6.0 ENVIRONMENTAL EMISSIONS

6.1 RELATIONSHIP WITH THE PLANNING SCHEME

(1) The purpose of this policy is to set out the requirements for the preparation and submission of development applications, including technical reports, for sites that have the potential to emit, or be impacted adversely from, environmental emissions such as air or noise.

(2) This part sets out:

(i) information council may request to demonstrate compliance with the performance outcomes of the code. These are contained in the following subsections:
- 6.2.1.1 Air quality reports
- 6.3.1.1 Noise reports
- 6.3.1.2 Noise management plans

(ii) guidance for applicants on approaches to air quality and noise management. These are contained in the following subsections:
- 6.2.2.1 Air quality management
- 6.3.2.1 Noise impacts
- 6.3.2.2 Alternative noise criteria
- 6.3.2.3 Noise management and reduction
- 6.3.2.4 Noise barriers

Note: Where a development includes a devolved Environmentally Relevant Activity as defined under the Environmental Protection Act 1994, this part of the development is assessed for environmental impacts in accordance with the Environmental Protection Act 1994.

The Department of Environment and Science has developed the following guidelines to support environmental authority applications with air and noise impacts:
- *Guideline - Environmental Protection Act 1994 - Application requirements for activities with impacts to air; and*
- *Guideline - Environmental Protection Act 1994 - Application requirements for activities with noise impacts.*

6.2 AIR QUALITY

6.2.1 Information Council May Request

6.2.1.1 Air Quality Reports

(1) An air quality report may be required for a proposed development that has the potential to emit air pollutants that could have an adverse impact on air quality due to the volume or type of emissions and/or the proximity of the development to a sensitive land use.

(2) An air quality report is required to determine potential air quality impacts and matters that must be addressed to ensure the proposal meets the air quality requirements of the relevant codes.

(3) The report must describe the existing air environment, the predicted air quality and any health risk impacts and assess these impacts in comparison to the applicable air quality objectives.

(4) Air quality reports must be prepared by a suitably qualified person who has demonstrated practical and theoretical knowledge of air quality assessments.

(5) An air quality report must contain the following –

(a) A detailed site plan showing the layout of the site including main emission sources and the surrounding environment including local industries, sensitive receptors and topography;

(b) A detailed description of site activities including:
  (i) the type of emissions, such as stack, area/volume, fugitive;
  (ii) the operational parameters of all emission sources, including information such as variations to emission rates due to "peak" or "average" emissions, or upset conditions;
  (iii) a description of the processes conducted at site, including operational hours;
  (iv) the technology and design required to achieve best practice environmental management;

(c) A discussion of the prevailing meteorology based on on-site data (where available) or the closest monitoring information representative of the proposed site. This should include wind roses and an analysis of wind characteristics that are important to the dispersion of pollutants;

Note: The Queensland Department of Environment and Science's Air Quality Sampling Manual provides guidance on measuring meteorological parameters when completing air dispersion modelling.

(d) An estimation of emissions. Emissions can be estimated using various methods such as -
  (i) National Pollutant Inventory Emissions Estimation Technique Manuals;
  (ii) USEPA AP 42 Emissions estimations handbooks;
  (iii) from monitoring or stack testing;
  (iv) industry specific best practice guidelines;

(e) An assessment of the existing air quality including a description of the surrounding land uses that may affect ambient air quality. Where available, air quality information from nearby monitoring stations should be included. The Queensland Department of Environment and Science has accepted the use of the 99th percentile for determining background pollution concentrations;

(f) Dispersion Modelling (where undertaken) should consider the following:
  (i) an appropriate dispersion model (e.g. CALPUFF) should be chosen in accordance with the New South Wales government's *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW;*
  (ii) if the AERMOD model is selected, then the meteorological data file needs to be prepared in accordance with the Victorian Environmental Protection Agency document entitled: *Construction of input meteorological data files for Environmental Protection Agency Victoria Regulatory Air Pollution Model (AERMOD), Publication No. 1550, 2013*; meteorological data is site representative across all seasons over at least one year;
  (iii) simulated meteorological files may be used provided the data is demonstrated to be generated using appropriate methodologies and is representative of conditions of the site;
  (iv) building wake effects are included where there is an on-site or nearby building that may impact on plume dispersion;
  (v) terrain effects are accounted for where terrain may affect emission impacts;
  (vi) cumulative impacts are accounted for either in the model or in background monitoring data;
  (vii) variation to operating conditions and worst case scenarios. Apart from the normal suite of emission data such as emission rate, temperature, exit velocity or stack dimensions, the variation in process characteristics that impact on

emissions need to be considered, such as hours of operation, upset conditions, different feedstocks and fuels, and changes in process controls;

