HERITAGE

AH1 Archaeological Monitoring

The developer shall facilitate the planning authority in preserving, recording or otherwise protecting archaeological materials or features that may exist within the site. In this regard, the developer shall:

- *employ a suitably-qualified archaeologist, who shall monitor the stripping of topsoil during site development*
- *Provide satisfactory arrangements, under the supervision of a suitably – qualified archaeologist, for the recording and removal of any unknown archaeological material that is encountered during site development.*

Reason: In order to conserve the archaeological heritage of the site and to secure the preservation by record of any unknown remains which may exist within the site.

WASTE MANAGEMENT

WM1 Storage, Collection and Recycling / Disposal of Waste

All waste materials shall be stored, collected, recovered and/or disposed of in accordance with the requirements of the planning authority. A record of the volumes of waste oils, used batteries, used tyres, disused plant & machinery, and scrap metal arising within the development shall be kept by the operator. These records shall be kept on-site and made available to the planning authority upon request.

Reason: To provide for the proper disposal and/or recovery of waste, and protection of the environment

ENVIRONMENTAL MANAGEMENT & MONITORING

EM1 Environmental Management Systems (EMS)

The developer shall establish and implement an Environmental Management System (EMS) within 6 months of the grant of permission. The scope and format of the EMS is to be agreed with the Planning Authority, taking into account the nature and scale of the activity.

Reason: To ensure management of the environmental aspects of the development on a planned basis.

EM2 Environmental Monitoring

The developer shall establish and implement an environmental monitoring programme as part of the EMS. This programme shall include such surveys, sampling, analysis and measurements as set out in Conditions W6, AQ3, N3, and V4. Monitoring and analysis equipment shall be operated and maintained as necessary so that monitoring results accurately reflects the emission or discharge. The frequency, methods and scope of monitoring, as set out in the conditions attached to this permission may be amended with the written agreement of the planning authority, pending review of the monitoring results.

Reason: To ensure compliance with the requirements of other conditions attached to this permission.