



Industrial estates, precincts and industrial developments

Scoping Tool: Public Health Considerations

Land-use planning decisions have a direct impact on public health both in terms of promoting healthy living and in terms of preventing both acute and chronic diseases.

This information sheet is for State and Local Governments responsible for both land-use planning for industrial estates and assessing development proposals. This information sheet may also help government officials and public health professionals provide guidance to planners and others about the potential health implications of their decisions. Property developers of residential and industrial estates and precincts or industrial facilities may also find this information useful for preparing proposals.

Land-use planning directed towards sustainable economic growth through industrial development incorporates strategies which ensure sensitive land-users are not disadvantaged or placed at risk from industrial activity. Land-use plans that consider the health and wellbeing of local communities help preserve or even improve the health of the community affected by the proposed plans. Health and amenity issues that affect residential areas also affect business, visitors and workers in an industrial estate. Although traditionally not an area for public health, the aesthetics and amenity of an industrial estate can impact on how the area is perceived and in turn influence the health and wellbeing of people in the estate and adjacent neighbourhoods.

Industrial areas are important for economic growth and therefore the potential for incremental intrusion of non-industrial activities on these areas also needs to be considered to ensure the core function of an industrial area remains for industrial use. Industrial developments are most often compromised when separation distances to sensitive receptors¹ have not been considered during the planning stage of either a residential estate or an industrial estate. Buffers based on separation distance can be implemented by State Government long after developers have purchased land for Industrial or residential estates. The potential for this to occur is greatest wherever residential land lies adjacent to heavy industry or land that is zoned and reserved for mixed industrial development and it is clear that separation distances have not been considered during planning or are inadequate.

This guidance is about promoting healthy public policy and is based on the understanding that health is not just the product of health care activities but is influenced by a wide range of activities that include land-use planning and industry regulation. Understanding how these activities influence health provides an opportunity for planning authorities to adopt strategies that help to prevent and reduce certain ill health for as long as possible and thereby help to reduce or avoid related health costs.

¹ Sensitive receptors are any residential area and include but are not limited to schools, hospitals, elderly housing, day care facilities and individual residences.

Factors that influence public health to be considered by assessors and proponents include (but not limited to).

- Air quality
- Noise
- Hazard management
- Climate change
- Light
- Water quality
- Radiation safety
- Traffic

Features of Industrial Neighbourhoods that affect the health and safety of employees, visitors and neighbouring communities:

- Disaster preparedness and emergency management
- community consultation
- Built Environment and workforce well being

Air quality

Local air quality can be affected by air pollutants emitted from industrial facilities in an industrial estate or precinct during both the construction stage and during normal operations.

Air pollutants may include odorous chemicals, gases, fumes and particulate matter (dust). Such pollutants, when not managed correctly, have been associated with health problems ranging from short lived reversible respiratory health effects to long term chronic cardiorespiratory health effects in exposed individuals. Air pollution has also been implicated in non-cardiorespiratory effects such as autoimmune disorders and low birth weight.

People who live near or adjacent to industrial estates do not expect industrial emissions to impact their health. They also expect a high standard of amenity. Two proven ways that impacts can be minimised is by providing a buffer between industry and sensitive land-uses and by ensuring industrial activities are regulated to minimise the impacts of noise, odour, dust and traffic.

A primary responsibility of State and local government planning authorities and is to preserve good air quality over residential areas both for purposes of health and amenity. To this end the planning authorities seek to ensure that air emissions from industrial facilities do not cause the air pollutants over residential areas to exceed health based air-quality standards/guidelines. The National Environmental Protection Measure (air NEPM) for ambient air quality prescribes ambient air quality standards for six key pollutants (PM₁₀, O₃, CO, NO₂, SO₂ and lead). Standards/guidelines for other pollutants are available from the Department of Environment Regulation (DER) or DOH. Standards/guidelines apply to residential areas and it is incumbent upon a proponent to determine that air pollutants emitted by their facility comply with the appropriate standard/guideline. To help ensure air quality standards/guidelines can be met in residential areas the DER regulates emissions for industrial facilities they licence and for facilities assessed by the Environmental Protection Authority (EPA) as requiring emission regulation.

