Government of Western Australia
Department of Health

Mine sites, exploration camps and construction villages

Scoping Tool: Public Health Considerations

Mine sites, exploration camps and construction villages need to consider the health and wellbeing of employees and local communities during the early planning stages for these types of proposals.

It is necessary to enhance the human health benefits of proposals as well as provide written evidence and commitment to address and minimise any potential public health concerns. This is a cost effective way of eliminating future health implications and health related costs that may be imparted to industry, or State and Local Governments, from poorly planned proposals.

Public health factors to be considered by proponents should include (but not limited to):

Air quality
- Emissions, dust, smoke, ash, odour
- Buffers
- Noise (including traffic)
- Light

Water quality
- Wastewater disposal
- Drinking water
- Non-drinking water (recycled water or alternate water supplies)
- Environmental waters (for recreational use)

Land and hazard management
- Vector borne disease (Mosquito management)
- Pest management
- Pesticide use
- Contaminated sites
- Acid sulphate soils

Radiation safety

Workforce health
- Communicable diseases and sexual health
- Public buildings
- Safe and nutritious food supply
- Disaster preparedness and emergency management

Communities
- Aboriginal health
- Climate change
- Provision of health services (hospitals, GPs)
- Consulting with the community

Air quality

The construction and operation of mine sites and camps have the potential to increase air pollutants on site, at employee accommodation villages, as well as to local communities. Emissions from mining activities may include gases, fumes and particulate matter (dust). Such pollutants, if not managed correctly, may result in significant health problems ranging from short lived reversible health effects to a range of long term chronic health effects in exposed individuals.

Proponents should be aware that the Department of Health considers accommodation villages / camps to be “sensitive receptors”, meaning air quality guidelines apply in areas where accommodation villages/camps are located. For this reason such accommodation should be strategically located to reduce risks according to dominant wind direction and distance from mine activities.

Where there is a risk of air borne emissions whether fugitive or from point sources like stacks, the Department of Health is supportive of the need for a proponent to provide the following written evidence to appropriate decision making authorities:

- That the proponent is familiar with the contaminants of concern
- Of the intention to develop and implement an air quality monitoring plan or provide justification that a dust management plan is not required
- Of adaptive mitigation and management practices sufficiently flexible to respond proactively to conditions likely to generate emissions
- Of strategies to deal with community concerns where applicable

A proponent should not take the list provided above as exhaustive and should if necessary seek the advice of a suitably qualified and experienced environmental consultant to prepare a concise but detailed management plan.

Emissions and total suspended particulates

The off-target movement of emissions and other particulate air pollutants can be a cause for concern to residents and workers in proximity to mining and industrial areas. These concerns may be based on fears of exposure to emissions, but also due to the detection of odours associated with some types of emissions.

Odour

Odours can arise from a number of mining and associated activities. If not managed appropriately, odours can impact adversely on an individual’s quality of life and health. Proponents should be aware that odours present a difficult management issue and have the potential to cause significant nuisance complaints for industry and local authorities. The Department of Health takes odour complaints seriously even when the risk for direct health effects is low.

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Dust

Dust is a general term used to describe particles that are suspended in the air we breathe. Regulators use the term “particulate matter” (PM).

Dust particles comes in a wide range of sizes and from a wide variety of sources, including soil, vegetation, microorganisms (pollens, fungi, bacteria), sea salt, fossil fuel combustion, bush fires, and industrial activities. In addition, common atmospheric gases such as sulphur dioxide and nitrogen oxides may react in the atmosphere over time to form particles.

A wide range of mining-related activities generate dust, including the removal of vegetation, transport and loading activities and wind action on industry stockpiles and exposed areas. The combustion of gasoline, diesel and ship fuel also contributes to levels of air particle pollution.

Typically with mining and industrial operations the biggest concern is the affect of dust on nearby communities and accommodation villages. These activities can cause extensive nuisances to surrounding populations particularly when enhanced by local conditions, including wind strength and direction, rainfall, humidity and ambient temperatures, soil type, and vegetative cover.

Dust irritates the lungs and can trigger hay-fever type reactions, as well as asthma attacks. In predisposed people, these attacks can be serious and cause breathing problems. Breathing a lot of dust over a long period of time is known to cause chronic respiratory problems.

Additionally, roofs can act to funnel dust and other residues into rainwater tanks with the end result being a concentration of pollutants in the water. This is of particular concern if rainwater is the main source of drinking water for residents or workers.

