



PROCESS DESCRIPTION

This guideline covers the extraction of stone, sand and gravel by quarrying and by the extraction of sand and gravel from rivers and offshore sandbanks (coastal and marine extraction).

Quarrying involves the removal of the desired rock from “beds” or seams relatively near the surface by means of an open pit. These pits often occupy a large area of land for excavation of the rock and disposal of waste rock.

Quarrying and Dredging operations mainly include

- Blasting and/or simple excavation and extraction. In dredging operations, excavation consists of dislodgement and removal of sediments (soils/overburden) and/or rocks from the bed of the water body. The dredger is used to excavate the material either mechanically, hydraulically or by combined action;
- Dimension stone extracted for more decorative purposes is potentially separated and shaped by more precise and delicate techniques, such as diamond wire saws, diamond belt saws, burners (jet-piercers), or light and selective blasting with weak explosive;
- Sorting, crushing and screening to ensure that the appropriate grade and size of material is collected;
- Primary processing (washing, separation by flotation);
- Deposition of waste materials;

- Transport of raw materials around the site (by conveyors, trucks and other vehicles) to stockpiles storage areas. In dredging operations, transport is generally achieved by:
 - Self-contained hoppers of the dredgers;
 - Barges;
 - Pumping through pipelines;
 - Using natural forces such as waves and currents.
- Loading to off-site transportation vehicle (road/rail/ship or barge)

Quarrying

The impacts of Open Cast Mining are covered in detail in the guidance of the same name (and should be referred to for guidance on land-based operations) and are only summarised here.

The operation of a quarry begins with stripping the soil and subsoil above the bedrock known as the overburden. Generally, soils are removed in phases to allow vegetation and groundcover to remain intact as long as possible, which minimizes the environmental impacts of the scheme, such as for example, soil erosion and dust impacts, visual intrusion and potentially noise.

This is then

- Used to create noise attenuation bunds;
- Used directly to achieve progressive and final rehabilitation;
- Stored on site for future rehabilitation needs.

Dewatering may be required to keep the quarry clear of water. This water may require treatment prior to discharge.



Coastal & Marine Extraction

Extraction of sand and gravel from beaches and offshore areas yields an inexpensive source of sand and gravel for construction or industrial uses. This may result in negative impacts on adjacent coastal areas: extraction from shallow areas may modify near shore wave conditions, affect erosion and deposition rates, and alter seafloor habitats and near shore circulation.

River Extraction

River gravels are clean, relatively well sorted, easy to extract and require little processing, but their extraction creates a range of potential issues and impacts including:

- Modified river form;
- Increased rates of channel incision and bank erosion, causing damage to structures such as bridges due to reduction in sediment supply;
- Increased turbidity/poor water quality: re-suspension of sediments. Nutrients and heavy metal pollutants can also be made available for uptake by plants and animals;
- Altered sediment composition with adverse impacts on biological diversity;
- Reduction in biological diversity.

Extraction techniques include “bar scalping”; dry-pits; wet-pits; bar excavation; in stream gravel, sand or “bed load traps”; channel-wide in stream mining; and floodplain and terrace pit mining.

KEY ENVIRONMENTAL, HEALTH AND SAFETY RISK/LIABILITY ISSUES

Water Use & Quality

Quarries can use large quantities of water for processing and dust suppression. Abstraction at high volume is likely to require licensing from government authorities (either at the local, regional or national level or indeed both).

Mine operations may cause major degradation of water resources either by drawdown of groundwater levels leading to the drying up of wells, diversion or damming of surface watercourses, and contamination of waters by uncontrolled site discharges.

Lowering of the water table may affect supplies of water to industrial abstractors of groundwater and sensitive environments such as rivers and wetlands.

Groundwater rebound (rising groundwater levels) may result from the cessation of pumping operations when mining operations cease leading to discharge of potentially contaminated mine-water at the surface. Such water may be acidic in nature and contain high concentrations of dissolved metals which may cause harm .

Storm water from operations must be carefully managed to:

- Minimise run-off;
- Avoid erosion of exposed ground surfaces;
- Avoid sedimentation of drainage systems;
- Minimise exposure of polluted areas to stormwater;
- Separate clean and dirty water.

The river and marine excavation may disturb pollutants such as heavy metals and nutrients



causing contamination making these available for uptake by plants and animals.