The air-quality standards/guidelines apply to all sensitive receptors therefore industrial estates and residential areas should be strategically located to one another with due regard to factors that influence emission dispersal and dilution. Factors such as dominant wind direction and separation distance can reduce potential risks to communities. DOH also considers amenity important for health and wellbeing. Intermittent odour and dust emissions in particular degrade amenity and the potential for these to occur should be considered in the planning and approvals process. While the PM₁₀ air NEPM protects against the adverse health effects from dust, separate guidelines exist for dust levels that preserve amenity.

Air borne emissions are a feature of most industrial precincts whether from a fugitive source like a stockpile or from a point source like a stack. , Regardless of the source, a key question of the decision-making authority will be how the proposal or plan minimises amenity and health effects associated with air emissions? The following information from the proponent can assist answer this question

- A list of the potential contaminants of concern (their health effects and the recommended guideline for each contaminant may be required for high risk developments).
- Monitoring or modelling data of the contaminants of concern if available.
- A statement of intent to develop and implement an air quality monitoring and management plan or a statement justifying why such a plan is not required
- Evidence of adaptive, mitigation and management practices sufficiently flexible to respond proactively to conditions likely to generate unexpected emissions, and
- Evidence of strategies to engage with the community or to deal with community concerns if and when they arise.

This is not a complete list and if necessary a proponent may seek the advice of a suitably qualified and experienced environmental consultant to prepare a concise but detailed air-quality risk assessment or air-quality management plan. Where there is a potential risk for large scale industrial air borne emissions to impact air quality, a 'health risk assessment' may quantify those risks and enable appropriate management actions to be developed. The DER and DOH may also provide proposal assessing authorities and proponents with advice.

Noise

Noise pollution is a potential problem when residential estates encroach on industrial areas. Potential noise impacts to residents can occur from sources such as industrial equipment, trucks and machinery (e.g. pumps or refrigeration plants).

Noise above the health guideline can lead to significant health and nuisance concerns from residents and workers. To minimise health and nuisance impacts associated with noise, a proponent should develop a noise management plan and have it approved by the authorising authority. Such a plan should be proactive and consider both the impact on and from future neighbours as the case may be.

The DER regulates noise from licensed facilities while local government regulates noise from non-licensed facilities and residential areas.

Traffic

Increased traffic movements of trucks and machinery offsite through residential areas and local towns 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. A traffic management plan may be needed to manage traffic impacts on surrounding areas.

Light

Light pollution, characterised as excessive or obtrusive artificial light, 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 neighbouring properties.

Water quality

Wastewater disposal

In most instances, industrial developments require reticulated sewerage to be delivered by a licensed supplier in accordance with the draft *Country Sewerage Policy* or the *Government Sewage Policy - Perth Metropolitan Region*.

http://www.public.health.wa.gov.au/3/1430/2/subdivisions_and_town_planning_approvals.pm

However, in some locations reticulated sewerage systems, particularly in regional and remote areas, is not provided or planned. Moreover, existing sewerage systems may not have the capacity to accommodate increases in connection rates without significant investment. Therefore, it should be noted that it can take several years from planning stage 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 and the development.

In situations where on-site wastewater systems are proposed, such as septic tanks or aerobic treatment units, it is essential to conduct a Land Capability Assessment or a geotechnical report as per AS 1547 (2000) at the lot and subdivision level. In all cases, lot sizes will need to be able to accommodate the wastewater generated on-site within their boundaries.