The greater the distance of a mining site to an accommodation village/camp, settlement or individual residence the less risk there is of exposure to individuals from excessive dust and other mining related emissions.

Nevertheless dust suppression measures should still be employed to reduce amenity impacts and potential short-term respiratory effects for workers, visitors and accommodation villages/camps.

Buffer area width

Buffer areas are legitimate planning tools. They are used to separate land uses to ensure long term protection of the areas being impacted upon and minimise potential health impacts and any future conflicts. It is essential for appropriate buffers to be planned and maintained

accordingly to ensure noise, emissions, dusts, airborne particulates and odours do not cause future health concerns for local communities.

In principle Local or State Governments may impose a buffer retrospectively when government has determined that public health is being put at risk from industry emissions or noise. This has significant implications for both government and industry and has proven to be a significant economic impost on both when this has occurred retrospectively. For this reason industry may choose to implement a voluntary buffer that will help to protect them from future land use conflicts.

Noise

Noise pollution is a potential problem with closer encroachment of industrial properties on residential living. Potential noise impacts to incoming residents and accommodation villages can occur from a range of sources such as industrial equipment, trucks and machinery and constant or long-term noise (e.g. pumps or refrigeration plants).

Noise can lead to significant health and public nuisance concerns to workers and existing and future residents. Additionally, traffic movements of trucks and machinery offsite can also cause concerns for local towns (including transient aboriginal communities) where there is an increase in transit routes without appropriate planning and discussion.

To minimise health and nuisance impacts associated noise, a proponent needs to provide written evidence that a noise level monitoring program will be establish to monitor current background levels at the proposed boundaries of the development to ensure appropriate noise mitigation strategies are implemented.

Traffic

Increased traffic movements of trucks and machinery offsite through residential areas and local towns (including transient aboriginal communities) can cause concerns. It is important that where there is an increase in transit traffic appropriate planning and discussion with potentially affected communities is undertaken.

Light

Consideration is needed for the potential for light pollution, characterised as excessive or obtrusive artificial light, which may affect nearby communities.

Light pollution can be divided into two main types: (1) annoying light that intrudes on an otherwise natural or low-light setting and (2) excessive light that leads to discomfort and

adverse health effects. Its sources include advertising lights, commercial properties, offices, factories, streetlights, other buildings and illuminated sporting venues.

It is important to consider any light obtrusive activities surrounding the proposed development to ensure they do not impact on new communities or accommodation camps and villages.

Water quality

Wastewater disposal
In some instances existing reticulated sewerage systems, particularly in regional and remote areas, may not have the capacity to accommodate increases in connection rates without significant investment.

Upgrades to an existing system can require significant capital and may not be scheduled by the wastewater treatment plant owner. This needs to be considered before progressing further with a proposal. It should be noted that it can take several years from planning discussions before an upgrade is operational.

Where a reticulated sewerage system is not available, health and environmental concerns may arise if a site does not install and maintain an appropriate onsite wastewater system to service the workforce.

To ensure the Department of Health is satisfied that there will be appropriate provision of wastewater disposal systems, a proponent needs to provide written evidence on:

- The predicted population size within the development
- Whether the site will be connected to the reticulated sewerage system. If so:
  - The capacity of the local reticulated mains to handle the increase in population, and/or
  - Details of future proposals to upgrade the reticulated sewerage system
- Whether the site facilities and/or accommodation villages will require connected to onsite wastewater systems. If so:
  - Provide groundwater levels and soil type
  - Types of onsite wastewater system proposed e.g. septic tanks, aerobic treatment unit
  - The location of the onsite wastewater system in proximity to accommodation and other facilities
  - Whether sufficient area is available to accommodate onsite wastewater treatment systems and the effluent disposal area required. Developers should note that some proposals have been constrained due to insufficient area for effluent disposal.

Drinking water
A safe and potable supply of drinking water is essential for all. Detailed consideration needs to be given to how many people will need access to drinking water and how drinking water will be supplied during construction activities and ongoing operational phases.

In situations where connection to a drinking water supply through a licensed provider is not available, consideration must be given to alternative drinking water systems.

