Environmental Impacts of Quarrying, Mining and Dredging

Teacher notes – Worksheet with suggested discussion points

Where the worksheet fits in

This worksheet is intended to compliment A level studies on the use of mineral resources and the associated environmental impacts of quarrying, mining and dredging. It provides students with the opportunity to undertake their own research, to gain a wider understanding of the impacts, and to give consideration to the significance of different environmental impacts related to quarrying, mining and dredging. There are also opportunities for students to develop their citizenship skills.

Curriculum links

Environmental Science

AQA Environmental Science, A/S Module 2 – The lithosphere 11.3 Mineral resources: Environmental impacts of mining, quarrying and dredging.

Geography

Edexcel Geography (B), A2 Unit 5 – Researching global futures Part1 Managing natural environments, Option 5.1 Environment and resources: What are the environmental impacts of resource exploitation?

OCR Geography (B), A2 Module 2692 – Issues in Sustainable development

Introduction

As essential industries in today's environmentally aware society, it is vital that quarrying, mining and dredging operations ensure that they achieve the best possible environmental management of their activities. Poor environmental management within the industry results not only in non-compliance of legislation, which includes heavy fines, but also in poor public relations, loss of business, and loss and destruction of wildlife and habitats. Good environmental management in the industry can result in good publicity and public relations, increase in business, and the creation of habitats for a variety species, including endangered species and specialist habitats.

Understanding the essential role of the extractive industry and its contribution to society is an important part of the education process. It is equally important to recognise and increase understanding of the industries environmental impacts, both negative and positive, and understand management techniques to both mitigate in the former and enhance in the latter.

Learning outcomes

Students will:

- Have an understanding of the environmental impacts related to the human activities
- Be able to list some of the potential environmental impacts of the various quarrying, mining, and dredging activities
- Learn to evaluate the significance of environmental impacts
- Understand that impacts can be both positive or negative
- Have an understanding of the mechanisms used to minimise environmental impacts

- Develop personal research skills
- Develop group working skills
- Communicate clearly the results of their research and explain its significance
- Contribute to discussions
- Develop problem solving skills

Suggestions for use

This worksheet can be used to coincide with specific case studies of a particular mineral or metal extraction, or using the extractive industry generally. Students can research the topic areas individually or as part of group work to be completed as homework or during class time. During class time, individuals can form a number of small groups, each assigned one of the activities related to quarrying, mining or dredging, and discuss what they have found during their research and then the whole class could rejoin to discuss each activity.

Resource links

General environmental impacts and management of quarrying

Good Quarry www.goodquarry.com

Quarry Products Association www.qpa.org/env_pla.htm

Legislation and policy

www.bgs.ac.uk/mineralsuk/planning/legislation/home.html

Waste

Sustainable Aggregates Information Service www.aggregain.org.uk/

The UK government's Waste and Resource Action Programme www.wrap.org.uk/

EIA and biodiversity

British Geological Survey www.bgs.ac.uk/mineralsuk/environment/home.html

Dredging

British Marine Aggregate Producers Association www.bmapa.org/index.htm

Environmental Impacts Of Quarrying, Mining And Dredging

Quarrying/Mining/ Dredging Activities	Potential Impacts	Significance Of Impact	Ways To Minimise Impacts
The removal of top and sub-soil to access the required resource underneath the earth	• Loss of organic rich soil and the forms of life it contains • Loss of wildlife – land without top and sub-soil is less capable of sustaining life • Barren land after quarry operations have ceased if the land is not restored with soil	• The impact of removing soil is negative • The effect is direct • The effect is temporary if the soil is stored for use in the sites restoration. The effect could be potentially permanent if the soil is not returned. • The effect is immediate • The duration of impact is for the duration of quarry operation, and is usually low in frequency	• Legislation – permission for extraction sites usually require the strategy for the movement of soils to be drawn up before permission is granted during the planning process, unless restoration is to commercial or domestic development. The need for progressive restoration is usually stressed in planning conditions. • Good practice - Soil is stored for use in the sites restoration. - Correct storage of soil – plan for the prevention of: contamination during storage (weeds, seeds); compaction during operations at site (toxic, anaerobic)