Quarry Wastes

Large quantities of soil and overburden or waste rock may need to be removed to expose the underlying rock/mineral to be extracted. This overburden should be stored in pre-planned designated areas such as “earth bunds”, and designed to be safe according to the geotechnical properties of the material. Overburden material should be used as infill during mine progression. Topsoil must be stored separately from overburden for future site rehabilitation.

Tailings are the materials left over after the process of separating the wanted from the unwanted material. Environmental impacts include sedimentation of drainage networks and dust;

Disposal of quarry tailings in rivers, lakes, lagoons or shallow marine areas is not an acceptable practice.

Land Use

The land area required for the open pit excavation, dumping of waste materials external to the pit itself and other surface infrastructure such as buildings, roads, construction camps, towns and access corridors could destroy surface features of economic, cultural and nature conservation value.

Consultation with key stakeholders will be required to understand any conflicting land use requirements, the communities’ dependency on natural resources and any conservation requirements.

Nature Conservation/Archaeology

Development of quarries and mines in areas of environmental or cultural significance eg national parks or sites of archaeological significance may generate public opposition and adverse press coverage

Biodiversity

Quarrying and dredging operations will lead to the direct destruction of the immediate habitat and may cause consequential alteration or degradation of surrounding habitats through changes to the hydrological regime, reduced sedimentation causing greater erosion and deposition of disturbed fine sediment or increased sedimentation causing a “smothering” of habitat.

Habitat alteration should be minimised to the extent feasible and critical habitats must be protected and preserved. The implementation of a Biodiversity Action Plan and biodiversity “offset” or development projects may be required by the regulatory authorities.

Dust & Suspended Sediment

Mining operations create large amounts of dust that can be hazardous to health when inhaled. Occupational asthma is common in the mining industry.

Dust is generated in mining and extraction by:

- Blasting;
- Excavation;
- Moving equipment;
- Traffic on unsealed roadways;
- Loading and unloading operations;
- Stockpile stacking;
- Land reclamation operations;



- “Beneficiation” (crushing, grinding, compaction and drying).

Dust can be controlled by regular watering with mobile water trucks or fixed sprinkler systems. Otherwise, where water is limited, surface binding agents, the sealing of heavily used access ways and the covering of stockpiles should be implemented.

Extraction from rivers and marine areas re-suspends fine sediment, causing destruction of sea grass meadows, coral reefs and other important habitats. Gravel washing also generates fines sediment (“fines”, that is extremely small particulates of mud, silt, sand, etc) which are allowed to settle in pits, usually an old gravel pit. If not contained adequately, these can contribute fine sediments to the river channel. Once a pit is filled, it can act as fine sediment plug in the floodplain which may be eroded by subsequent channel migration releasing concentrated fine sediments into the channel.

Collision

Large vehicles and moving equipment is core to the operation of a mining operation. Accidents with vehicles colliding with people are a common occurrence both within the perimeter of the mine and on access roads.

Hazardous Materials

Typically, heavy equipment will be diesel powered and substantial quantities may be stored on site/on board together with lubricating/hydraulic oils, solvents, paints and other hazardous substances. Typical storage facilities include above ground storage tanks and drums of assorted compounds.

Spills of hazardous materials from equipment in the water during river and offshore extraction may be more serious because of the exposure of aquatic organisms and potential contamination of water supplies.

Fire & Explosion

The storage and use of explosives creates safety risks.

Permitting Requirements

- In Europe, the Espoo Convention¹ provides a region-wide framework for environmental impacts assessments (EIAs) of projects that may have transboundary effects. EIAs undertaken as part of obtaining consent may be required to meet this standard.
- The Baltic Marine Environment Protection Commission (HELCOM) has adopted a Recommendation with guidelines according to which EIAs should be undertaken in all cases before a license for extraction is issued.
- The OSPAR Commission has developed a Strategy on the Protection and Conservation of Ecosystems and Biological Diversity of the Maritime Area, which includes sand and gravel extraction.
- Within the EU, the screening criteria for determining whether an EIA must be conducted before an opencast mine can be opened are set nationally. However, these generally require an EIA for all developments except new small-scale ancillary buildings. Similar requirements will exist in non-EU countries. Because of the potential extent of

¹ UNECE



environmental and social impact, and the requirement for consultation, the process of gaining planning permission in some circumstances may take several years.

