Planning Advice Note: Pan 50 Annex C

CONTROLLING THE ENVIRONMENTAL EFFECTS OF SURFACE MINERAL WORKINGS
Annex C: The Control of Traffic at Surface Mineral Workings
December 1998

Introduction

Purpose

1. The aim of this Annex to PAN50 ` Controlling the Environmental Effects of SurfaceMineral Workings` is to provide advice on how the planning system can be used to manage traffic associated with surface mineral workings within environmentally acceptable limits. The Annex is based on the DETR commissioned research by Entec UK Ltd, The Environmental Impact of Traffic Associated with Mineral Workings, published by The Stationery Office 1998 [ISBN 0-11-753476-5].

2. The Government recognises that traffic from mineral workings can have a significant impact on the environment and the quality of life of communities and seeks to ensure that levels are kept to the minimum practicable level consistent with good environmental practice and the efficient and economic working of sites.

Background

3. Mineral traffic within Scotland employs several surface modes of transport. This includes movement by road vehicles, rail, coastal shipping, conveyor and off road vehicle. The impact of mineral traffic on local communities requires careful consideration by operators and the planning authority. Road vehicles carrying minerals, particularly on local roads, are among the heaviest and largest to use these roads. Concern about traffic arises regardless of the mineral extracted. Complaints arise from `intimidation` by large vehicles, danger due to very wide vehicles on narrow roads, damage to verges, dust, spillage, mud from wheels and body of vehicles, noise from early starts and early arrival at sites, vibration and congestion.

4. Most off-site traffic to and from a mineral working will consist of loaded vehicles travelling outwards and empty vehicles returning. Some vehicles returning to a mineral working may carry a return load of other minerals or other materials, for example waste material for tipping or a lorry returning to a crushed rock quarry carrying sand for use in the production of coated roadstone. Movement of heavy plant and equipment can be significant at some mineral workings.

5. In some cases value added products using the product from the mineral working may be made on site or in close proximity. These often include ready mix concrete and coated roadstone. Cement, plaster products, bricks, concrete blocks and tiles are other products whose manufacture is often closely associated with mineral workings.

6. For many minerals the low value of the product means that local supply has an advantage in the market because of lower transport costs. Road based deliveries up to a 50 kilometre radius from the point of extraction are the norm for local supplies. For higher value minerals, such as some energy minerals, industrial minerals and processed construction materials, the market will stand higher transport costs and, therefore, greater travel distances. Rail freight may well prove to be competitive with road, with rail advantage increasing with distance and bulk. Bulk shipment by sea has much lower costs on a tonne-kilometre basis.

Factors Affecting the Choice of Mode

7. Traffic associated with mineral workings may be on-site traffic within the boundary of the workings or off-site traffic, either involved in the operation of the workings or carrying mineral products to market. Specific factors affecting on-site traffic and off-site traffic are set out in Tables1 and 2.

8. Government policy seeks the use of rail transport wherever it is practicable. However, It is usually only high volume outputs to a single user or distribution point which justify use of rail. Deliveries to local markets within a region are generally undertaken by road.

TABLE 1: FACTORS INFLUENCING ON-SITE TRAFFIC

Factors	***Comments***
Size of the workings	The extent and layout of the working affects the distance over which mineral and other material needs to be transported
Type of working	Includes: • Underground or surface • deep or shallow • wet or dry
Nature of the Mineral	Includes: • wet or dry • abrasive or non-abrasive • liquid or solid
Processing	Includes: • processing required on-site • number of stages in processing • location of processing plant • nature of processing
Overburden	Whether overburden has to be moved and stored to gain access to the mineral including: • soil movements and storage • substrata movements and storage
Output level	Affects: • the volume of mineral or other material which needs to • be movedthe frequency of movements
Site geography	Such as: • topography • geology

	• groundwater • surface water • local climate

(Source: Entec)

TABLE 2: FACTORS INFLUENCING OFF-SITE TRAFFIC

Factors	***Comments***
Length of haul	Increased length of haul changes the balance of advantage between different modes of transport
Characteristics of the mineral including density and particle size	Affects the need for containment and the loading of vehicles
Any special handling Characteristics	Dust during handling is a key concern both for the environment and for health and safety; the need to maintain purity may be critical for some products
Value of theMineral	Transport costs are very critical where they represent a high proportion of the delivered price; this is the case for all low value minerals including most aggregates
Volume of material to each customer and market area	Increased volume and market concentration changes the balance of advantage between different modes of transport
Urgency and regularity of shipments	The customer may require specific volumes of mineral product at set times; construction projects often require large quantities, e.g. for road resurfacing, over a very short period. In contrast industrial users may require shipments at regular intervals
Frequency of movement and consignment size	Both change the balance of advantage between different modes of transport
Availability of	Making better use of existing infrastructure generally has a

Infrastructure	lower marginal cost than new construction
Scope for the use of transhipment depots	May enable the use of lower cost transport modes for longer distance trunk hauls
Characteristics of end users	Industrial users are more likely to be fixed in their location thus permitting investment in infrastructure. Construction users move from site to site and can only be served directly by non public road modes in limited circumstances
Intermediate processing needs	May require a break of journey, thus allowing alternative modes of transport to be used for the initial stage
Nature of processing at final destination	Requirements for mineral product in a particular form e.g. as slurry
Need for external inputs, such as fuel, and other minerals	Affects inward movements to the mineral working
The need for restoration	Traffic associated with restoration will include inputs of restoration materials, notably fill and topsoil, and plant and machinery movements

(Source: Entec)

The Regulatory Context

9. The environmental impacts and effects from traffic associated with mineral workings may be affected by the following regulatory controls:

- Town and country planning legislation which may be used to regulate those aspects of traffic which directly relate to land use activities, although planning legislation cannot be used directly to regulate traffic on public roads.
- Environmental controls on pollution under the Environment Acts and under nuisance legislation whose main focus is on impacts such as noise and dust from traffic within mineral workings.
- The licensing of goods vehicle operators under the Goods Vehicles legislation.
- Road traffic controls under the Roads legislation.
- Legislation for other modes of transport such as the Carriage of Goods at Sea Act and Railways legislation.
- Health and safety controls which focus on safety at work and the working practices adopted to minimise the risk of accidents.

on-site traffic within workings

10. On-site traffic within mineral workings can be divided into the following:

- overburden movements of soil and substrata required to expose the mineral and in subsequent restoration;
- mineral haulage to central processing or dispatch point;
- ancillary movements of personnel and materials.

Table3 summarises on-site traffic operations at mineral workings.