Environmental Impacts Of Quarrying, Mining And Dredging

Quarrying/Mining/ Dredging Activities	Potential Impacts	Significance Of Impact	Ways To Minimise Impacts
The mechanical handling of minerals	• Dust emission • Fumes Nuisance • Dust deposition on surrounding properties and land (nuisance dust may be described as the coarse fraction of airborne particulates, typically greater than about 20 μm) Ecology • Physical effects of stomata damage and blockage, resulting in drought stress • Chemical effects of dust either directly on the plant surface or on the soil (change in soil chemistry) Health • Increase in particulate concentration - open cast coal mining is associated with a small increase in the mean concentration of airborne particles measured as PM_{10} but this is not thought to have any effect on health. It is also not thought that health has been affected around	The significance of the impact of dust emission will depend upon: • Size of dust particles • Chemistry of dust particles (highly alkaline, inert or acidic) • Meteorological conditions (dry windy conditions causing greatest impact) • The size of the area affected • The amount of dust deposited Generally: • The impact of dust emission is negative • The impact can be both direct and indirect on the immediate and surrounding environment • The effect is temporary for the duration of the site operation • The effect is immediate • The duration of the impact is for the duration of site operations • The frequency of impact is variable, depending upon the cause, e.g. blasting twice per week or once per month or daily for plant operations	• Prevent the dust becoming airborne to begin with. • Legislation – Dust is assessed and regularly monitored under the planning regulations and the Integrated Pollution Prevention and Control (**IPPC**) regime. Planning conditions require that sites consider the likelihood of dust emission before permission is granted. An Environmental Impact Assessment (**EIA)** is used as a tool to identify potential effects/sensitive areas and identify ways of minimising any adverse effects. • Good practice – Monitoring – active monitoring devices for occupational health and safety methods, and passive monitoring devices for a broader approach, including for nuisance effects – An Environmental Management System (**EMS)** is encouraged for the effective ongoing assessment of impacts, such as the Eco-Management and Audit Scheme (EMAS) or ISO14001. – Dust assessment survey resulting in dust action plan – 4 stages: 1) Establish existing baseline conditions; 2) Identify site activities that could lead to dust emission without mitigation;

The mechanical handling of minerals continued.	working quarries		3) Identify site parameters which may increase potential impacts from dust; 4) Recommend mitigation measures and site design modifications – Site design/working methods Site design – - Placing dust generating activities where maximum protection can be obtained from topography, woodland or other features; locating dust generating activities where prevailing winds will blow dust away from residential properties/sensitive premises/ users; minimising the need to transport and handle materials by placing adequate storage facilities close to processing areas. Working methods – - Consideration of weather conditions when operating; - Soil handling and storage (sealed and seeded as soon as possible); - Blasting (use of filters and application of water to area); - Exposed material (using voids and topographic features to protect); - Loading/unloading (lowering drop height, water mist spray, use of screen); - Transport by vehicles (low speed limits, water sprays, clean roads); - Use of covered storage for material sized less than 3mm with side enclosure on 3 sides taking account of prevailing wind direction.