- The Mining Waste Directive (2006/21/EC) specifies a number of requirements to ensure protection of the environment and human health, depending on the risks posed by the type of waste. Operators are required to provide a waste management plan for the minimisation, treatment, recovery and disposal for all extractive waste regulated by the directive.
- Some opencast mining operations may be or may have been associated with backfilling with waste materials. The operation may need an additional permit or the existing permit may need to cover both mining and waste management activities.

Geotechnical Stability

All structures such as open pits, waste dumps, tailing dams and containment facilities should be planned, designed and operated to minimise the risk of landslides, rock falls, face slumping or land collapse. These structures must be managed during the mine or quarry lifecycle to protect health, safety and the environment as the geotechnical properties will change as the material weathers. Additional levels of safety should be applied in active seismic areas and those exposed to extreme weather events. Systematic monitoring and review of geotechnical stability data is required.

OTHER ENVIRONMENTAL, HEALTH AND SAFETY RISK/LIABILITY ISSUES

Manual Handling

Many injuries from mining are associated with handling, lifting and carrying heavy or unconventional shaped objects.

Trips and Falls

Slips, trips and falls are regular occurrences in the mining industry and result in many injuries. Typically, these are because of uneven ground and poor housekeeping.

Security

There are security and safety liabilities associated with access to the site and especially with the storage of explosives used in quarries.

Electrical Hazards

High voltage electrical supplies may be required to operate machinery such as crushers, conveyors and screening equipment.

Noise & Vibration

Noise and vibration will be generated by drilling and blasting operations, from excavation activities, loading and unloading of rock, crushing and conveying operations, and vehicle movements may reach levels that are hazardous to health. Careful control of blasting is required to reduce noise and vibration. Blasts should be timed to minimise noise and vibration disturbance.

Hand-arm vibration comes from the use of hand-held power tools and is the cause of significant ill health (painful and disabling



disorders of the blood vessels, nerves, joints and muscles of the hands and arms).

Good occupational health systems are required to monitor and control employee exposure to vibration.

The noise of gravel extraction and processing operations may affect holding, feeding, or migratory behaviour of fish or other species.

Extreme Weather

Workers are typically outside in a quarry, river or offshore site and are susceptible to variations in weather: i.e. sun, extreme heat and cold, wind, rain etc.

Remote Site Health

Extraction operations may be located in extremely remote areas with little or no access to emergency or general medical services. A programme of illness prevention through education, sanitation measures and vector² control should be adopted.

KEY SOCIAL, LABOUR AND COMMUNITY RISK/LIABILITY ISSUES

Human Rights, Local Communities & Indigenous Peoples

Rural communities and indigenous peoples often lack legal title to their lands, even though they may have occupied the same lands for many generations. Consequently, they may be vulnerable to eviction when a mining or quarry lease is granted, and the eviction may be

imposed without prior consultation, meaningful compensation, or the offer of equivalent lands elsewhere. These are human rights violations and are not acceptable practice.

Those that remain may experience a loss of revenue due to the environmental damage to the resources on which they rely, e.g. fishing grounds, water or loss of traditional livelihoods. Where resettlement takes place, companies need to ensure that living standards are not diminished, that community and social ties are preserved, and that they provide fair compensation for loss of assets and economic opportunity among others.

Roles and responsibilities for ensuring the long-term well-being of resettled communities need to be defined and monitored. Meaningful community participation in projects" is required through consultation to obtain "free, prior, informed consent" for all operations which may impact communities.

Effects on fisheries

Extractive industries may cause loss of fishing through

- Physical destruction of fishing grounds through mining/dredging;
- Increased turbidity ("cloudiness" of water). As a result of sedimentation, destruction of sea grass meadows, coral reefs and other essential habitats;
- Loss of important spawning or nursing ground areas for fish.

² A vector is an organism that does not cause disease itself but serves as a transmission route conveying pathogens from one host to another

Loss of Coastal Protection

- Impacts of mining on coastal protection can be extensive, either by interference with the supply of sand and gravel to the beach, or by reducing offshore wave protection and thereby changing the wave energy and/or direction reaching the coast. This may remove some natural barriers which afforded some protection from storms and make some areas more prone to flooding.
- Loss of income from tourism if coral reefs or other attractive underwater or coastal features are destroyed and become less attractive to tourists.

River Form Modification

Sand and gravel extraction from rivers can cause destabilisation of channels, increased and unpredictable rates and patterns of incision, erosion and deposition, often for considerable distances both up and downstream. The reduction in sediment supply can increase the rates of channel incision and bank erosion, causing damage to structures such as bridges. A hard armoured bed layer may develop, and the loss of sediment may affect estuarine/coastal transfer processes.