(viii) the grid spacing of the receptor grid is chosen so that the predicted maximum concentration is not underestimated. Discrete or elevated receptors are included in the assessment in order to assess the impact where applicable;

(ix) pollution contours for all pollutants, and tables summarising the predicted ground-level concentrations at sensitive receptors, are included with comparisons against relevant air quality standards;

(g) where there is potential for odour impacts on sensitive receptors, the following additional information is required to determine the likelihood of adverse odour impacts:

(i) details of the modelled odour concentrations at the "most exposed existing or likely future off-site sensitive land uses" including a comparison with the odour criteria list in the relevant planning scheme code

(ii) recommendations to minimise as much as reasonably practicable the impact of odour emissions at sensitive land uses which may include the provision of adequate separation distances, edge/buffer treatments, waste minimisation and best practice control activities, refer to Table 1 of this policy for further information.

Note: For further guidance on odour impact assessment reports refer to the Queensland Department of Environment and Science's Odour Impact Assessment from Development Guideline. For additional reference material for assessment and measurement of air quality refer to Australian Standard 4323.3:2001 Stationary Source Emissions - Determination of Odour Concentration by Dynamic Olfactory.

(h) recommendations to minimise the impact of air quality/odour emissions, including emission control technology and adequate setback distances where a sensitive land use may be affected.

6.2.2 Guidance for Applicants

6.2.2.1 Air quality management

(1) Applicants are encouraged to take opportunities to reduce air emissions through best practice management and the application of the management hierarchy for air emissions. This management hierarchy is based on; avoid, recycle, minimise and manage, as described in the *Environmental Protection (Air) Policy 2008*. Some examples of waste prevention and minimisation, cleaner production and best practice environmental management are provided in Table 1 below.

Table 1 – Methods to minimise impacts from air emissions

Design and operations management	Maintain adequate buffers between operations and nearest sensitive land use.
	Incorporate alternative attenuation measures into the development to reduce nuisance impacts at sensitive land use.
	Locate and design the buildings and infrastructure to reduce potential impacts on adjacent land uses, for example locate building openings, exhaust vents, stacks, and refuse storage areas furthest from sensitive land uses.
	Provide sealed areas on site for vehicle manoeuvring and access.
	Clean equipment, work and traffic areas regularly to minimise the sources of dust and clean spilt materials immediately.
	At sites which have potential organic vapour emissions such as bulk fuel storage facilities and service stations, where practicable, install vapour recovery systems. Vent pipes are located as far away as possible from sensitive land uses.