Environmental Impacts Of Quarrying, Mining And Dredging

Quarrying/Mining/ Dredging Activities	Potential Impacts	Significance Of Impact	Ways To Minimise Impacts
Removal of a wild area for site operations	• Loss of species and habitat – if area is not restored for wildlife. Through: • The physical removal of habitats and wildlife • The alteration to existing habitat (e.g. creation of soil storage mounds, creation of barriers, fragmentation of habitats, changes in numbers to predator/prey, introduction of new habitats/species) • The removal of wildlife and habitats in the surrounding area (due to loss/reduction of species bank, removal of keystone species) • Enhancement of species and habitat – if site is restored for wildlife	• Impacts can be negative (if site is not carefully restored for wildlife) or positive (if carefully restored with enhanced wildlife, possible more biodiverse than original) • The effect can be immediate and direct (the physical removal of species and habitats), but may also have delayed and indirect effect (knock on effect on surrounding species and habitats) • Impact can be temporary or permanent, depending on the after use of the site, i.e. whether it is restored for wildlife enhancement. • The duration of the impact may be for the duration of site operations, if the site is restored, or for a longer period if it is not, until natural succession takes over, or possibly permanent if the land is removed of all soil, although this case is rare in today's operations. • The frequency of impact is usually low.	• Legislation – There are numerous legislative and planning policy instruments, including: **Legislative** – National Parks and Access to the Countryside Act (1949); Wildlife and Countryside Act (1981); Town and Country Planning Act (1990); The Town and Country Planning (EIA) (England and Wales) Regulations (1999); The Environment Act (1995); The Badgers Act (1992); Conservation (Natural Habitats and c.) Regulations (1994). **Planning** – UK Biodiversity Action Plan (1994); Local Biodiversity Action Plans; Biodiversity: UK Steering Group Report (1995 - all volumes); PPS 9 Nature Conservation and Biodiversity (2004-Consultation); PPS 11 Regional Spatial Strategies (2004). – Ecological Impact assessments (**EIA**) are required as part of the planning process, which has2 purposes: 1) To demonstrate that a proposed development will meet the legal requirement relating to species 2) To determine the significance of impacts affecting valued species and habitats.

Removal of a wild area for site operations			• Good practice – Identify and design measures to mitigate and compensate for negative impacts, and also measures to achieve positive enhancement. **Alternative Sites** should be considered wherever possible to avoid any impacts in the first place. **Protection of existing habitat** during the lifetime of the mineral extraction will act as a refuge ensuring ensure that existing habitats and wildlife will continue to thrive **Habitat creation** is possible both during site restoration and during the operational period of the site, providing opportunities for the enhancement of wildlife and habitats. **Translocation of features** that can be physically lifted and moved is an option, although there are many failures with translocation. **Consideration of neighbouring habitats** to avoid negative impacts of them. Make designs for mitigation an iterative process involving the mineral developer/operator, the planning authority and the ecological consultant If best practice for dust, water and noise are followed, any negative impacts to existing wildlife and habitats should be minimised.

Environmental Impacts Of Quarrying, Mining And Dredging

Quarrying/Mining/ Dredging Activities	Potential Impacts	Significance Of Impact	Ways To Minimise Impacts
The use of mobile plant equipment and a processing plant	• Dust/fumes - **Discussed under mechanical handling of minerals** • Noise – audible Nuisance – Intermittent noise (high frequency such as whistles and shrieks) – Noise significantly above the usual background level – Noise during non-working hours that causes disturbance Bad community relations with surrounding community. Disturbance to wildlife in the immediate area.	• The impact of dust emission and noise is generally negative • The effect can be direct, in the immediate area, and indirect, affecting the surrounding area, particularly in unfavourable weather conditions. • The effect is temporary for the duration of site operations. • The effect is immediate • The frequency of effect is usually on a daily basis but can be variable depending upon the cause.	• Legislation – Planning conditions set by the Mineral Planning Authorities (**MPAs)** usually impose limits upon the sound pressure level (dBA) generated at the works boundary or at the nearest sensitive area (e.g. housing). Mineral Planning Policy 2 (published by the **ODPM**) provides guidance to both operators and **MPAs** on the content of noise related planning conditions. Planning conditions usually set limits on noise level – noise should not exceed 55dBA during the day and 42dBA at night at a noise sensitive site; the noise generated by the operation should not increase the sound level by more than 10dBA above the existing background level in a sensitive area. Using **BAT** (Best Available Techniques) Pollution Prevention and Control Act 1999. • Good practice – Maintenance of equipment to ensure quieter running – Construction of noise screening bunds or barriers and planting trees at boundary – Replacement of equipment with modern quieter designs