Site Closure and Rehabilitation

Mine closure and rehabilitation should be considered as early as possible in mine planning and design. Funding for closure and post-closure activities must be included in the feasibility analysis for the mine. A draft closure and rehabilitation plan should be prepared before production commences, including allocated and sustainable funding for its implementation. It should include both physical

and socio-economic considerations ensuring that:

- Future public health and safety is not compromised
- Beneficial and sustainable after-use for the affected communities
- Beneficial socio-economic effects are maximised and adverse ones are minimised.

The plan should be updated in line with changes to the site, environmental and social conditions. The plan should include aftercare and monitoring of potential impacts for a duration determined on a risk basis but for not less than 5 years and frequently much longer.

Emergency Preparedness & Response

An emergency response plan should be prepared in accordance with the guidance of United Nations Environmental Programme (UNEP) APELL³ for Mining.

Visual Impact

Surface mining and river dredging operations have a negative visual impact particularly with respect to tourism or recreation. Mining operations should seek to prevent and minimise this impact through consultation with local communities about post-closure land use. Potential mitigation measures include use of screening materials such as trees, as well as the appropriate placement of ancillary facilities and access roads.

³ Awareness and Preparedness for Emergencies at the Local Level



Water Abstraction

Mines can use large quantities of water in processing plants (see separate guideline) but also in dust suppression. Consultation with key stakeholders including the local community is necessary to understand potentially conflicting demands and/or conservation requirements of water resources. Lowering of the water table may affect supplies of water to industrial abstractors of groundwater, farmers and sensitive environments such as rivers and wetlands.

Geotechnical Instability

The natural topography surrounding the site as well as mine infrastructure may be vulnerable to instability particularly where the soils are deeply weathered or where there is high precipitation. These conditions can be hazardous for settlements and housing related to mining activities.

Settlement of, and potential methane generation within excavation backfill can place constraints and liabilities on future developments.

Additional levels of safety should be applied in active seismic areas and those exposed to extreme weather events. Systematic monitoring and review of geotechnical stability data is required.

OTHER SOCIAL, LABOUR AND COMMUNITY RISK/LIABILITY ISSUES

Exploitation of migrant and casual workers.

Mining and quarrying may attract casual/short term workers. They may be hired directly or through labour agents or by contractors and they

may be subject to discriminatory treatment and exploitation.

Contractor management

Organisations may employ and use contractors for significant and/or specialist operations and there are likely to be legal requirements for the company to ensure that any contractors used are “competent” to undertake the tasks proposed.

Fitness for Work

Fatigue or impaired fitness for work in some roles within the extractive industries may substantially increase the risk of serious injury, equipment damage or environmental impact. Potential mitigation measures include: shift-pattern adjustment; medical examinations; drug and alcohol policies.

Noise

Noise and vibration will be generated by drilling and blasting operations, from excavation activities, loading and unloading of rock and vehicle movements. Environmental noise and vibration issues will be dependent on the proximity of receptors, e.g. proximity to roads, railways or housing may place restrictions on blasting operations.

Vector and Water Related Diseases

Water storage dams may become mosquito breeding sites increasing the risk of malaria or breeding sites for other diseases.

Transport and Traffic Management

Disturbance from traffic may arise due to the transfer of materials between extraction and processing sites or from the extraction site to the



nearest port, inland waterway or railway station. Large numbers of heavy vehicles may cause road damage.

Vehicles removing raw materials from the site may cause off-site dirt and dust problems. Vehicle loads should be covered and wheel-washing may be required prior to leaving the site. Traffic management studies should normally be done to identify risk and mitigation measures.