	Develop and implement an environmental management plan that details the procedures for air quality management and pollution prevention, staff training, role definition and responsibilities and monitoring of performance.
Dry materials/stockpile handling	Maintain exposed stockpiles of raw or processed material to prevent fugitive dust emissions.
	Maintain stockpiles with walls on three sides and use water sprays to keep material damp where practicable.
	Keep stockpile materials 0.5 metres below wall tops and 0.5 metres inside open ends of stockpile walls.
	Enclose conveyors and chutes to minimise wind-generated dust emissions and provide a belt scraper on each conveyor.
	Use water sprays at receival areas and transfer points to keep material damp. Minimise drop height between conveyors.
	Store materials which are of fine or small particle sizes in sealed containers where practical.
Surface cleaning and/or coating	Surface coating by spraying is conducted in spray booths fitted with adequate filters to catch overspray. Filters can be waterwash, fibre or baffle. A baffle filter is only acceptable for small paint rates where paint is applied electrostatically. Where practicable surface coating and cleaning are conducted inside of buildings or enclosures.
	Spray booths are fitted with a stack of adequate height to ensure there is sufficient dispersion of exhaust gases. Stack outlets should not be fitted with conical weather caps, spinning tops or the like which would interfere with the free vertical discharge of the exhaust gases.
	Where possible, use water-based coatings or those which produce low emissions.
	Replace lids or cover odorous materials promptly after use to minimise evaporation, off site impacts and wastage.
	For surface coating processes, train staff in proper application techniques of materials to improve drying times and minimise odour impacts.
	Surface finishing equipment using abrasive and water blasting, sanding and grinding should have dust collection devices fitted, such as an enclosed booth, unless the object is too large or too heavy to fit in the booth or a fixed structure. Outdoors blast cleaning should preferably be carried out using a blasting gun or an airless applicator which sucks away the blasting agent together with any dust generated to a dust collector. Outdoor abrasive blasting should also be avoided during high wind conditions. Where impractical, adequate buffer distances are provided with effective barriers or screens to prevent adverse particulate emissions.
Emission controls	Point source particulate and odour emissions are vented through a filter to minimise the discharge. Filters include devices such as: wet scrubber, cyclone, bag, electrostatic, paper, activated carbon, and fibre. Odour control equipment can include one or a combination of technologies including condenser, scrubber biofilter and/or afterburner.
	Use mechanical ventilation systems and activated carbon filters or scrubbers to prevent the release of any uncontrolled and objectionable odours from buildings or rooms.
	Fabric or bag filters are installed to vent silos. Silos should also include automatic level sensors, air tight inspection hatch and an alarm or shut off valve to prevent overfilling and a burst bag detector system with ducting to ground level near tanker filling point.
	Dust extraction systems exhausting through fabric filters may be an effective alternative to water sprays. Water spray systems are installed for outdoor operations with a high dust generating potential.
	Fuel burning should not be carried out under reducing conditions which has the potential to cause smoke nuisance.
	Where facilities include bulk storage facilities for organic liquids, such as petroleum, implement design features and install suitable controls to manage organic vapour emissions.

	Volatile liquids are pumped instead of poured.
Waste management	Putrid or tainted organic materials should be stored in enclosed containers and refrigerated until removed from premises.
	The transportation of odorous wastes including sewage effluents, food processing waste, offal, manure or carcasses is in covered vehicles or containers/bins to minimise odours or dust emissions.
	Wastes are recycled and reused where possible. No wastes are burned as a disposal method, except where it can be demonstrated it is a form of energy recovery.

6.3 NOISE

6.3.1 Information that may be requested

6.3.1.1 Noise Reports

(1) Where a proposed development may cause a noise impact on a sensitive land use, a noise report may be required to confirm the development will not adversely impact on the sensitive receiving environment.

(2) Noise reports must be prepared by a suitably qualified acoustic consultant who has demonstrated practical and theoretical knowledge of noise assessments.

(3) A noise report must include the following information as a minimum:

(a) A site analysis plan at a scale of 1:100 or 1:200 indicating the location of the development noise sources and sensitive land uses;

(b) Plans showing the orientation of buildings and facilities including:
- (i) the location of openings such as delivery areas, loading bay areas, car parking and refuse collection;
- (ii) the location of noise generating plant such as air conditioning, pumps, compressors and fans with respect to adjacent sensitive land uses;
- (iii) details of proposed noise attenuation devices;
- (iv) design and construction materials to be used;
- (v) sketch plans and elevations showing building design, building layout and materials;
- (vi) the façade noise level used as the basis for calculating building attenuation requirements at each location including reduction weightings (Rw) for the building;

(c) Proposed operations including a comprehensive description of -
- (i) the proposed operational hours, site operations and activities;
- (ii) plant and equipment to be used, including its location, time and period of operation, and frequency of use;
- (iii) the operating sound power level in dB(A) and frequency analysis for all proposed equipment and plant;
- (iv) an accurate description of any noise with annoying characteristics described in terms of the noise level, frequency and duration of occurrence;
- (v) details of the frequency of proposed transport to and from the site including deliveries;
- (vi) noise sources from surrounding businesses and activities including the location, nature and operational hours;

Note: If an exact description of equipment cannot be supplied, noise data from equivalent equipment operating at similar operating conditions may be accepted as a substitute. Ensure transport routes are located to cause minimum noise impact in surrounding areas and are identified on a suitable map.

(d) Noise issues - all noise issues associated with a proposed development must be clearly defined, preferably in a table or a list. Minor noise issues which do not justify a full analysis should still be identified and reasons given to explain their insignificance.