The use of mobile plant equipment and a processing plant continued.			– Silencers fitted to mobile plant (exhaust and air intake fans) – Use of sound insulation enclosing noise generating equipment (e.g. around processing plant) – Noise monitors should be used to ensure controls are effective, especially in sensitive areas

Environmental Impacts Of Quarrying, Mining And Dredging

Quarrying/Mining/ Dredging Activities	Potential Impacts	Significance Of Impact	Ways To Minimise Impacts
Blasting to fracture or fragment the rock mass to enable excavation	• Dust emission – **Discussed under mechanical handling of minerals** • Noise/vibration – – Audible noise – **Discussed under the use of mobile plant equipment and a processing plant** – Ground vibration – Overpressure (pressure waves that travel through air from a blast) – Flyrock (fragments of rock propelled into the air by explosions) Possible structural or cosmetic damage, but more often fear of damage and/or nuisance. • Fumes – Toxic and non-toxic fumes resulting from explosives used for blasting *NB.* The need for, and therefore impact of, blasting varies significantly between the types of mineral being worked. – Sand, gravel, clay and peat workings rarely need blasting.	• The impacts resulting from blasting can be positive, although effects are usually the fear of impacts, damage and/or nuisance rather than actual impact, structural or cosmetic damage. • The effect is both direct and indirect, as pressure waves travel through the air into surrounding areas. • The effect is temporary for the duration of site operations. • The effect is immediate. • The frequency of impact is variable, depending upon how often blasting operations take place.	• Legislation – Under the **Quarries Regulations, 1999**, a written specification must be prepared for each blasting operation to ensure, so far as is reasonably practicable, that when blasting occurs it will not give rise to danger. • The **MPA** specifies planning conditions relating to blasting, such as setting ground vibration limits, restrictions on time and frequency, and control of blasting practice. • Good practice – Avoid blasting in adverse weather conditions. – Good communication with community, including warnings of blasting activity, window cleaning, structural surveys for houses within a specified distance. – Use alternative methods to blasting if viable (which is also in the operators financials interests). – Careful blast design to minimise the impacts of flyrock and overpressure, (also requirement of Quarries Regulations 1999) including appropriate burden, the correct setting out and drilling of blasts, correct charging and stemming to help control flyrock, overpressure and ground vibration. – To minimise vibration impacts, undertake

Blasting to fracture or fragment the rock mass to enable excavation continued	– Opencast coal workings usually only need to loosen the material so most of the energy stays in the ground. – Hard rock quarries however need to loosen, fragment and move away material from the quarry face, for this more energy is lost in air so overpressure is likely to be greater.		test blasts before blasting to monitor effects. – Careful mixing of explosives if site mixed.

Environmental Impacts Of Quarrying, Mining And Dredging

Quarrying/Mining/ Dredging Activities	Potential Impacts	Significance Of Impact	Ways To Minimise Impacts
The production of mineral waste	• Visual – especially when waste is dumped off site and piled high • Dust – large **overburden** dumps, and if allowed to dry out, silt from settling ponds, can be a source of dust. • Water – pollution/turbidity/ toxicity – run off from wastes can carry sediment that can potentially contaminate the water environment and cause erosion. *NB.* - Mineral waste can be considered as either temporary (material that is backfilled or used within the excavation) or permanent (material that is dumped outside the excavation not to be used) waste. The impact significance of the former depends on whether it becomes a nuisance before it is used, and the latter depends upon how much is produced. - The amount of waste produced varies between the types of minerals being worked.	• Impacts from the production of mineral waste can be both negative and positive. • The effect can is both direct and indirect. • If good practice is adhered to, the negative effects are temporary and the positive effects are permanent. • The effects are both immediate and delayed, e.g. possible contamination if good practice is not adhered to. • The durations of impacts will be for the duration of site operations, and potentially after also if good practice is not adhered to. • The frequency of the impacts is variable depending up on the scale of site operations.	It is important to recognise that operators are always keen to minimise the amount of mineral waste they produce as material that is dug and not used is wasting time and money. • Legislation – Aggregate Levy (HM Revenue and Customs) is a new environmental tax on the commercial exploitation of aggregate in the United Kingdom, which came into effect 1st April 2002. • aims to bring about environmental benefits by making the price of aggregates better reflect these costs • encourages the use of alternative materials such as recycled materials and certain waste products Part of the Aggregate Levy revenues are used in the Aggregate Levy Sustainability Fund (ALSF), which is used to fund projects that address the environmental and social costs of aggregate extraction by delivering environmental improvements, minimising the demand for primary aggregates and reducing the local effects of aggregate extraction. • Good practice – - Minimise the production of waste – good