To ensure the Department of Health is satisfied that there will be appropriate provision of wastewater disposal systems, a proponent is required to provide written evidence/details on the predicted occupant size, trade waste type/quantities and whether the development will be:

- Connected to a reticulated sewerage system. If so:
 - Detail what is the capacity of the local reticulated mains to handle the increase in generated wastewater volumes, and/or
 - Details of future proposals to upgrade the reticulated sewerage system or the wastewater treatment plant, or

- Connected to an onsite wastewater system. If so:
 - Provide a Land Capability Assessment at the lot and development levels, or a Geotechnical report as per AS 1547 (2000) at the lot and development level;
 - Provide groundwater levels and soil type;
 - Type of onsite wastewater system proposed e.g. septic tanks, aerobic treatment unit, etc.;
 - The location of the onsite wastewater disposal system in proximity to office/ traffic and parking/ 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 on-site 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 (scheme water) is not available, consideration must be given to alternative drinking water systems. DOH approval is required for such systems.

To provide an alternative drinking water system, written evidence/details are to be provided on:

- Drinking water volumes required;
- How drinking water will be provided to the development;
- The commitment to comply with the *Australian Drinking Water Guidelines 2011* (2011 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), and
- Routine evaluation of the 12 elements of the Drinking Water Quality Plan.

Where rainwater is proposed as the main source of potable water, consideration must be given to WA's decreasing rainfall patterns. In addition, depending on the proximity of the estate to agricultural and other industrial sites, there is the potential for roofs to act as a funnel and capture dust, chemicals and spray drift residues that may concentrate in the rainwater tank. Rainwater monitoring and other mitigation strategies will be required to ensure public health is not compromised.

Non-drinking water (recycled water or alternative 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 systems (in particular recycled water) are not appropriately installed and managed.

Written evidence/details should be provided to the Department of Health on:

- The proposal/concept for a recycled water scheme, 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 Australian Guidelines for Water Recycling (AGWR):
 - AGWR - Phase 1 (2006);
 - AGWR - Phase 2: Stormwater Harvesting and Reuse (2009), and
 - AGWR - Phase 3: 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.

DOH cannot support mandatory recycled water re-use for a development. Rigid sustainability targets may not recognise that some areas are just not suitable for garden or grey-water re-use, due to potential issues such as the height of the groundwater table, proximity to wetlands, small lots sizes for instance.

Hazard Management

Vector borne diseases (mosquito management)

Mosquito populations and the types of mosquito-borne diseases vary across WA. Existing habitats such as wetlands can support extensive mosquito populations and can cause serious nuisances to humans who may reside within these areas, as well as increase the chance of people contracting debilitating or potentially life threatening mosquito-borne diseases.

New industrial estates may be proposed in areas that are not suitable for humans to live. Re-contouring the land and installing infrastructure can create new habitats for mosquitoes to breed.

To minimise the risk of mosquito-borne disease and breeding sites, a proponent needs to provide written evidence of the following:

- Existing breeding locations within close proximity to the proposed development, and the extent of known mosquito-borne disease risk and nuisance levels from biting insects.
- Commitment to develop and implement a mosquito management plan that provides strategies for managing mosquito breeding sites during construction and ongoing operational phases of the development and for minimising the exposure of future occupants to adult mosquitoes.
- Commitment to locate, design and maintain any proposed man-made water bodies (e.g. constructed wetlands, vegetated swales and other stormwater infiltration infrastructure) in accordance with the Chironomid midge and mosquito risk assessment guide for constructed water bodies (Midge Research Group, 2007).

Nuisance insects (including stable fly)

Consideration needs to be given to other nuisance insects such as stable fly that may cause health concerns to future workers and occupants.

Stable fly can be a significant public health concern and is generally a problem surrounding rural activities such as agriculture, irrigated horticulture, animal industries, dairies and piggeries.

Consequently, incoming industrial occupants may be exposed to nuisance fly breeding and infestation that can be associated with surrounding activities.

Stable flies are an aggressive, biting, blood sucking fly that attacks livestock, domestic pets and humans in search of a blood meal. The primary host animals are cattle and horses which are normally 'accessible' to stable flies in a rural environment. The repeated biting attacks can cause considerable suffering and distress to animals and in some cases, cause death. Whilst this is not strictly a public health issue it can be a significant nuisance to residents and cause suffering and annoyance to livestock and domestic pets.

Stable fly breeding has been known to be a problem in the Shires of Harvey, Gingin, Murray, Serpentine/Jarrahdale, and in areas that have mixed agriculture and horticultural activities.