FINANCIAL IMPLICATIONS

- Compensation may possibly be required by regulatory authorities and other private and public sector bodies, for loss of natural resources such as agricultural land and forestry; for resettlement and economic displacements;
- Protest by local population and non-government organisations to defend existing surface features can lead to delays in the permitting process, reduction in extent of resource that can be exploited and increase in mine operational costs;
- Failure to follow the legal process for an environmental or social impact assessment, including appropriate public consultation, may affect the start of the project or lead to a legal challenge and have adverse impact on the financial projections for the project.
- Major increases in operation and investment costs could be necessary where outdated facilities at the site need to be replaced to satisfy more stringent regulation. Poor environmental and health and safety performance may accelerate the demands for a more stringent regulatory environment;
- It is good financial practice, and indeed may be a legal requirement, for provisions to be set aside for site decommissioning and rehabilitation costs, including areas possibly affected by past quarrying activities. It is necessary to understand the company's portfolio and interests (operational, contractual, legal) in closed as well as active mines, quarries, etc;
- Failure of the pit wall, spoil heaps or tailings dam has the potential to cause loss of life with associated financial liabilities. It may lead to valuable minerals becoming unworkable;
- Exposure of employees to occupational hazards may result in health compensation claims;
- Fees and fines will be applied by regulatory authorities for discharges to air and waters above statutory permitted ;
- Groundwater rebound may cause ground instability with potential for flooding of properties several miles by the resurgence and discharge of contaminated mine water and potential mobilisation of contaminants previously above the level of the water table. This may lead to compensation claims;
- Groundwater rebound may increase the operating costs of other mines in the area and potentially lead to compensation claims.



IMPROVEMENTS

Environmental, Health and Safety Improvements

These may take the form of management practices and systems, technology employed, competence and know-how, including training.

- Control operations by having a permit to work system which covers environment, health and safety and operational areas;
- Ensure the findings from the EIAs and SIAs and any other agreements are appropriately incorporated in to the operational programme for the mine or quarry;
- Environment, health and safety training for all employees and contractors limits;
- Control **dust** emissions by:
 - Use of dust suppression techniques on site roads, e.g. water sprinkling, speed controls, all-weather surfaces;
 - Covering vehicle loads with sheeting before transport from the site;
 - Dedicated parking areas for employees' vehicles;
 - Fitting crushing and screening machinery with filter systems
 - Fitting stockpiles with sprinkler systems or dust caps.
- Reduce **noise and dust** emissions by:
 - Use of stockpiles and pit walls as sound barriers/screening bunds to protect sensitive areas;
 - Use of conveyors in place of dump trucks;
 - Enclose noisy machines to isolate people from the noise where practicable;
 - Locating potential sources away from receptors,
 - Tree planting in shelter belts.
- Reduce exposure times for people working near noisy machinery;
- Use and maintain effective filters in vehicle cabs to keep air free of dusts and fumes;
- Ensure careful control of blasting to reduce noise and vibration, e.g. timing and proximity to receptors;
- Provide personnel training on explosives handling and safety management. Only certified blasters or explosives experts should conduct blasts;
- **Visual impact.** Reduce visual impact by techniques such as:
 - Minimising the area of overburden stripped prior to excavation;
 - Progressive restoration of worked out areas;
 - Screening or concealed location of processing plant and haulage routes.

- **Water management.** Improve water management by developing a sustainable water supply management plan;
- Ensure clean and dirty waters are segregated. Dirty water will require treatment prior to discharge depending on the nature of the contaminants;
- Reduce sediment loading of drainage ditches by:
 - Reducing exposure of soil and rock to wind or water, e.g. by revegetating exposed surfaces;
 - Use of settling ponds, silt fences to prevent sediment transport;
 - Establishing streamside vegetation;
 - Mine design and construction techniques to minimise runoff, e.g. counterering, terracing, slope reduction, drainage installation.
- **Geotechnical stability.** Implement systematic monitoring and regular review of geotechnical stability data on all structures;
- **Storage of materials and pollution control.** Bulk containment (e.g. oil storage tanks) must be:
 - inspected regularly to prevent leakage;
 - provided with secondary spill containment;
 - installed with automatic alarms and shut off systems.
- **Safety:** Provision of personal protective equipment (PPE) that is fit for the task to prevent injury and maintain hygiene standards. Staff should be trained in the correct selection, use and maintenance of PPE.
- Separate people from vehicles and machinery where practicable:
 - Ensure drivers and users are properly trained to operate the machinery and equipment;
 - Fit vehicles with rollover protective structures;
 - Use mechanical lifting devices where possible;
 - Ensure that machinery is adequately guarded to reduce likelihood of entrapment.
- **Emergency response.** Introduce accident, fire and explosion precautions and emergency response procedures;
- Ensure security of storage areas to prevent third parties misusing chemicals (or their containers);
- **Aftercare and mine closure.** Aftercare should cover both rehabilitation of restored land (if that is the end use) and proposals to monitor and control pollution;
- Develop (or review) a Mine Reclamation and Closure Plan which includes post closure monitoring. Ensure that a sustainable source of funding is allocated sufficient to implement the plan. This may be mandatory in some countries.