The production of mineral waste continued.	Sand and gravel workings do not produce much permanent waste. Hard rock workings vary in the amount of waste they produce. Slate quarries can produce a large amount of waste material. China clay workings produce a high level of permanent waste, and their sand tips can have visual impacts and stability problems.		planning - Use of waste as part of progressive restoration and landscaping wherever possible - Store top and sub- soil correctly for future use – discussed under the removal of top and sub-soil to access the required resource underneath the earth - Keep waste out of sight within workings, ensuring that contamination is encased - New uses for mineral waste - Recycling of aggregates to reduce demand for primary aggregates

Environmental Impacts Of Quarrying, Mining And Dredging

Quarrying/Mining/ Dredging Activities	Potential Impacts	Significance Of Impact	Ways To Minimise Impacts
Change in/removal of land use	• Loss/change of amenity – Disamenities – loss of facilities, familiar landscape and potential lowering of house prices – Severance (discontinuity) – loss or change to footpaths, roads, recreational facilities resulting in longer journeys and increased distance • Conflicts with existing land use • Bad relations with surrounding community • Aesthetic problems – visual impacts • Creation of new/improved amenity/land use, e.g. enhancement of biodiversity	• Impacts of land use change are generally negative, if good practice is adhered to, as mineral extraction as a land use is only a temporary land use. Positive impacts are more often the result, e.g. new/improved amenities, enhanced biodiversity. • Effects can be direct and indirect, e.g. loss of wildlife in the immediate area may affect the wildlife in the surrounding area. • The effects are temporary as land can be restored to former use, or returned as a new amenity. • The effects can be immediate and delayed. • The effects can last for the duration of site operations and potentially after operations cease depending up on the land use. Although positive impacts of enhanced biodiversity can be seen during site operations. • The frequency of impact is low.	• Legislation – Planning regulations – **the mineral planning authorities (MPA)** follow guidelines by the government in the form of national and regional guides and strategies. – Permission is refused for site development where adverse effects on the local community, environmental damage or loss of amenity cannot be kept to an acceptable minimum – Government policy requires greater consultation and involvement with the community during planning and the mineral planning authority (MPA) must prepare a 'statement of community involvement'. – The MPA are required to consult with local communities, a long list of named statutory consultees (DEFRA, Environment agency and similar bodies) and with local voluntary conservation and environmental groups • Good practice – Ensure good communication between the operator and public at the start of the site; Complaints should always be recorded, dealt with promptly and followed up. – Establish regular liaison meetings with local residents

Change in/removal of land use continued.			– Warn nearby residents of any unexpected activity likely to cause complaints (e.g. unscheduled blasting) – Arrange ‘open days’ for community – Use of topography of a site to prevent direct line of sight into quarry workings. – Screening the operation by the erection of bunds, tree planting and hedgerow maintenance. – Restore visible areas where extraction is complete as soon as possible – Restore land to former land use after site operations cease, or create new land use/amenity, in consultation with local community and consultees.