One of the main sources of breeding has been the use of poultry manure for vegetable production on the Swan Coastal Plain. It is also known that stable flies also breed prolifically in rotting vegetable material, other manures, animal bedding and feed (if left exposed to the elements).

To minimise health risks associated with nuisance insects it is recommended that the proponent undertakes land-use surveys within a 5-10 kilometre radius of the proposed estate to ascertain activities that may pose a risk from nuisance fly breeding, particularly if there are known stable fly problems in the area.

If any such activities are identified then effective management plans should be developed in consultation with the landowners on which the activities occur.

Pest management

All developments are likely to attract pests such as mosquitoes, cockroaches, rats and feral animals, which need to be controlled to prevent health concerns for the surrounding community.

Written evidence should be provided on the intention to develop and implement a pest management plan that appropriately controls pests and minimises any use of pesticides in the control of insect pests, weeds and feral animals where appropriate..

Pesticide use

There are general requirements for pests (weeds, weed pathogens, vermin, vectors, feral animals etc.) control on industrial estates and open areas in residential estates. Appropriate training and licenses are required in accordance with the *Health (Pesticides) Regulations 2011* to apply pesticides (insecticides and herbicides)

Written evidence should be provided on the intention 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.

If a proponent wishes their own employees to apply pesticide(s) as part of their Pest Management Program, then the employees should be provided with sufficient knowledge, skills, training and the personal protective equipment to safely apply the pesticide(s). The pesticides available to non-licensed individuals may differ in formulation and strength which should be considered when developing a pest management plan.

Contaminated sites

Industrial estates may be proposed on land that is potentially contaminated from previous or existing land uses. Contamination may be of ground and surface waters and soil, and result from the release of hazardous substances associated with industrial and commercial activities, poor asbestos removal practices or dumping, or the distribution of acid sulphate soils.

If a site is suspected of or known to be contaminated it will need to be reported to the Department of Environment Regulation (DER) in accordance with the *Contaminated Sites Act 2003*.

DER will assess and classify the site if necessary, which may trigger a formal process of site investigation and/or clean-up. The aim of this work is to ensure that any contamination does not present an unacceptable risk to the environment or to people.

Acid sulfate soils

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

When ASS is 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 into the surrounding environment.

The production of hydrogen sulphide gas from ASS is also a concern for public health.

Further queries on contaminated sites and ASS should be directed to the DER Contaminated Sites Branch. DER will request DOH advice on human health issues and public risk related to contaminated sites and ASS as required.

Radiation safety

Power lines, electromagnetic fields and health

The magnetic field from a power line can vary widely because the current in the wires depends on the amount of power consumed. On the other hand, the electric field from a power line varies very little because the voltage essentially remains constant.

Electric and magnetic fields are also different in the way they interact with our bodies. Electric fields have very little penetration, while magnetic fields can penetrate to our inner organs.

The strongest electromagnetic fields (EMFs) are found around those major transmission lines that carry the highest voltages and currents. EMFs are also present around suburban distribution systems that, although at much lower voltages, still carry large currents.

Each power line runs along a corridor of land called an easement. The width of the easement is determined by a number of factors, including the electrical load on the line. The widest easements,

naturally, are given to the lines with the highest loads e.g. an easement width of 60 metres is typical for 330kV lines.

Public access to an easement is permitted, but building and long-term occupation are not. At the edge of an easement, the EMFs are appreciably lower than they are in the centre. The World Health Organisation limits are not exceeded anywhere within easements; the EMFs outside easements are consequently well below these limits.

On this basis, there is no reason to discourage either Industrial development that borders power line easements, or short term recreational activity within easements.

The Radiation Safety Act and Regulations specify maximum exposure limits for non-ionising emissions from radiofrequency radiation, ultraviolet radiation and electromagnetic fields from power lines and electronic equipment. Where a potential hazard in this area may arise, the Radiation Health Unit can provide advice on determining compliance to the relevant standards or guidelines.