A proponent needs to provide written evidence on:

- Drinking water volumes required
- How drinking water will be provided to the site
- The commitment to comply with the 2011 Australian Drinking Water Guidelines (ADWG), as published by the National Health & Medical Research Council
- The establishment of a Drinking Water Quality Plan including a drinking water quality monitoring program for chemical and microbiological analysis
- Routine evaluation of the 12 elements of the Drinking Water Quality Plan

Non-drinking water (recycled water or alternate water supplies)

The Department of Health supports non-drinking water schemes as a sustainable and beneficial option to manage water resources. However, serious health implications may result if non-drinking water (in particular recycled water) is not appropriately installed and managed.

A proponent needs to provide written evidence that:

- All recycled water schemes will be approved by the Executive Director of Public Health prior to implementation
- The volumes of non-drinking water produced/required
- The treatment of the non-drinking water to a level that is fit for purpose
- The commitment to implementation of the relevant Australia Water Recycling Guidelines: Australian Guidelines for Water Recycling - Phase 1 (2006); Australian Guidelines for Water Recycling - Phase 2: Stormwater Harvesting and Reuse (2009); and the Australian Guidelines for Water Recycling - Phase 2: Managed Aquifer Recharge (2009).
- The establishment of a Recycled/Alternate Water Quality Plan including the water quality monitoring program
- Routine evaluation of the 12 elements of the Recycled/Alternate Water Quality Plan

Environmental waters (for recreational use)

Communities place great importance on the need to keep waterways commonly used for recreational activities such as swimming, surfing and fishing, free from disease and other health related problems.

It is essential to protect recreational water environments against direct contamination from faecal and chemical contaminates from the site and associated infrastructure.

To minimise the risk of recreational water illnesses, a proponent needs to provide written evidence:

- That all recreational water bodies in close proximity to the development site will not be impacted by faecal or chemical contamination from the site and associated infrastructure
- Where appropriate, of the intention to develop and implement a recreational water monitoring and management program in accordance with the National Health Medical Research Council, 2008 Guidelines for Managing Risks in Recreational Water, to monitor microbial, algal species and numbers and chemical contaminates. This should include background monitoring prior to construction, during construction and following operation.
- There may also be a need to undertake similar types of monitoring in relation to fish/shellfish health for recreational collection and consumption.
- Depending on the nature of development, construction activities e.g. where dredging or similar activies may be required, then other parameters e.g. pH, water clarity (Secchi disc measurements), dissolved oxygen levels, total suspended solids in relation to aesthetics and physical water quality suitability for recreation may also be required.

Land and hazard management

Vector borne diseases (mosquito management)
Mosquito populations and the types of mosquito-borne diseases vary across WA. Mine sites, exploration camps and construction villages can create new habitats for mosquitoes to breed, and can be located in remote areas where serious mosquito-borne disease can occur and where mosquito management may be difficult.

Sites located near waterways, salt marshes, or in cyclone or flood prone areas, will be particularly susceptible to mosquito populations.

Infrastructure installed on-site may create new mosquito breeding sites if not appropriately located, designed and maintained.

Developers tend to ignore concerns raised about the need to minimise mosquito breeding and can put their employees and local communities at risk of contracting debilitating or life threatening mosquito-borne diseases, as well as impacting on lifestyle due to the pressure of nuisance mosquitoes around work and living areas.

To minimise the risk of mosquito breeding, a proponent needs to provide written evidence on their commitment to develop and implement a detailed mosquito management plan that provides strategies for managing mosquito breeding sites during construction and ongoing operational phases of the development.

Pest management
All developments are likely to attract a range of pest species, these may include weeds, insects, rodents and feral animals. Control of pests are required to prevent health concerns for employees and to reduce their impact on the surrounding community.

A proponent needs to provide written evidence of their commitment to develop and implement a pest management plan that appropriately controls pests and minimises the use of pesticides.

Pesticide use
A site may require the application of pesticides by contractors to control a range pest species (eg. insects, weeds, feral animals etc). Where contractors are engaged, appropriate training and licensing is required in accordance with the *Health (Pesticides) Regulations 2011*.

A proponent needs to provide written evidence of their commitment to control pests by employing the use of contractors who are appropriately trained and hold a current Pest Management Technician Licence and be employed by a Registered Pest Management Business.

Note: If a proponent wants to use their own employees to apply pesticide(s) as part of their Pest Management Program, then employees should be provided with sufficient knowledge, skills, training and the personal protective equipment to safely apply pesticide(s).

Contaminated sites
Many mining activities have the potential to contaminate ground and surface waters and soil, such as through oxidation of acid forming material and sulphatic material, disposal of hyper saline water, disturbance of natural asbestos materials, storage of hazardous substances, and leachate containing hydrocarbons, chemicals and heavy metals.