TABLE 3: ON-SITE TRAFFIC OPERATIONS AT MINERAL WORKINGS

On-Site Traffic Operation	***Presence at Mineral Working Types***	***Duration of Operations***	***Comment***
Overburden Movements - soil	All surface mineral workings on greenfield sites	Short - undertaken at the start of each new phase of mineral working and during restoration	Relatively significant where the mineral working is shallow e.g. most sand and gravel workings. Less significant where workings are deep and a long period of extraction follows initial soil stripping
Overburden Movements - substrata	Most higher value minerals including coal. Most aggregates production will not sustain significant movement of overburden although local market conditions and the type of aggregate concerned may dictate otherwise	Varies depending on the mineral working concerned but tends to be medium to long term	At opencast coal sites overburden movements take place throughout the life of the site from initial soil stripping until final resoiling and restoration.
Mineral haulage and load out	All mineral workings	Throughout the active life of the mineral working	Absent only during the initial development and final restoration stages of a mineral working
Ancillary traffic	All mineral workings	Throughout the active life of the mineral working	Personnel movements are not normally significant. Movements of fuel raise

			particular concerns

(Source: Entec)

Overburden Movements

11. Planning authorities normally require topsoil and subsoil to be removed and stored for subsequent use in site restoration. Traffic associated with soil stripping and restoration will normally be over short periods. Where development is phased, soil stripping will be required at the start of each phase. Topsoil in particular is valuable and it is essential to maintain the soil structure and avoid contamination with other mineral or overburden. Soils may be stockpiled or directly placed in areas previously worked for minerals and now under restoration. The latter has advantages in reducing double handling of material. Soils must be moved when they are reasonably dry to avoid damage to the soil structure through compaction and for ease of handling. Further advice on top soil and subsoil movement will be contained in the proposed PAN on Restoration.

12. Overburden from substrata is generally dealt with in a different manner to overburden soils. Substrata soils are less sensitive than topsoil or subsoil, but care is required in extraction and movement. Overburden from substrata volumes are often large and cost is a significant consideration. Overburden may be stored in temporary stockpiles and returned to the working following extraction. Where the mineral working is being progressively worked in phases, overburden removal from one phase may be placed directly in a previous phase. Overburden from the first phase of the working will need to be temporarily stockpiled for use in restoration of the final phase. The scale of overburden removal is dependent on the depth of the mineral resource; the greater the depth of the mineral resource, the greater the volume of overburden that must be removed. Removal of overburden from deep workings may involve traffic on steep gradients.

13. Large scale overburden removal is only viable for higher value minerals. Aggregates production will not support a substantial volume of overburden removal. In contrast some minerals, such as coal, are more valuable and can sustain higher volumes of overburden removal; opencast coal typically involves the removal of up to 15cubic metres of overburden for each cubic metre of coal won. Where the overburden contains other potentially valuable minerals (e.g. fire-clay), this layer or material should be stored separately and not mixed with general material.

14. On-site traffic from overburden removal can involve a range of methods using earthmoving and constructional equipment. Smaller scale workings tend to use standard equipment including bulldozers, hydraulic excavators, wheeled loaders, scrapers and dump trucks. Where material is moved over a short distance a single movement using a bulldozer, dragline, hydraulic excavator or wheeled loader may be possible. For longer movements a haul truck will normally be used with loading by hydraulic excavator, dragline, face shovel or wheeled loader. Alternatively scrapers may be used where overburden is sufficiently soft and friable to allow removal by a scraper blade. These have the advantage of speed and reduced handling costs. However they cannot be used where crushed rock is present.

15. Further advice on the dust aspects of soil stripping and overburden handling is contained in PAN 50 Annex B paragraphs 64 and 65 and will be discussed fully in the proposed PAN on restoration.

Mineral Haulage and Load Out

16. Extracted mineral is typically hauled to a central point within the mineral working for processing. Sometimes raw mineral will be taken to a remote location elsewhere for processing, a relatively common practice in sand and gravel extraction. Some minerals, particularly those used for low grade fill, can be used 'as dug' and are dispatched direct to the user.

17. The mode of transport used to transfer mineral from the point of extraction to the processing plant or load out point depends on:

- the volume of the mineral;
- the nature of the mineral e.g. solid/liquid;
- the dimension of individual pieces of the mineral following extraction;
- the haul distance;
- the gradient of the movement;
- factors peculiar to the type of working;
- any processing carried out at the mineral working.

18. The location of processing plant is critical to the generation of on-site traffic and location of plant close to the point of extraction reduces haul distances. A mobile crusher fed directly by face shovels and linked to a field conveyor which transports the mineral to the processing or stockpile area can be used at some workings to reduce the need for haul trucks to operate between the working face and the processing plant.

19. Dump trucks with a payload of around 100 tonnes are the largest operated in Scotland at present; their use is exceptional and confined to large scale operations such as opencast coal sites. Smaller two or three-axle vehicles, either all-wheel drive and articulated, or of simple two-wheel drive rigid construction, are more often used. Articulated dump trucks are generally vehicles with three axles. Payload varies considerably but these vehicles are generally more flexible than larger two axle rigid dump trucks. Where the quality of the haul road is good, normal road going lorries may be used for mineral haulage and this will be favoured where mineral is to be used 'as dug'.

20. Conveyors are widely used at all types of mineral workings and can be fixed conveyors or field conveyors. Fixed conveyors are not readily relocated while field conveyors are flexible and can readily be relocated or extended. Conveyors can be open, covered or fully enclosed. Conveyors may have limitations on their ability to manage gradients and the size of mineral that can be conveyed relative to the width of the conveyor belt. Crushing of some minerals may be required prior to conveyor transportation. Sand and gravel is generally easily carried by conveyor with the drop from 'load and carry' plant being sufficient to break up the material.

21. Rail is in widespread use at underground workings, such as coal. However, in many surface mineral workings the use of on-site standard gauge track and rolling stock to transport minerals has been replaced by the use of haul trucks. Small scale rail systems are still in use at some peat workings where the bearing capacity of the ground is low and conventional wheeled vehicles cannot be used.

22. Ancillary traffic includes the movement of maintenance vehicles, personnel movements and the movement of materials such as fuel and explosives. It will typically be composed of graders, water bowsers, four wheel drive vehicles and tractor hauled plant. These give rise to low potential for impacts as the scale of movement is small. However, where plant at the work face is fuelled and serviced in situ, concerns can arise with associated fuel and lubricant movements.

Environmental Impacts

23. The main environmental impacts of on-site traffic can be categorised as follows:

- leakage/spillage of fuel and other contaminants;
- dust raised by the passage of vehicles, wind blow or the loading of vehicles;
- noise from vehicle engines, wheels or bodywork, conveyors, material handling and warning signals;
- churning and compaction and their impact on site drainage.

24. Spillage may occur:

- when loads are insufficiently contained by the vehicle bodywork to avoid the load spilling during transport;
- where material is inadvertently dropped onto the vehicle bodywork outside the load compartment during loading and this material is subsequently spilled;
- where material is so wet when loaded that it drains through the vehicle body during transit, the drained water may contain fine particles of material in suspension;
- where material is spilled to the ground during loading;
- where turbulence around a moving vehicle is sufficient to raise dust from the load.