Environmental Impacts Of Quarrying, Mining And Dredging

Quarrying/Mining/ Dredging Activities	Potential Impacts	Significance Of Impact	Ways To Minimise Impacts
Physical presence of excavation site upon the water environment	• Disturbance or removal of surface water features • Excavation dewatering (excavations extending down into the saturated zone will inevitably fill up with water and it is necessary to lower the water level by dewatering the excavation, commonly pumping from a sump) - Loss of groundwater resources from the saturated zone (below water table). - Drying up of abstraction wells (wells from which water is taken for a specific purpose). - Reduction of water in surface features, including streams, lakes, wetland areas, etc. - Change in groundwater flow paths causing: - Possible contamination from external sources - Possible saline intrusion - Subsidence and settlement caused by falling groundwater levels and induced flows. • Contamination - Contamination of surface and ground water by suspended	• Impacts on the water environment from the physical presence of an excavation site can be negative in effect if good practice is not adhered to. • The effects are both direct and indirect. • The effects can be permanent and temporary, depending up on type of impact. • The effects can be immediate and delayed, depending up on the type of impact. • The duration of the impact will be for the duration of site operations and potentially after working operations cease. • The frequency of impacts is low.	• Legislation – The Environment Agency (EA), the water regulatory body for England and Wales, is responsible for protecting the water environment, through setting conditions that implement the European Water Framework Directive (2000). Legislation requirements include: - The requirement of a trade effluent license to discharge effluent to a sewer. - The requirement of wastewater discharge consent to discharge effluent into watercourses and coastal waters. - To cause or knowingly permit a pollutant to be discharged into a watercourse is a criminal offence. - The requirement of an EA license to be held by the occupier of the land for water abstraction in England and Wales. - The planning process plays an important complimentary role to legislation controlling activities on land, including land use and development that could affect the water environment. • Good practice Good planning – - Consult with EA about any possible

Physical presence of excavation site upon the water environment continued.	sediment (turbidity – can result in clogging of filter feeders, reduction of light) - Pollution from natural contaminants, including acid rock drainage. - Pollution from the working of previously contaminated land. - Contamination from fuels, oils and solvents. - Contamination from industrial processes within the site.		water environment issues. - Locate the operation so as to avoid disturbance wherever possible. If avoidance is not possible: - Replace surface waters features and disturbed water dependent species - Limit depth of excavation to limit loss of groundwater resources - Construct new abstraction wells or deepen existing ones if measures are not sufficient to prevent the drying up. To avoid contamination: - Careful design of surface drainage within a site - Use of settling lagoons for suspended solids - Use of vegetated channels and reed beds for dealing with heavy metal contaminants absorbed into suspended sediment particles - Capping of spoil heaps (rock, clay, soil or synthetic material) to minimise infiltration of rainwater. - Appropriate water treatment works - Careful material handling and storage - Staff training and provision of information - Emergency measures and contingency plans

Environmental Impacts Of Quarrying, Mining And Dredging

Quarrying/Mining/ Dredging Activities	Potential Impacts	Significance Of Impact	Ways To Minimise Impacts
Haulage of extracted resource	• Noise – Discussed under the use of mobile plant equipment and a processing plant • Severance (discontinuity) – a busy road through a community may effectively divide the community in two. • Dust/Fumes – An increase in heavy goods vehicles in rural areas can increase the levels of exhaust fumes, dust, and dirt. Discussed more under mechanical handling of minerals • Accidents – Pedestrians may feel intimidated by heavy goods vehicles on a previously quiet road • Bad relations with surrounding community	• Impacts from the haulage of extracted mineral resource can be positive if good practice is not adhered to, but generally otherwise negative. Usually the effects are a fear of nuisance/disruptive rather than actual nuisance. • The effects can be direct and indirect. • The effects are temporary for the duration of the site operations. • The effects are immediate. • The duration of impacts is for the duration of site operations. • The frequency of impacts is variable but typically on a daily basis.	• Legislation – Alternative transport is an important stage of the planning conditions. Typical planning conditions include: – Limits upon number of vehicle movements – Sheet lorries to prevent spillage – Use of wheel wash to prevent dirt being carried onto the road – Limits upon times of first and last deliveries – Parking restrictions on public roads – Special attention to the location and design of the junction of the access road with the public road • Good practice – Ensure good communication between the operator and public at the start of the site; Complaints should always be recorded, dealt with promptly and followed up. – Establish regular liaison meetings with local residents – 'Code of conduct' for drivers, to drive safely and courteously, to adhere to planning conditions, and to maintain their vehicles in a clean and roadworthy condition. – Discipline procedures for drivers who do not observe the 'code of conduct'.