Social, Labour and Community Improvements

- Consult with key stakeholders (e.g. government, civil societies and potentially affected communities):
 - Assess the potential for adverse impact due to in-migration;
 - Understand conflicting land use demands and community dependency on natural resources;
 - Prepare an emergency response plan;
 - Develop the Mine Reclamation and Closure Plan.
- Tailor pre-placement medical examinations to the requirements of the role;
- Implement a drugs and alcohol policy for the operation;
- Undertake health awareness and education programmes in collaboration with local community organisations;
- Provide preventative treatment and vector control to site workers and families, e.g. immunisation; spraying, health monitoring. Consider extending to local community;
- Implement a grievance/dispute resolution mechanism for workers and members of the community to raise issues with the Company;
- Unsightly landscapes and noise pollution can be improved by maintaining buffer zones, planting greenbelts, constructing barrier fences or earth barriers;
- Prompt rehabilitation of disturbed areas that are most visible can reduce the visual impact and improve relations with the local community;
- Consider whether any upgrades to site security arrangements are required.

GUIDE TO INITIAL DUE DILIGENCE SITE VISITS

It may not be possible to inspect all of the site due to its size and due to restricted access to areas being actively worked. The success of the site visit also depends largely on the co-operation and availability of appropriate site personnel. Emphasis must always be placed, however, on the necessity to visually inspect areas considered important.

Valuable sources of information are the agreements with regulatory authorities with respect to approval of planning applications and discharge consents. The information on environmental controls is often contained in an 'Environmental Passport' document. Review of this information enables identification of the site specific environmental issues at the mine or quarry.

General

- Confirm how the mine or quarry will be operated. Is it joint venture between different organisations and which organisation has operational control? Also understand the type and number of contractors likely to be employed and that environment, health and safety systems will also apply to contractors.
- The method of working the mine and the type of plant used; the history of the site and

the previous existence of potentially contaminative activities at the site in the past;

- Confirm organisational responsibilities and systems for environment, health, safety and social matters. Check that these systems also cover any contractors working at the operation;
- Look for signs of poor housekeeping such as signs of spillages and high numbers of empty drums. Particularly note any recent spills;
- Check the condition of any assets, facilities, equipment, production areas – look for wear and tear, and poor maintenance;
- Evidence of dust emissions from the pit, such as deposits on vegetation at the site boundary.
- Are any reclamation works in progress either on stockpiles, tips, lagoons or backfilled excavation areas? What do the restoration works comprise?
- If wells are also located near the site is any monitoring of the water levels in these wells carried out?
- If the water is originally clean, is it contaminated by discharge onto ‘dirty’ areas of the site before entering natural surface/ground-waters?

Disposal of Waste Rock

- Is the pit progressively backfilled with inert on site material or materials from off site sources? Are these off site materials potentially hazardous? If the latter, are there any indications that this is not necessary?
- Are the earth bunds constructed in terraces to promote stability and possible future revegetation or are excessively steep slopes produced?
- Is waste rock dumped near surface water courses or over areas of possible cultural or nature conservation value?
- Are the dumps surrounded by surface drains to collect sediment loaded surface run-off and so protect water courses?
- Do the dumps appear to be heavily eroding and slumping?

Active Excavation Areas

- Is water present on the pit floor, any evidence of contamination of this water, and where is the water pumped to? Where is the water from the dewatering discharged to? Does it lead to wastewater treatment systems or discharge directly to surface waters and note the colour and appearance of adjacent water courses;
- Are there other arrangements for dewatering the pit such as pumping from peripheral boreholes?

Stockpile Areas

- How are these organised?
- Does the area look well managed or are excessive areas of land used and contaminated?



- Is the area located near any water body or other surface feature which creates unnecessary risk of contamination?
- Is surface runoff from the areas collected and where is it discharged?
- Does any discharge look as though it is heavily contaminated by solids? What colour is it?
- The proximity and sensitivity of aquatic environments;
- Are there any users of water neighbouring the site which might be affected by contamination of the water or lowering of water levels caused by the mine?
- Noise and vibration levels at the site and proximity to sensitive receptors such as schools, and housing.

Fuel and Bulk Material Storage Arrangements

- What fuels and materials are stored in bulk on site?
- To gauge the potential for spillages and leaks consider the following:
 - Are there any underground storage tanks?
 - Are surface storage tanks and usage areas hard surfaced and bunded? Are these in good condition or are cracks present? Are these regularly tested for leakages?
 - Is the size of the containment adequate for the volume of the materials stored?