25. Airborne dust raised by the passage, or loading of vehicles can represent a substantial environmental impact. The accumulation of fine material on vehicle paths is very dependent on the nature of the ground. Vehicles may be operated on:

- bare ground which has not been treated in any way;
- haul roads which are roughly engineered and surfaced with crushed rock or other aggregate;
- haul roads and internal access roads which are surfaced with some form of sealed surface such as tarmac or concrete;

26. The greatest potential for the creation of dust through wheel action is by the operation of vehicles on bare ground particularly on light and friable soils. Topsoil and subsoil will generally fall into this category. The potential is reduced where the bare ground is composed of bedrock, such as igneous rock, which is not readily broken down. Where loose materials are used for surfacing the potential for dust is greater than with sealed surfaces. However, the potential for dust will generally be reduced where surfacing materials are composed of larger diameter material; thus a 10mm crushed rock surface will have less potential for dust than quarry scalpings. The strength of the material is also important; hard materials such as igneous rock and some sandstones are less likely to break down under the weight of traffic. Dust from rail systems is likely to be limited to that from the load and any dust on or adjoining the railway line.

27. Noise is a concern where haul roads and other operating areas are close to site boundaries or are in elevated positions. The impact of horns and reversing warning bleepers can be a particular nuisance as can the operation of a hard rock crusher. However, for on-site traffic operations, environmental concerns result from the cumulative effects of all impacts associated with a mineral working rather than the effects of a particular traffic operation in isolation; communities will be concerned about all noise created by the working, rather than noise from just mineral haulage traffic. In some situations the noise from processing activities will mask most, if not all, of the noise from the traffic. However, a processing plant may be located at the centre of a mineral working site, with any impact at the edge of the site attenuated by distance. In contrast, traffic is mobile and more likely to generate impact at the edge of the site where it is potentially more significant, e.g. to people living near the working.

28. Table 4 contains further information covering on-site logistical problems.

TABLE 4: UNDERSTANDING ON-SITE LOGISTICAL PROBLEMS

Questions	***Information Required***	***Importance***
What is the extent of the working?	• Overall area • Mineral reserves • Active mineral extraction area	• More extensive workings involve longer haul lengths and increase the scale of operations • The range of transport

	(current phase) • Worked out areas	solutions available may broaden with increased scale of operations
What is the character of the workings?	• Underground or surface • Deep or shallow • Wet or dry	• Underground workings present particularly difficult logistical problems • Deep workings may involve steep gradients and are worked over long periods; shallow workings tend to be short term and/or to move laterally, working each new phase over a short period • Wet workings may be worked from the bank or by dredging
What are the characteristics of the mineral or other material to be moved?	• Dry or wet • Liquid or solid • Other physical characteristics e.g. abrasive or non abrasive, hard and soft • Particle size and consistency • Density • Chemical characteristics e.g. corrosive, toxic or otherwise potentially harmful	• Liquids such as slurry can be piped • Particle size affects use of conveyors and haul truck load compartment needs • Abrasive, corrosive or potentially harmful materials may require special handling • Density affects vehicle loading
Are there any specific mineral extraction requirements?	• Bench height • Method of working • Phasing	• May dictate particular logistical solutions
Is the mineral processed on-site, and if so, how?	• The location of processing plant • The nature of mineral processing • The need for intermediate stockpiles	• Historic locations for processing plant rarely provide an optimal solution to logistical problems but may be difficult to change • Processing may include blending of raw minerals to meet mineral product specifications e.g. coal for electricity generation and coated roadstone to roads authority standards.
Is overburden	• Volume of	• Phasing to allow direct

removal and storage necessary?	overburden soils • Volume of overburden substrata • Location of stockpiles • Phasing of working	placement where possible is a key element in dealing with overburden movements • Cost of overburden removal may be critical to viability of working
What is the flow of mineral?	• Volume • Timing	• The requirements of processing plant are critical
How frequent are movements?	• Continuous • Regular • Intermittent • Campaign	• Continuous movements may permit use of fixed links • Regular movements can support investment in infrastructure • Intermittent movements will require flexibility • Campaign extraction may involve intense activity for a short period followed by no activity for a long period
What is the topography of the working?	• Gradient over which movement required	• Use of all on-site modes is affected by gradient

off-site traffic

29. Off-site traffic associated with mineral workings can be divided into:

- The transportation of mineral products from the mineral working to the customer. This includes the movement of added value products manufactured at the mineral working.
- Traffic bringing inputs to the mineral working, notably deliveries of fuel, lubricants and materials, such as bitumen, cement, sand and other materials for use in processing at the mineral working e.g. to produce coated roadstone, ready mixed concrete or cement, or in the manufacture of value added products such as bricks and blocks.
- Personnel movements.

30. The movement of mineral products is likely to be the dominant source of environmental concerns for off-site traffic at most mineral workings. The impact on local communities is also likely to be greatest from this aspect.

Mineral Product Traffic Between Mineral Workings and Markets

31. This includes the whole movement between mineral working and customer. It is useful to distinguish three stages:

- the initial stage of the movement between the mineral working and the strategic transport network e.g. over local roads;
- the main trunk haul stage on the strategic transport network;

- the final delivery stage to the customer, e.g. over local roads.

32. Not all movements will involve all stages. Local deliveries may not use the strategic transport network at all, but long distance deliveries will usually involve all three stages. All three stages of the movement may be undertaken on a single mode of transport but, particularly for longer distance movements, different modes of transport may be used for the initial stage and the main trunk haul and for final delivery. There are relatively few customers able to receive final deliveries other than by road. The main exceptions are:

- electricity generating stations with rail sidings or wharves equipped with unloading facilities;
- major construction sites with rail or water access;
- major industrial plants;
- major minerals distribution sites.

33. A wide range of factors influence modal choice, off-site movement by sea and rail are more likely to be viable where:

- the mineral workings are remote from the main markets both domestic and overseas;
- markets tend to be large single users, or concentrated in a specific geographical area.

Road

34. Road transport is the most common means of moving minerals for short and medium journeys, generally up to a 50 kilometre radius from the source. The predominant vehicle type used is the four-axle rigid tipper with a payload of around 20tonnes, although two and three-axle tippers are used for the delivery of smaller loads. For longer distance movements five-axle articulated tippers are more common with a payload of around 25tonnes. Tipper lorries are used for coal and some industrial minerals. The design of tipper bodies is normally specific to the load carried. Low density minerals tend to be carried in high sided tippers which can accommodate a greater volume of mineral. For industrial minerals, road transport tends to dominate particularly where volumes are small. Energy minerals, industrial minerals such as silica sand, and processed construction materials such as cement, are of higher value than aggregates and can bear the cost of transport over longer distances. Where mineral products are in the form of dry, free-running powders or granules they are suited to transport by bulk tanker. However, this form of transport requires that customers have bulk powder handling facilities and for small scale users the volumes may not justify the required investment.

Rail

35. For longer journeys, rail transport can bring lower costs and environmental benefits. If rail links are not present at one or both ends of the journey, then transhipment and onward delivery costs will tend to reduce any advantages. Rail operates on a trainload basis with trains carrying up to 3000tonnes in a single train on some lines although 1000tonnes or lower is more common. Industrial and energy minerals are moved to major customers by rail in significant quantities. This is typically where:

- movements are over a long distance;
- rail handling is available at both ends of the journey;
- volumes are sufficient to sustain trainload operations on a regular basis, generally at least once per week.