There should be a plan to prevent or manage any potential contamination on an ongoing basis during the exploration, development, operation and after the closure of the site. If a site is suspected of or known to be contaminated it will need to be reported to the Department of Environment and Conservation (DEC) in accordance with the *Contaminated Sites Act 2003*. Further queries on contaminated sites should be directed to the DEC Contaminated Sites Branch.

Acid sulfate soils
Acid sulfate soils (ASS) are naturally occurring soils and sediments containing iron sulfides, most commonly pyrite.

When ASS are exposed to air the iron sulfides in the soil react with oxygen and water to produce a variety of iron compounds and sulfuric acid. Initially a chemical reaction, the process is accelerated by soil bacteria. The resulting acid can release other substances, including heavy metals, from the soil and into the surrounding environment.

The production of hydrogen sulphide gas from ASS is a source of concern for pubic health.

Further queries on contaminated sites and ASS should be directed to the Department of Environment and Conservation Contaminated Sites Branch. DEC will request WA Health advice when appropriate on human health issues and public risk related to contaminated sites and ASS.

Radiation safety

Proponents need to liaise directly with the Radiological Council with respect to:

- Registration and licensing under the *Radiation Safety Act 1975* if either sealed or unsealed radioactive sources are to be used or stored.
- Preparation of Radiation Management Plans and Radioactive Waste Management Plans for mining (including exploration) and processing of radioactive ores.
- Transporting radioactive substances.

Any project which deals with radioactive substances above exempt levels or that has a potential to deliver radiation exposures which exceed the public dose limit of 1 milliSievert per annum, needs to be considered and in some cases approved by the Radiological Council.

Daily administration of the Radiation Safety Act is handled by the Radiation Health Branch of the Department of Health, acting through the Secretary of the Radiological Council.

Note: Radiation Safety on mine and exploration sites is also subject to regulation under *the Mines Safety and Inspection Act 1994*. Please contact the Department of Mines and Petreoleum for further information with respect to this legislation.

The Radiation Safety Act and Regulations specify maximum exposure limits for non-ionising emissions from radiofrequency radiation, ultraviolet radiation and electromagnetic fields from powerlines and electronic equipment. Where a potential hazard in this area may arise, the Radiation Health Branch can provide advice on determining

Workforce health

Communicable diseases and sexual health

To minimise the risks of communicable diseases (including respiratory, gastrointestinal infections or sexually transmitted diseases) arising from interactions among the workforce and

local communities, appropriate management and education of the workforce should be put in place.

A proponent needs to provide evidence of their commitment to develop and implement ongoing communicable disease and sexual health education for the workforce population, particularly worksites located within close proximity of local communities.

Public buildings
Where onsite accommodation is provided, a range of mandatory Local Government health related building regulations need to be addressed to ensure the dwellings promote good health for all occupants.

If a swimming pool (or aquatic facility) is to be provided for employee use additional approvals are required to ensure the pool is installed and operated to consistently high health and safety standards.

To ensure all site facilities and accommodation villages will not impact negatively on human health, a proponent needs to provide written evidence that:

- The necessary Local Government building approvals have or will be obtained to ensure compliance with the building requirements of various health related building regulations, health local laws and standards.
- Prior to the construction, alteration or extension of a swimming pool / aquatic facility approval will e obtained from the Executive Director Public Health.

Aquatic facilities must have approval under the *Health (Aquatic Facilities) Regulations 2007*

Safe and nutritious food supply
A safe and nutritious supply of food for workforce employees is essential.

A proponent needs to provide written evidence on:

- How food will be supplied and transported safely to the site.
- The intention to comply with the *Food Act 2008* and associated standards and regulations.

Disaster preparedness and emergency management
Many mining activities are located in remote areas that are not only isolated from health services, but are located in areas prone to natural disasters such as cyclones.

Mining activities can also result in fires, blasts and other explosions that require emergency health assistance.

Therefore it is essential for mine sites, exploration camps and accommodation villages to develop an Emergency Medical Response Plan.