Sensitive Receptors

- Are there any receptors in the area which may be sensitive to operations at the quarry. For example, other sensitive receptors may be the presence of other mines, human settlements (including indigenous populations), other economic activities (including forestry and agriculture), and wildlife habitats in the area which may be sensitive to the effects of the operation;

Health & Safety

- Is there a documented system to support health and safety?
- Assess the level of health and safety awareness at the works, are staff wearing PPE appropriate for the task, e.g. safety boots, hard hat, high-visibility vests, gloves, ear-defenders, safety glasses etc.
- Check signage around the site;
 - Does it convey the health and safety risks?
 - Are fire exits clearly marked?
 - Are routes for pedestrians and vehicles segregated?
- Is there a programme of worker health monitoring? What does it check for?

Incident Management

- Is fire fighting and first aid equipment available and are people competent in the use of the equipment and procedures and appropriately trained?
- Discuss emergency response to accidents and major incidents etc;



- Have there been any recent (within the last three years) incidents on site such as fatalities, fires/explosions, spills, slippage or slumping of materials?

Social, Labour and Community

- Does the organisation engage in regular formal consultation with key stakeholders including the local community?
- Check that labour standards, contracting and remuneration are in line with national law and are consistent with the average for the sector;
- Check that hours worked, including overtime, are recorded and staff should receive written details of hours worked and payment received;
- Has the Company received inspections from the local labour inspectorate in the previous three years? Have these resulted in any penalties, fines, major recommendations or corrective action plans?
- Does the organisation have a grievance mechanism which allows employees and other stakeholders to raise concerns?
- Are employees free to form, or join, a worker's organisation of their choosing?
- Is there a programme of health awareness and education initiatives?

Inspections & Regulation

- Check the conditions and duration of validity for all permits.

- Has the company or quarry been subject to any poor publicity?
- Find out what insurances are in place (health, hygiene, fire etc). Identify number and type of claims against insurance.
- Have insurers made any environment, health and safety audits of the facility? What were there findings and actions taken by management to address these
- Have the premises been inspected recently (within the past 2 years) by the regulatory authorities for health and safety, labour conditions, hygiene and environment? What were their findings?

Investment

- Review budgets for capital expenditure (capex) and operational expenditure to cover environment, health and safety matters. Does the business plan have line items for environment, health, safety and social improvements as well as asset management and maintenance? Do financial provisions appropriately reflect operating and post closure environment, health and safety /social obligations as agreed with the authorities or other parties?
- Do the valuations of mineral assets appropriately reflect environmental and social obligations? Does the organisation have consent for all the mineral assets which are planned to be worked? Are these issues factored in to the business plan?

Take note/ask questions relating to any activities that address the improvements listed in the improvements section of this document.



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Sub-sectoral Environmental and Social Guidelines: Stone, Sand and Gravel

ACTION PLANS

Dependent on the individual business, select appropriate improvements from the list above to include in the action plan. The plan should feature costed measures and set implementation targets. The measures may require increased management supervision, or significant process upgrades which may involve considerable capital expenditure.

As a minimum, any business should be required to have the following in place:

- Operational procedures to manage environmental, health & safety risks;
- Monitoring programmes;
- Improvement objectives, targets and project plans;
- Training for personnel;
- Regular independent inspections, checks and audits with records to demonstrate achievement of the required level of performance against legal requirements and improvement action;
- Emergency plans for environment, health and safety accidents;
- Mine closure and rehabilitation plan;
- Senior management review and demonstrated involvement in environment, health and safety management;
- Financial statements, budgets and financial projections which reflect environment, health, safety and social obligations.



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Sub-sectoral Environmental and Social Guidelines: Stone, Sand and Gravel

REFERENCES AND ADDITIONAL SOURCES

Australian Government Department of Resources, Energy and Tourism, Leading Practice Sustainable Development Program for the Mining Industry,

http://www.ret.gov.au/resources/mining/leading_practice_sustainable_development_program_for_the_mining_industry/Pages/LeadingPracticeSustainableDevelopmentProgramfortheMiningIndustry.aspx

Baltic Marine Environment Protection Commission (HELCOM) 1998, Marine sediment extraction in the Baltic Sea (Recommendation 19/1), <http://rod.eionet.europa.eu/obligations/340>

Black Sea Commission 1992, Convention for the Protection of the Black Sea of 1992 – the Bucharest Convention. <http://www.blacksea-commission.org/main.htm>

European Bank for Reconstruction and Development (EBRD). Environmental and Social Policy May 2008. Performance Requirement 2: Labour and Working Conditions.