Movement by Conveyor or Cableway

36. Conveyors or cableways may be used where high volumes of material are moved over fixed routes; they are particularly appropriate where there is insufficient space for other modes and where barriers, such as roads and rivers, have to be crossed. Conveyors are used in the transportation of coal, common clay and shale, igneous rock, and sand and gravel. Conveyors are most commonly used for off-site transport where:

- a processing plant is located close to, but on a site separate from the mineral working itself, e.g. where sand and gravel deposits close to a processing plant are worked out and supplies need to be obtained further afield, and at mineral workings associated with cement works and plaster product plants;
- minerals need to be transferred to a railhead or quay, which is some distance from the working, for onward dispatch by rail, ship or barge;
- distances are short.

Deliveries of Inputs to the Mineral Working Site

37. These may include fuel, plant and machinery, inputs required for processing or for inclusion in added value products, waste material for tipping and further restoration material. Some mineral products require other material inputs in processing which are not found at the mineral working itself. Coated roadstone is typically made up of four main materials:

- crushed rock particles;
- sand/fine crushed rock;
- recycled road planings; and
- bitumen.

38. Where a coated roadstone plant is located at a crushed rock quarry, sand, recycled road planings and bitumen will be brought in. Fuel is a major input, particularly on sites where large quantities of overburden have to be moved. Lubricating oil is required in lesser amounts but can still be significant. Fuel and lubricants are a concern because of their potential to contaminate ground and water. Movements of plant and machinery may be relatively infrequent but will tend to involve low loader vehicles with wide loads. Most of the movements of inputs to mineral working sites are by road.

Personnel Movements

39. Movements of employees, outside contractors and visitors tend to be in cars and small commercial vehicles. The environmental impact of car movements to and from a mineral working can be significant at peak road traffic times. However, the environmental impacts of personnel movements will generally be less significant than movements of mineral products and inputs.

Environmental Impacts

40. The potential effects of off-site traffic appear to be the most significant environmental concerns of all those raised by traffic associated with mineral workings. Road traffic raises particular concerns given its presence on the public road where it mixes with pedestrians, cyclists, private cars and other road users, and in close proximity to other land users. While the environmental effects most frequently arise close to the mineral working, they may also arise much further away.

41. Off-site impacts can be categorised into spillage, noise from vehicles, and the more general community related impacts of traffic in the environment.

42. Off-site spillage from road vehicles will generally be to the public road and is likely to reduce with distance from the mineral working entrances. Spillage off-site will include mud and other material carried on to the public road by vehicles. Spillage will be influenced by the containment

offered by the road vehicle itself. Bulk tanker lorries carrying liquids and powders contain the mineral and are unlikely to result in spillage except in an accident or where a valve leaks. For tipper lorries, particular problems may occur where a mineral or material is less dense and the vehicle body can be overfilled with loose material which then spills.

43. A number of factors influence dust from the load itself. Where the material itself is not dusty, i.e. if it is wet, viscous or composed of large particle sizes, dust will be minimised or avoided altogether. Particular problems are likely where fine dry materials are exposed to wind. Exposure to wind can be reduced by protection such as the sides of the vehicle body rising above the load or enclosure of some form. However, this may increase impacts by creating strong localised air currents which disturb dust to a greater extent. For fixed links such as conveyors the height of the link above the ground may affect dust levels by increasing exposure to strong winds.

44. Where conveyors are used for off-site transport e.g. to a rail head or processing plant they may cross over public roads and footpaths. Spillage from the conveyor is possible, particularly where it is on a gradient and/or not enclosed. Overloading of a conveyor increases the potential for this impact. Maintenance issues such as vibration, belts with holes and dust emissions from transfer points require to be considered.

45.Where haul roads and internal access roads are surfaced with concrete or tarmac the potential for dust off-site is greatly reduced. On the public road the potential environmental significance of dust will be much greater because of the presence of other road users and of other land uses adjoining the road. Dust levels which are acceptable on-site are likely to be less acceptable on the public road. Dust from rail systems is likely to be limited to dust from the load and any dust lying on or adjoining the railway line. The action of a steel wheel on steel rails does not have the same potential for dust creation as the action of a tyre on a loose surfaced road.

Community Related Impacts

46. The presence of traffic on the road network results in a number of impacts which can be categorised as community related:

- Severance impacts where the flow of vehicles on a road divides a community. Severance may be created by the difficulty of crossing a busy road or by the physical barrier of the road itself. All road users including pedestrians, cyclists and motorists may be affected. The presence of a vehicle can also contribute to congestion and to delays for other road users.
- Road safety impacts where the presence of a vehicle results in increased road safety hazards for other road users.
- Amenity impacts including noise, intimidation and the visual impact of traffic.
- Physical damage, including the over-running of verges and pavements beside roads. On rural roads not designed for such vehicle traffic physical damage is more likely to occur where there are insufficient passing places, or passing places are not readily visible well in advance by approaching drivers.

47. The impacts will be particularly influenced by:

- driver behaviour;
- the quality of road infrastructure.

48. All the above factors are influenced by the number and frequency of lorry movements. Cumulative impact is an important issue because problems are exacerbated by the number of extraction sites in an area.

49. The main community related impacts of rail mineral transport is the visual impact of rail related infrastructure, light pollution in relation to rail-heads especially when 24 hour working is

involved, possible spillage and the effects of noise and vibration near rail lines, in particular from train movements at unsocial hours.

50. Table 5 contains further information covering off-site logistical problems.

TABLE 5: UNDERSTANDING OFF-SITE LOGISTICAL PROBLEMS

Questions	***Information Required***	***Importance***
What are the characteristics of the mineral product and is any special handling required?	• Dry or wet • Liquid or solid • Other physical characteristics e.g. abrasive or non abrasive • Particle size • Density • Chemical characteristics e.g. corrosive • Delivery temperature • Value of the product	• Many mineral products must be protected from the weather • Liquids such as slurry can be piped or carried in tanks • Particle size affects handling methods • Density affects vehicle loading • Abrasive or corrosive materials may require special handling • Some products, e.g. coated roadstone must be delivered warm • The value of the product will influence the viability of transport operations and the ability to carry higher transport costs
Where are the markets for the mineral product and how large are they?	• Distance to markets • Volume • Market concentration	• Distance to markets and volume will strongly influence transport solutions • Large volume markets, whether concentrated within a particular area or represented by a large single user, will influence transport solutions
What are the customers' needs?	• The urgency of shipments • Consignment size • Timing of deliveries • Stockpiling by customer	• Some end users, notably in construction, will require very large volumes with timing of delivery critical • Industrial users may require continuous flow to minimise stockpiling • Requirements may be seasonal, e.g. coal fired

		power stations have high burn during winter and stockpile at other times of year
How frequent are movement?	• Continuity of traffic • Regularity of traffic • Whether operations are intermittent or irregular, e.g. campaign movements	• Continuous movements may justify use of fixed links • Regular movements can support investment in infrastructure • Intermittent movements can require flexible transport solutions
Is any further processing needed?	• Intermediate processing needs • The nature of processing at final destination	• Processing may require mineral product in particular forms which may facilitate transport
Are external inputs to the mineral working significant?	• Externally sourced mineral and other inputs for incorporation in products • Plant and equipment movements • Fuel, lubricants, explosives and other mineral working inputs • Inputs to other activities, e.g. waste disposal, at the mineral working	• Scope for return loading of transport • Dimensions of plant and equipment affect access requirements • Some inputs, e.g. fuel and explosives, require special handling
Are personnel movements significant?	• Number of employees for mineral working • Number of employees for transport operation • Number of visits by external service personnel	• Generally small in scale and not a significant influence on the transport solution adopted

(Source: Entec)

Mitigation: good practice measures

50. There is a range of good practice measures which mineral operators can adopt to mitigate the environmental impacts of traffic associated with surface mineral workings. Planning authorities can require many of these to be implemented by means of planning conditions or through legal agreements, in accordance with SODD Circular 12/1996 and 4/1998. Where certain planning conditions or legal agreements have not been imposed, mineral operators will nevertheless wish to consider adopting this advice in order that they may conduct their operations in an environmentally acceptable manner.