Climate change – health considerations

It is now known that our changing climate presents a significant and emerging threat to public health. While efforts to mitigate the effects of climate change are occurring on a global level some individual and communities will also need to adapt to changing environmental conditions to stay healthy. Emerging public health impacts of climate change include heat waves and other extreme weather events and a reduced water supply. Some relatively simple strategies that developers can employ to mitigate public health impact of climate change include.

Heat waves

- Reducing the effect of heat stress through industrial and residential design plans which retain natural vegetation and trees that help to cool industrial and urban environments.
- Considering building material with low albedo effects and
- Employing passive solar designs for buildings.

Extreme weather related health effects

- Developments should not be located in flood plains and should be designed to withstand extreme weather conditions.
- In bushfire prone areas, industrial and residential developments should comply with local planning authority requirements. Such requirements may prevent development in fire prone areas or may require developers to abide by particular building codes and occupants to develop fire protection plans.

Water consumption

- Consideration should be given to the supply and use of water, particularly in regional areas, and adopting approved methods to reduce water demand and reuse grey or waste water.

Features of Industrial Estates

Healthy built environments and Work force wellbeing

The Department of Health supports strategies that create an industrial estate that supports physical activity and healthy eating for workers and visitors.

Key principles in designing the built environment can contribute to the health and wellbeing of the industrial estate. There are a number of key principles that can be adopted or adapted to suit the level of industry; heavy industry may have different requirements compared with light industry.

- Mixed land-use integrated with transport.
- Accessible, convenient and safe active transport (walking, cycling and public transport).

- Well connected streets, pathways and walking/cycling routes.
- An attractive and welcoming industrial form.
- Safe and accessible places for all users.
- Parks and open space with a mix of formal and informal physical activity uses and gardens.
- Supporting infrastructure that encourages physical activity e.g. lighting, bike lockers and shade.
- Easy access to healthy food

Workforce wellbeing is the prerogative of the individual facilities and businesses within an industrial estate however planners and developers have an opportunity to promote health and wellbeing through land-use planning. When these design principles are integrated and applied correctly a range of health, social, economic and environmental benefits will follow. It can improve the wellbeing of the workforce and attract future investment.

The modern workforce is relatively more health conscious and selective in what they consume. Varied and nutritious food options for the workforce and visitors to an industrial estates to be encouraged. A proponent should consider:

- How food will be supplied and transported safely to the site.
- If the industrial estate/development is to incorporate a food business (lunch bar, etc.) then such businesses will need to comply with the *Food Act 2008*, associated standards, regulations and guidelines.

Disaster preparedness and emergency management

Industrial estates vary in size and complexity and it is a key requirement that an emergency plan is tailored to each facility within the estate. A less hazardous facility may require simple plan compared with a more hazardous facility.

Industrial activities/accidents can result in fires, blasts and other explosions that can cause emissions to air, water and soil to the surrounding areas. Industrial estates in close proximity to residential areas may require a different level of emergency medical response and disaster recovery compared with industrial estates that are located in isolated or remote areas.

Emergency medical response and emergency disaster recovery plans address not only internal emergencies (worksite accidents, etc.) but also external threats such as bush fire, cyclones, floods, etc. Access/egress to the industrial site or estate may be compromised during an emergency and /or disaster.

Safe Work Australia has developed a *Guide for Major Hazard Facilities: Emergency Plans*.

This guide is available for download from the Safe Work Australia website:

<http://www.safeworkaustralia.gov.au/sites/SWA/about/Publications/Documents/667/Emergency%20Plans.doc>

Community Consultation

DOH regards community consultation as an important component of activities undertaken during the planning stages for new development. Community consultation provides important opportunities to develop two-way relationships between industry and communities affected by planning decisions. DOH has developed a guide to assist proponents engage with communities.

Public Health consultation: a guide for developers.

http://www.public.health.wa.gov.au/2/1397/2/community_consultation.pm

Further information

The Public Health Division (Environmental Health Directorate) 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 Industrial estates, precincts and developments. For further information visit: www.health.wa.gov.au



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