Environmental Impacts Of Quarrying, Mining And Dredging

Quarrying/Mining/ Dredging Activities	Potential Impacts	Significance Of Impact	Ways To Minimise Impacts
The removal of marine aggregates by dredging	• Disturbance to marine life • Physical removal of habitats • Noise • Sedimentation • Coastal erosion (although no evidence of coastal impact due directly to dredging) • Conflict with fishermen • Damage to marine archaeology	• The impact of marine aggregate dredging is positive. • The impact is not thought to be permanent – the area of seabed dredged begins recolonisation almost immediately and within 2-5 years the seabed is biologically similar. • The effects are mainly direct, confined to the area being dredged, although noise and sedimentation arising from the dredging activities may potentially affect the surrounding areas. • The effects are immediate, and if the area does not recolonise there may also be delayed effects. • The duration of impact will be for the duration of dredging activity and the time following until the seabed had returned to its former habitat.	• Legislation – the marine aggregates industry is licensed by the Crown Estate (owners of minerals rights to the seabed around the UK). – Planning approval is required from the Department of the Environment, Transport and the Regions. Applications include a wide variety of environmental studies, including coastal processes, fisheries, marine archaeology and biology. Conditions are commonly attached including regular environmental monitoring and zoning to restrict the area dredged at any one time. • Good practice – – Ensure good communication between the fishing and dredging industries. – Continuous research into the effects of dredging on coastal processes. – Adhere to the code of practice relating to the mapping of the seabed prior to dredging in order to establish the positions of any wrecks and debris and the potential for submerged prehistoric landscapes. – Continuous research into the effects of dredging on marine life.

Environmental Impacts Of Quarrying, Mining And Dredging

Student worksheet

Environmental Impacts Of Quarrying, Mining And Dredging

1) Research mining, quarrying and dredging activities
   Links: www.goodquarry.com; www.qpa.org; www.bgs.ac.uk/mineralsuk; www.aggregain.org.uk; www.wrap.org.uk; www.bmapa.org)
2) Think about how and why these activities may cause environmental impacts. Consider the significance of the impact: whether the impact is negative or positive, whether the effects are direct or indirect, permanent or temporary, immediate or delayed in effect, and the duration or frequency of the impact
3) How do mining/quarrying operations minimise these impacts? Can you think of any other ways of minimising impacts?

Quarrying/Mining/ Dredging Activities	Potential Impacts	Significance Of Impact	Ways To Minimise Impacts
The removal of top and sub-soil to access the required resource underneath the earth			

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The mechanical handling of minerals			

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Removal of wild area for site operations			

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Quarrying/Mining/ Dredging Activities	Potential Impacts	Significance Of Impact	Ways To Minimise Impacts
The use of mobile plant equipment and a processing plant			

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Quarrying/Mining/ Dredging Activities	Potential Impacts	Significance Of Impact	Ways To Minimise Impacts
Blasting to fracture or fragment the rock mass to enable excavation			

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Quarrying/Mining/ Dredging Activities	Potential Impacts	Significance Of Impact	Ways To Minimise Impacts
The production of mineral waste			

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Quarrying/Mining/ Dredging Activities	Potential Impacts	Significance Of Impact	Ways To Minimise Impacts
Change in/removal of land use			

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Quarrying/Mining/ Dredging Activities	Potential Impacts	Significance Of Impact	Ways To Minimise Impacts
Physical presence of excavation site upon the water environment			

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Haulage of extracted resource			

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