Use of Alternative Modes of Transport for Mineral Products

52. The environmental effects of traffic associated with mineral workings may be reduced by the transfer of road freight to other modes. In overall terms the environmental effects of road transport are generally greater than those from other forms of transport notably rail transport. In particular the level of emissions to the atmosphere and the effects on other road users and land users adjoining roads are major environmental concerns both locally and at a global level.

53. The scope for the use of alternative modes will generally be more favourable where:

- Regular large volume deliveries are required to specific customers or particular locations.
- Flows are over a longer distance. Note that this may not be essential where the destination is the ultimate user of the mineral product, e.g. a power station or industrial plant.
- There is an existing rail line, minerals distribution depot or other infrastructure reasonably close to the mineral working. Conveyers have been used with good effect to connect mineral workings with railheads and wharf facilities.
- There is an existing siding or wharf facility which can be used as is or which can be adapted at reasonable cost.
- The road network is congested which increases lorry operating costs and reduces flexibility.

54. The Draft NPPG 4 Annex A: Land for Mineral Working, Opencast Coal and related Minerals (October 1998) states that proposals which provide for rail transport should be more favourably considered than road transport and that proposals which do not envisage rail transport should be accompanied by an explanation as to why it is not possible and the alternative arrangements to minimise impact on communities, this is an issue which it may be appropriate to consider as part of a supporting Transport Impact Assessment.

Transport Impact Assessment

55. A Transport Impact Assessment (TIA) is the key document for both the local roads authority and the trunk roads authority in explaining and quantifying the traffic and transport aspects of any proposed development. The preparation of a draft of a TIA at pre application submission stage is good practice and assists the local authority in assessing the transport implications of the proposal. A TIA should identify the traffic and transport impacts of a proposal and any required potential improvement measures at the site entrance, on the adjacent road network, and on lorry routing proposals to mitigate the impact of traffic generated from the development. A local authority would normally expect all such mitigation measures to be funded by the developer in advance of the proposed development coming into operation. A TIA should examine the wider transport implications and consider alternative modes of transport to road. Further advice on TIA preparation will be issued by The Scottish Office.

Lorry Routing

56. The specified routing of vehicles away from sensitive places including residential areas, schools, recreational areas as well as narrow country lanes and steep gradients may help to reduce

the effects of a wide range of impacts. Planning conditions and planning agreements are not appropriate means of controlling the right of passage over public roads. Where it is judged essential to prevent traffic from using particular routes, the appropriate mechanism for doing so is by means of an Order under section 1 of the Road Traffic Regulation Act 1984. Traffic Regulation Orders are not selective, in that they will restrict all traffic above a certain axle weight, not just mineral traffic. A planning authority may impose a suspensive (Grampian) condition making a mineral development contingent on the coming into effect of a Traffic Regulation Order. However, before imposing such a condition the planning authority would need to be sure that the limitations on the movements of heavy vehicles would not unacceptably affect other businesses or residents in the locality, and that those who might be affected have been given an opportunity to make representations on this possible consequence of the planning application.

57. Voluntary routing agreements between the planning authority and operators are difficult to monitor and cannot be enforced. However, if operators are concerned about their reputation and have long term plans to continue operations in a particular area they will often do their best to ensure that drivers adhere to the agreed routes.

58. Physical measures, for example, the design of the site access angled such that vehicles are prevented from turning in a particular direction, or the erection of signs clearly stating the direction to be taken by vehicles on leaving the site may help to ensure drivers adhere to a voluntary routing agreement or traffic regulation order. The design of a site access and the erection of signs to restrict turning may be included as conditions of planning permission. Care needs to be taken that visibility splays for exiting vehicles are not compromised. Details of a routing agreement should be clearly specified and distributed to each driver. Sealed plastic cards are an effective way of doing this.

59. If there is serious doubt whether local roads can accommodate such increase in heavy traffic as the proposed development is likely to generate, then, unless improvements are made or there is convincing evidence that control of traffic is feasible, planning permission may have to be refused.

New Road Links and Improvements

60. A planning authority may decide that road links or improvements are required to make a mineral working proposal acceptable in land use planning terms. New road links and improvements may include:

- new links to provide more direct access to a mineral working;
- bypasses to existing towns and villages;
- major realignment and improvement of existing roads;
- smaller scale junction improvements;
- traffic management measures including traffic calming.

61. The consideration of any new road links or improvements should be undertaken with the relevant local or trunk road authority. Where new road links or improvements are thought necessary a planning authority may attach a condition to planning permission or enter into a planning agreement. A condition may require the provision or improvement of a service road or means of access even if such works are not included in the application, provided that they can be undertaken on the site in respect of which the application is made, or on other land which is under the control of the applicant, and relates to the proposed development.

62. Private haul roads can be used to keep heavy lorries off public roads thus reducing conflict with other traffic, including pedestrians and cyclists, avoiding environmentally sensitive areas, and residential areas. Private haul roads may either provide access to the road network at a suitable point, or link directly to railheads, processing plants or mineral distribution depots. Some mineral operators have negotiated with landowners and planning authorities to use forest roads or abandoned rail lines for private haul roads.

63. The construction of private haul roads and their subsequent use may affect other people and environmental resources in the countryside through which they pass. Appraisal of the potential effects is necessary to ensure that there is a net environmental benefit from the proposed road.

Landscape Works

64. At an early stage in the design of a site and throughout the life of a site, detailed consideration should be given to using landscape works to reduce the effects of traffic impact from spillage, vehicle operations, link infrastructure and fixed facilities.

65. Every effort should be made to try and integrate the development into the local surroundings. Maximum use should be made of existing landscape features such as woodlands, shelter belts and hedges which can act as ready made screens. Trees and shrubs of appropriate native species which harmonise with the surrounding landscape should be used to screen vehicle parking, sheeting bays, storage and loading areas, plant and machinery, accommodation and other fixed facilities, particularly when such areas are located close to potentially sensitive neighbours. There is evidence that dense planting of trees and shrubs can reduce pollution concentrations. Where appropriate a condition could require tree and shrub planting well in advance of development taking place, to enable establishment of an effective screen.

66. Tree planting is only one aspect of minimising the impacts of noise and dust. Careful consideration needs to be given to the design of man-made landscape features. A mound or bund may become a visual intrusion if it is poorly designed or out of character with the landscape. A scheme of landscaping should be submitted and approved by the planning authority. The scheme should include consideration of landscape maintenance needs.