<http://www.ebrd.com/enviro/tools/index.htm>

European Commission 2004, Integrated Pollution Prevention and Control: Reference Document on Best Available Techniques for the Management of Tailings and Waste-Rock in Mining Activities, July 2004,

<http://eippcb.jrc.ec.europa.eu/reference/mmr.html>

European Union 1985, Council Directive 85/337/EEC of 27 June 1985 on the assessment of the effects of certain public and private projects on the environment, <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31985L0337:EN:HTML>

European Union 2006, Directive 2006/21/EC of the European Parliament and of the Council of 15 March 2006 on the management of waste from extractive industries and amending Directive 2004/35/EC

- Statement by the European Parliament, the Council and the Commission, <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:102:0015:01:EN:HTML>

Extractive Industries Transparency Initiative (EITI), <http://eitransparency.org/>

IFC/EBRD 2009, Draft: The Migration Effect: Risk Assessment and Management Strategies for Addressing Project-Induced In-Migration,

http://www.ifc.org/ifcext/sustainability.nsf/Content/PublicComment_InfluxManagement

International Council on Mining & Metals, www.iccm.org

International Finance Corporation (IFC) 2007, Environmental, Health and Safety Guidelines, Mining, April 30th 2007,

[http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_Mining/\\$FILE/Final+-+Mining.pdf](http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_Mining/$FILE/Final+-+Mining.pdf)



European Bank
for Reconstruction and Development

Sub-sectoral Environmental and Social Guidelines: Stone, Sand and Gravel

International Institute for Environment and Development 2002, Breaking New Ground: Mining, Minerals and Sustainable Development, <http://www.iied.org/sustainable-markets/key-issues/business-and-sustainable-development/mmsd-final-report>

International Labour Organization (ILO, Programme on Safety and Health at Work and the Environment (SafeWork), Safety and Health in Mining
<http://www.ilo.org/public/english/protection/safework/sectors/mining/index.htm>

ISO14001:2004: Environmental Management Systems – Requirements with Guidance for use, Geneva: ISO

Kondolf GM, Smeltzer M, Kimball L 2001, Freshwater Gravel Mining and Dredging Issues, Prepared for Washington Department of Fish and Wildlife, Washington Department of Ecology, Washington Department of Transportation, <http://www.wdfw.wa.gov/hab/ahg/freshdrg.pdf>

OSPAR Commission 2003, Biological Diversity and Ecosystems Strategy,
http://www.ospar.org/html_documents/ospar/html/Revised_OSPAR_Strategies_2003.pdf#nameddest=biodiversity

UNEP Mediterranean Action Plan (MAP) 1995, Convention for the Protection of Marine Environment and the Coastal Region of the Mediterranean of 1995 (further to the earlier version of 1976) – the Barcelona Convention, <http://www.unepmap.org/index.php?module=content2&catid=001001004>

United Kingdom Environment Agency 2004, The Removal of Gravel from Rivers, Policy Number: 359_04,
http://www.intertidalmanagement.co.uk/contents/management_processes/pdfs/risks%20benefits/359_04.PDF

United Kingdom Health and Safety Executive, Quarries,
<http://www.hse.gov.uk/quarries/information.htm>

United Nations Economic Commission for Europe (UNECE), Convention on Environmental Impact Assessment in a Transboundary Context (as amended) (Espoo, 1991), <http://www.unece.org/env/eia/>

United Nations Environment Programme (UNEP) 2001, APELL for Mining: Guidance for the Mining Industry in Raising Awareness and Preparedness for Emergencies at Local Level (Technical Report 41), <http://www.unep.fr/shared/publications/pdf/WEBx0055xPA-APELLminingEN.pdf>

Voluntary Principles on Security and Human Rights, www.voluntaryprinciples.org

World Organisation of Dredging Associations (WODA) 1998, WODA Environmental Policy on Dredging, <http://www.woda.org/env-pol.htm>



European Bank
for Reconstruction and Development

Sub-sectoral Environmental and Social Guidelines: Stone, Sand and Gravel

WODA 2004, Hamburg Declaration: “From Gaps to Integration”,
<http://www.woda.org/HamburgDeclaration.pdf>