This public health initiative helps facilities respond to life-threatening emergencies, and has the potential to save the greatest number of lives during an emergency event. To ensure disaster and emergency response procedures are in place, the proponent should provide written evidence that:

- An Emergency Medical Response Plan (EMRP) will be developed for the site to plan for the health impacts of applicable incidents identified in the "Critical Infrastructure Emergency Risk Management and Assurance Handbook" (Emergency Management Australia, 2nd Ed May 2004). The plan shall include / consider:
  - An evacuation plan including aero-medical needs
  - Surge arrangements for mass casualty incidents
  - Support for family members of injured employees
  - Planning for extreme heat events
  - Limited health infrastructure in the region
  - Limited health specialist and general personnel in the region
  - Distance
  - Communications redundancy
  - Disaster equipment
  - Staff training
  - Business continuity, with particular attention to reliance on resources that may also be relied upon by other industries that are active in the area.
  - Advice to the following agencies in the event of activation of the EMRP:
    - Department of Health
    - Fire and Emergency Services Authority
    - WA Police
    - St John Ambulance
    - Royal Flying Doctors Service

The EMRP should consider specific regional requirements and be developed in collaboration with appropriate authorities and services.

Communities

Aboriginal health

The Department of Health supports opportunities for mine sites to engage Aboriginal people living in the area in the construction and operation of a site.

There should be consideration for a holistic approach of training for school aged Aboriginal children with a view to participating actively in the workforce. A school to workforce career pathway could be considered alongside a mentoring program from Aboriginal people already

employed within the range of industries associated with the mining, processing and construction industries.

Climate change – health considerations

It is now known that our changing climate presents a significant and emerging threat to public health. These public health impacts, including those outlined below, should be considered in any future development.

Heat effects

Increases in temperature are predicted. Design requirements may include retaining natural vegetation and trees that help to cool urban and rural environments, consideration of the albedo level of surface materials, as well as using passive solar designs for buildings.

Extreme weather related health effects

Increases in floods, cyclones and bushfires are predicted. Developments should not be located in flood plains and should be designed to withstand extreme weather conditions. In bushfire prone areas, adequate precautions should be taken to minimise the risk to human life in the event of a fire.

Food mileage

Food mileage refers to the distance food is transported from the time of its production until it reaches the consumer. Buying local food should be considered as part of a more sustainable option to minimise the environmental impacts of transporting food large distances.

Provision of health services (hospitals, GPs)

Where it is predicted that there will be a significant workforce on site (e.g. >500 people), either during the construction phase or ongoing operational phases of the mining site, there is likely to be an expectation that the workforce will need access to local health services such as the local hospital and general practitioner (GPs) services in the event of illness, accidents or disasters.

It is essential that local hospital services are contacted during the early planning stages to ensure there is the capacity of health services to meet the needs of the increase population.

Where private health facilities will be provided onsite, there is a requirement under the *Hospital and Health Service Act 1927* for all private health services to be licensed. If the facility includes the provision of medical services and/or the treatment of persons suffering from illness of injury or in the need of medical, surgical or dental treatment or assistance, then the facility is required to be licensed by the Department of Health, Licensing Standards and Review Unit.

To ensure appropriate health services are available to meet the needs of large populations, the proponent should provide written evidence that:

- Public hospitals, health services and GPs have been contacted to discuss the capacity of the hospital and GP services to meet the needs of the predicted increase in population, and that strategies are being implemented to ensure health services can continue to meet the needs of the local community.
- Private hospital facilities required appropriate licences from the the Department of Health Licensing Standards and Review Unit

Consulting with the community

The Department of Health regards community consultation as an important part of the planning stages for new developments such as new mining sites or any other small or large scale development that may affect the local community. It is essential for any community to be given opportunities to participate in decisions that have the potential to affect their lives.

It is important that proponents and communities are aware of issues that may be perceived as health risks. This provides industry with an opportunity to minimise or eliminate issues that may be seen to cause public health concerns during the early planning stages of developments.

Addressing health concerns early can save significant amounts of money that may be needed in the future to minimise or eliminate public health concerns. Proponents are encouraged to demonstrate that they are working effectively with communities.

Perceived health risks are sometimes greater than the actual health risk.

It is essential to manage perceived risks to ensure local communities are satisfied their health will not be impacted.

Further information

The Public Health Division of the Department of Health of Western Australia has a range of health resources and experts who can provide advice on improving the health outcomes of mine sites, exploration camps and accommodation villages. For further information visit www.public.health.wa.gov.au

This document was produced by the Health Impact Assessment team of the Environmental Health Directorate on behalf of the Public Health Division. This document will be regularly reviewed and updated. Feedback can be provided by emailing ehinfo@health.wa.gov.au with “Health Impact Assessment” in the subject heading.

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