67. Headlights from vehicular traffic and site lighting may cause significant visual intrusion for those living nearby. Artificial lighting should only be used when necessary. The light should be directed downwards into the site to illuminate the working area. The potential for nuisance to residents from vehicle headlights at night should be considered and landscaping works designed to screen sensitive areas.

Design, Location and Operation of Conveyors and Cableways

68. The design and location of conveyors should be carefully considered in order to avoid impact arising from dust and spillage. Some conveyor and cableway installations may be permitted development and will only require planning permission where these rights have been removed by direction or condition.

69. Conveyors and cableways should be routed away from residential property and other sensitive land uses. Dust and spillage of material from conveyors may be reduced by some form of wet suppression (usually water sprays) at conveyor discharge points. The operation of wet suppression may be initiated in a variety of ways including load detectors, timing devices or manual operation. Dust may be reduced by minimising the height of fall between the conveyor discharge points and stockpiles. Covering or enclosing conveyors may reduce the creation of dust or potential for spillage, especially if the conveyor is elevated above ground and/or on a gradient. The use of wide concave belts and installation of wind boards may also be effective.

70. Screening or painting the conveyor cover in an appropriate colour may help to reduce visual impact. Where a conveyor is positioned at ground level and covers some distance across the countryside it should be carefully located to minimise its visual impact on the surrounding landscape, for example close to field boundaries or along the edge of woodland. Where conveyors intersect public roads including public footpaths it is generally preferable for the conveyor to go under the road rather than over. This avoids the need for unsightly structures including provision for catching any spillage from the conveyor. Where conveyors or cableways must cross rivers, public roads, footpaths and railways, the safety of the structure will need to satisfy the relevant responsible authority.

Design, Location and Maintenance of Internal Haul Routes

71. The environmental impacts of the design and location of internal haul routes should be considered in detail during the initial design stages of a proposed mineral working. The objective is to minimise as far as practicable the potential environmental impacts associated with vehicle operations and fixed link infrastructures. Ideally haul roads should take the shortest practical route and be sited away from environmentally sensitive resources within the site and sensitive land uses adjoining the site, e.g. residential development. Roads routed to avoid punctuating the skyline and contained within the quarry rim will assist in minimising the potential visual impact. Routes can be screened from sensitive areas, preferably by mature vegetation, or alternatively by grassed bunds/mounds. Route selection may be affected by ease of access to the mineral and the need to recover all available mineral on site. It may also be a compromise between the most direct route and a route which reduces gradients thus minimising the need for vehicles to be driven in a low gear at high revs.

72. The design of the phasing of larger schemes should take account of the need to integrate restoration and landscaping of earlier phases with the routing of well defined roads in later phases. If done skilfully, such design can avoid physical damage to landscaped areas, while providing opportunities to mitigate the impact of haul roads in later phases and to allow for permanent access for agricultural or other suitable use on completion of restoration.

73. Roads surfaced with quarry sourced materials will generally be the least conspicuous. However, this may not be practicable where the mineral is weak and prone to rapid disintegration under the weight of the haul trucks. A large proportion of fine material is likely to lead to dust generation in dry weather and slippery conditions in wet weather. The most common wearing course material for haul roads is compacted gravel or crushed stone which has low rolling resistance, which reduces the possibility of tyre damage, and a high coefficient of adhesion, which is less likely to lead to the creation of dust.

74. Maintenance of site roads is essential in order to help reduce the potential environmental impacts felt through noise, vibration, spillage or dust. In particular an operator must ensure that mud and other material is not carried onto the public road from the site. The site entrance, weighbridge and lorry load out access roads and other permanent site roads should be surfaced and kerbed as well as adequately drained. Roads and areas of hard standing with kerbs are more easily kept clean and prevent material from being tracked onto surfaces where it could form a dust source. Kerbs also allow better management of site drainage.

75. A vacuum road sweeper or other machine may be used to clear up any spillage of material or accumulations of dust on-site and off-site in the vicinity of the site entrance. There is a need to ensure that a slow moving road sweeper does not itself create a road safety hazard on the public road, and that water films left by road sweepers do not ice over and create hazards to drivers in winter months. Pot holes should be filled in and worn areas of road repaired to minimise the creation of airborne dust and noise from on-site vehicular traffic.

76. A water bowser may be used on-site to damp down internal haul roads and surfaced access roads. An operator must ensure that there is an adequate supply of water and that there is the ability to apply the required quantity of water to maintain the control of dust under all conditions, particularly dry windy conditions. Operators should carry out an assessment of water requirements based upon:

- peak potential evaporation rates;
- maximum area requiring control, i.e. width and length of site roads;
- allowance of three times the calculated quantity, in order to compensate for run off and uneven application.

77. From the above the necessary full time and stand-by bowser fleet may be calculated, taking into consideration bowser capacity, delivery rate and cycle time. Adequate manpower must be available.

78. Where there is sufficient water available on-site static water spray systems can be installed adjacent to permanent site roads. The condition of site roads should be monitored on a daily basis to ensure that spillages and other debris are removed as quickly as possible.

79. Runoff management and the works necessary to protect the aquatic environment should be considered in consultation with SEPA. Further advice on surface water will be contained in the proposed PAN 50 Annex on groundwater and surface water.

Design of Site Entrance

80. Careful design of the site entrance is important in order to minimise road safety hazards and congestion. The design of the site access should be discussed and agreed with the road authority at the proposal stage and this is an issue which it may be appropriate to consider as part of the supporting TIA. The design should be compatible with any lorry routing agreements. The type of junction layout will be determined by traffic flows and the speed of traffic on the main road. Conditions should ensure that the access is constructed and suitably surfaced before the rest of the development proceeds. Road signs warning motorists of a quarry entrance may be appropriate as a safety measure. The possible erection of such signs should be discussed with the relevant roads authority.

81. The design of a site access to prevent lorry movements in certain directions requires careful consideration. There may be a temptation for lorry drivers to ignore voluntary routing instructions or to circumvent access design restrictions by carrying out manoeuvres which may be hazardous to other public road users. Site access design to direct traffic in a particular direction is only appropriate: where regulations are in place to reinforce the direction; or where the alternative direction does not offer time, distance or some other saving to make it attractive to lorry drivers.

On-site parking

82. The provision of an on-site lorry parking area is relatively common at mineral workings. Its main environmental benefit is to minimise the noise, vibration, congestion, road safety hazards and general disturbance to local people from lorries queuing outside the mineral working. On-site parking allows regular hauliers to leave their lorries on-site overnight and use other forms of transport to travel to and from the site. The parking areas should have hard surfacing to minimise the risk of mud and other debris being carried onto the public road; be properly drained via oil interceptors where there is a risk of surface or groundwater pollution; be well landscaped where visible from outside the site; and be positioned away from local communities.

Fuel and Lubricant Storage and Handling

83. The safe storage and handling of fuel and lubricant is essential to ensure that impacts associated with spillage of fuel and lubricant do not arise. Spillage of fuel used by petrol and diesel engines can impact on ground and surface water as well as being a potential fire hazard. Petrol poses the greater fire risk but is less likely to contaminate ground because it evaporates. It is unlikely to be used in mineral workings except in light commercial vehicles. Diesel is a lesser fire risk but is more likely to contaminate ground and water resources. It is an offence to discharge or otherwise cause or permit the entry of polluting matter into controlled or other waters.

84. In order to minimise the potential for spillage, fuel and oil should be stored in secure tanks positioned within a well landscaped, bunded area, the floors and walls of which should be impervious to both water and oil. The bund should be capable of containing at least 110percent of the maximum capacity of the largest tank within the bund. Lubricants are generally supplied in 45 gallon drums; both full and empty drums should be stored in a bund area. There should be no drain-holes or valves from the bund and uncontaminated rain water from un-roofed bunds should be emptied by pumping. Filler points to the tanks should be contained within the bunded area and should vent downwards into the bund. All delivery hoses and nozzles should be secured within the confines of the bund when not in use. Consideration should be given to the provision of roofing over a bund to minimise the accumulation of surface water within the area from rainfall, which may become contaminated. No part of a fuel storage area should be within 10metres of any surface water features. Oil interceptors should be designed into roads and hardstandings. A copy

of the Operator's Code of Practice for refuelling and emergency plans should be clearly displayed in the site office.

85. A condition of planning permission may require that the best practicable means shall be adopted to ensure that there is no leakage of oils or other pollutants to the quarry floor, to adjoining land or to adjoining water courses; to minimise risk of pollution of land, ground water and surface water. Further advice on minimising pollution can be obtained from SEPA.

Noise Level Limits

Limits on permitted noise levels may be imposed as a condition of planning permission in order to protect local residents from noise arising from vehicle operations on-site, although it is not practical to apply these limits specifically to traffic noise. Planning applications should be accompanied by background and proposed noise surveys, particularly if an Environmental Assessment is involved. Ways of minimising noise levels from traffic should be considered during the design stage of a new site or extension to an existing site as well as during the operating life of a site. Noise levels on-site may be the subject of a planning condition which specifies a maximum level of noise which must not be exceeded at certain noise sensitive locations surrounding the site, or at the site boundary. The noise limits imposed should also have regard to the particular environment of the site and in particular the likely background noise level.

Acoustic Barriers and Screening Mounds

The construction of acoustic barriers and screening mounds may be imposed as a condition of planning permission to protect local residents from traffic operational impacts on-site. The construction of screening mounds or bunds from soil or overburden may be effective in reducing noise levels. However, the construction of such mounds can be one of the noisiest activities on-site. Local residents should be made aware that high levels of noise will only last for a short period of time and will result in longer term benefits. Acoustic fencing and buildings e.g. a site office, may also be effective in reducing noise levels. The effectiveness of a mound or bund for noise control is dependent upon the degree of screening achieved, i.e. whether the source of noise is visible. The effectiveness of any barrier is increased if it is located close to the source of noise or close to the noise sensitive location. The design and siting of bunds is also important in terms of their effect on the landscape and the avoidance of a `dust bowl` effect.

Audible Warning Signals

88. Audible warning systems generated by vehicle operations on-site can be a key noise nuisance to neighbours of mineral workings. The use of bleepers is an important health and safety measure to warn personnel of reversing vehicles. The use of directional alarms, warblers, infra red sensors, flashing beacons, radar equipment or cameras is now a legal requirement in many circumstances and may allow for some re-examination of the noise level of bleepers. A traffic routing scheme which minimises reversing should be used on-site whenever possible in order to help reduce the noise impact from bleepers associated with reversing vehicles and to improve safety on-site.

89. The most significant source of noise from conveyors is usually from warning sirens which are a health and safety measure to warn personnel that a conveyor is about to start operating. A reduction in the level of noise from warning sirens may be appropriate in some circumstances, although they should at all times remain at a level which allows personnel and others in the vicinity of the conveyor to hear the noise. The type of siren and their direction away from noise sensitive neighbours may also help minimise the effects of noise. Further advice specifically on the control of noise at surface mineral workings is contained in PAN 50 Annex A.

Renewal and Maintenance of Vehicles and Plant

90. Well maintained vehicles can make a significant contribution towards minimising impacts associated with vehicle operations both on-site and off-site. Regular maintenance of all mobile plant on-site is effective in reducing noise generated by worn parts. Rubber linings and suspension systems should be fitted to all vehicles, chutes and hoppers. Fitting of worn conveyor belting to chutes and hoppers is a cheap and effective means of noise control. Maintenance areas should be surfaced with concrete or other such hard surfacing to prevent any possibility of ground water

contamination from spilled oil and other fluids during maintenance work. Major maintenance in working areas should be avoided and minor maintenance should be covered in the operator's code of practice.

Vehicle Wheel and Body Cleaning

91. Wheel and body cleaning facilities allow for removal of potential spillage material from road vehicles before they leave the site, thus reducing the chance of material being spilled or carried onto the road. Mud deposited on roads by quarry traffic may be dealt with under roads legislation. However, prevention of environmental danger at source is preferable to action through the courts after the event.

92. The need for cleaning can generally be avoided where road use vehicles are kept on hard surfaced roads and spillage to the bodywork during loading is avoided. However at some sites, particularly those where extraction takes place over a short period, it may be difficult to justify the capital expenditure on hard surfaced roads and permanent loading facilities. In determining what type of facility to install, consideration should be given to the number and frequency of vehicles leaving the site, the surfacing of the loading area, the method of loading, water supply and drainage, space availability, type of material to be removed, flexibility of use, cost and site characteristics and conditions.

93. At sites with high traffic flows, queues may arise as drivers wait to use a wheel spinner or all vehicle washing unit, causing delay to drivers and discouraging drivers from using the facility. In such circumstances high pressure water jets positioned at the side of the exit road may be more appropriate. Where water jets are used the exit road should be designed such that it slopes away from the public road to ensure that the dirty water drains into the site rather than on to the public road. Cleaning facilities should be positioned well before the site exit (minimum 100m) to enable any residual mud and other debris to fall from the vehicle body and wheels within the site boundary rather than onto the public road. Long-term mineral operations require a range of cleaning measures for vehicles. At short-term operations it may be sufficient to hose down vehicles and brush off debris before the vehicle emerges from the site onto the public road. In the interests of public safety and amenity, a condition of planning permission can require that no commercial vehicles shall enter the public road unless their wheels and chassis have been cleaned to prevent material being deposited on to the road.

Sheeting

94. Sheeting of loaded road vehicles and rail wagons should be carried out where there is a risk of spillage and dust arising from the load. Almost all finely crushed mineral will require sheeting. A possible exception to this is wet sand. Provided this will remain wet throughout the journey and provided the sand is well below the top of the bodywork, there is minimal risk of spillage or of sand blowing from the load.

95. Sheeting systems may be either manual or automatic. Automatic sheeting systems are, on the whole, the most effective way of sheeting loads and are suitable for most loads including coated roadstone products. They may also offer savings in fuel consumption as they can be used when travelling empty to reduce turbulence and wind resistance. Automatic systems are often safer than manual sheeting systems as they can be operated from ground level, without the driver having to climb on to the vehicle. Automatic systems may be seen as the best solution, however, the initial cost will be greater than a manual sheeting system and the maximum payload will be slightly reduced. Automatic sheeting systems will be particularly appropriate where:

- vehicles are making a large number of short haul trips in a day requiring them to sheet and unsheet the vehicle frequently; and
- safe facilities for manual sheeting are not available.

96. When manual sheeting is in operation it is important to provide sufficient sheeting bay capacity to ensure that the total throughput of vehicles can be safely sheeted without causing delays. Ensuring that vehicles are not loaded above their legal carrying capacity and are properly trimmed

before sheeting will assist in minimising the potential for spillage from the vehicle during transit. Spot checks should be carried out by an operator to ensure that road haulage vehicles are trimmed and properly sheeted before leaving the site. At large sites CCTV cameras installed at the site exit can be used to monitor loads on leaving the site as well as helping in improving site security. A less expensive measure is the erection of a sign at the site exit reminding drivers of their responsibility to adequately sheet loads before leaving the site.

Restriction on Hours of Operation/Production Limits

97. Restrictions on the hours of traffic operations may be imposed as a condition of planning permission in order to protect local residents from impacts both on and off site including those from noise, vibration, congestion and road safety.

98. Careful consideration should be given to the actual times of the restriction. Often working is restricted at night and at weekends, bank holidays and public holidays. There is pressure on the minerals industry to provide material at night and at weekends for roadworks. An authority must decide whether working is generally allowed, to enable operators to supply weekend and night contracts, or whether it requires a separate approval for each and every night time/weekend working. Authorities may consider the different phases and types of operation on site such as extraction and load out operations separately and restrict the hours of each operation accordingly. In deciding what conditions are appropriate it should be remembered that it is not the hours of working themselves that may affect the local community, rather it is the environmental impacts associated with the working, including those related to traffic. Restricting working hours may not in itself minimise environmental impacts, particularly if production is intensified during the shortened working period. Longer working hours, including 24 hour working may be acceptable where the location of the site and/or other conditions can ensure that local residents do not suffer.

99. In some circumstances it may be appropriate to limit the rate of output from the site through a planning agreement, involving the keeping of a log of all vehicles crossing an exit weighbridge. More specifically, where alternative transport modes exist, limiting the amount of output dispatched by road should be considered. Such an agreement may be imposed in order to preclude substantial increases in traffic in the future.

Siting of Activities within Mineral Workings

100. Siting of activities should be carefully considered during the initial design stages of a proposed mineral working in order to minimise potential environmental impacts from traffic operations. An essential first step in considering the siting of activities is identifying the communities and environmental resources which are likely to be sensitive to environmental impacts.

101. Long term transport activities, such as lorry loading areas, should avoid locations close to the site boundary where potentially sensitive neighbours are present. Those activities likely to give rise to noise and other disturbances should be sited within areas which are screened from view by landscaping and enclosed with acoustic barriers such as bunds and fencing. Tips and stockpiles should be sited away and down wind from potentially sensitive neighbours in order to minimise effects from dust. The positioning of the materials handling area, including lorry load out facilities as well as vehicle parking and sheeting bays away from potentially sensitive neighbours is helpful in reducing the effects of noise.

102. A condition of planning permission may require the agreement of the planning authority before any machinery buildings, structures and erections or private ways are erected, extended, installed or replaced on-site. This can be used to ensure that these facilities, and the activities associated with them, are located to minimise effects on amenity.

Site Management and Monitoring

103. Effective site management by the operator and a responsible attitude by contractors, especially contract hauliers, are essential in ensuring that potential environmental impacts from traffic do not affect communities and environmental resources. On-site traffic management for vehicles should be one of the main areas to be dealt with in the site management plan. It can

include detailed measures for the control of traffic including one way systems, speed limits - which may vary depending on weather and surface conditions, priority at junctions, special protection for environmentally sensitive areas, standards for materials handling and adequate measures for the disposal of vehicle related waste such as tyres, obsolete machinery and oil. The management plan should also include any necessary measures to protect on-site features such as wall, trees, and buildings.

104 Codes of Practice are a useful way of informing employees and contractors about appropriate methods of working and of illustrating a responsible attitude to the general public. Codes of Practice should be written in sufficient detail to be of use rather than being used as a marketing/promotional leaflet. Each site manager should maintain a written record of all breaches of codes of practice, remedial action undertaken and representations from members of public and action taken as part of the implementation process. Site entrance notices should display at least a contact name and telephone number for enquiries from members of the general public. Site liaison provides a forum for operators to meet local residents and businesses as well as regulatory bodies and discuss problems, concerns and remedial actions.

development plans

105. One of the functions of development plans is to provide guidance to mineral developers on the appropriate development control criteria that will be used in determining planning applications for mineral development. Structure plans set out this guidance in general terms, and local plans should set out this guidance in greater detail. NPPG 4 : Land for Mineral Working gives further advice on the minerals content of development plans.

106. In drawing up development plans, planning authorities will wish to consider the advice in this Annex on the steps that might reasonably be taken to control traffic and in particularly to formulate the overall longer term transportation strategy for mineral extraction in the plan area.

implementation and review

107. This Annex provides a basic framework for the consideration of traffic aspects of surface mineral development proposals and for the monitoring and control of operations.

108. The Annex has been based on information currently available. It may need updating in the future to reflect changes in technology and environmental standards, and in the light of any future relevant research findings.

note

109. Enquiries about this Annex to PAN50 should be addressed to Ben Train, The Scottish Office, Planning Services Division, Room 2H, Victoria Quay, Edinburgh, EH6 6QQ (0131 244 7532) or by e-mail to ben.train@scotland.gov.uk. Further copies, together with other PANs, NPPGs and a list of current advice and guidelines, may be obtained by telephoning 0131 244 7066. A copy of this PAN Annex is also available on The Scottish Office web site at www.scotland.gov.uk

glossary of terms

Bowser: A tank used for fuelling vehicles or for supplying water.

Dragline: A type of excavator which has a bucket attached by wire to a long light boom or jib. The bucket excavates material by being dragged along the surface towards the machine, before being lifted into the air and loaded. Draglines usually dig below the level on which they stand.

Face shovel: An excavator which digs away from itself into a bank or face with a toothed bucket fixed to a rigid arm supported by a boom; its crude action provides powerful digging force.

Grader: A machine used for the final surfacing and repairing of haul roads.

Hopper: A vessel into which materials are fed, usually constructed in the form of an inverted pyramid or cone terminated in any opening through which the materials are discharged.

"Load and carry" movements: Movements which involve picking up material from the ground or a stockpile and discharging to a haul truck, conveyor feeder or other mode of transport or to processing plant e.g. mobile crushers/screens.

Overburden: Material, whether consolidated or not, which has to be removed before a mineral can be worked.

Scraper: A load-haul-dump machine in which the bowl is towed behind a tractor unit, fills by a planing action, hauls the spoil to the dump site and empties by means of an internal ejector blade pushing forward. Used in soft ground or in ground that fragments well after ripping or blasting.

Water bowser: Equipment incorporating a water tank used to spray a fine mist of 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

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