(e) Noise control strategy - a clear and concise statement and plan must be provided which sets out the proposed recommendations to deal with each of the identified noise issues. This may include a combination of-
  (i) source control - such as plant selection;
  (ii) source modification - such as acoustical treatments or management measures;
  (iii) propagation control - such as buffers and barriers;
  (iv) receptor modification - such as a dwelling upgrade;

(f) Provide details of the noise attenuation measure to be implemented to reduce noise levels to achieve the relevant noise criteria including the methods used to calculate this attenuation. Where acoustic barriers are recommended, associated landscaping plans are required demonstrating compliance with diagrams 1, 2 or 3 of Appendix A. For further information refer to section 6.5.5.3 Noise Reduction and Table 6 - Methods to minimise impacts from noise emissions.

(g) Noise monitoring/measurements (where required) must include:
  (i) a map showing the location of measurement positions, detailing microphone height and orientation, and including details of any obstructions or interference such as reductions in the angle of view;
  (ii) reflective surfaces and atypical barriers are avoided where possible when taking measurements;
  (iii) the type of sound being measured and the character of the sound field;
  (iv) the sound power levels obtained, including frequency analysis, where relevant;
  (v) the sound pressure levels measured at each monitoring location, including output data such as log files, traces, and charts from the noise monitoring equipment;
  (vi) The descriptors for all noise measurements for example $L_{A10,}$ L_{Amax}, L_{A90}, L_{Aeq};
  (vii) frequency weighting and response time, fast/slow/impulsive, used for each measurement;
  (viii) duration of each measurement period. Measurement intervals shall not be less than 15 minutes;
  (ix) date and time at which each measurement was performed. It is important the monitoring is carried out at times and over periods that adequately characterise the noise under investigation and the local acoustic climate. Justification of times and periods selected should be included;
  (x) noise levels should represent normal day to day operations;
  (xi) relevant meteorological conditions and other site considerations during assessment. These include, for example, air temperature, relative humidity, barometric pressure, wind speed and direction, rain, aircraft noise, vehicle noise and insect/wildlife noise;
  (xii) A description of the nature of ground cover, for example, thick grass, shrubbery and dense vegetation between the proposed development site and the area likely to be influenced;
  (xiii) noise level or noise contour predictions in the locality both with and without noise attenuation;
  (xiv) the assessment should include an evaluation of a range of noise attenuation options and recommendations to mitigate potential noise nuisance;
  (xv) provide details and justification of the methodology used, including all assumptions made as part of the assessment;
  (xvi) name of manufacturer, type and serial numbers of all monitoring and calibration equipment;
  (xvii) last laboratory calibration date, internal reference check and external calibration results before and after measurement;
  (xviii) name of the person who conducted the assessment and the name of the report author, if different.

(h) Noise predictions and calculations provided must include:
  (i) a description of the modelling methods applied;
  (ii) details of noise measuring and modelling procedures, calculations and assumptions;
  (iii) name of the model used for the predictions;
  (iv) monitoring data which supports calculations resulting from modelling;
  (v) for any source noise that may have tonal or impulsive characteristics, provide details of the calculations for adjustments/corrections;
  (vi) where tonal components are expected to be present, one-third octave band predictions are required to adequately describe the contribution from these noise sources. The level and frequency of occurrence of impulsive noise, or noise with other annoying characteristics such as amplitude or frequency modulation or information content, should be provided;
  (vii) individually predicted components are combined to produce the predicted cumulative noise impact at each receptor site;
  (viii) calculations showing effectiveness of proposed noise attenuation measures such as distance attenuation and building attenuation;
  (ix) predicted noise levels are compared with acceptable levels and/or the acceptable solutions specified in the relevant codes. Exceedences are identified separately and the relevant degree of noise reduction required to achieve compliance with the appropriate criteria is specified.

Note: The noise assessment must comply with the Queensland Department of Environment and Science's Noise Measurement Manual and Australian Standards.

6.3.1.2 Noise Management Plans

(1) A Noise Management Plan is required when potential noise nuisance can be effectively controlled through management measures.

(2) A Noise Management Plan allows an applicant to monitor and ameliorate potential noise nuisance through documented processes which can be regularly reviewed and amended as per site requirements.

(3) A Noise Management Plan must include:
  (i) the intended noise reduction measures and their anticipated performance;
  (ii) management measures include all noise control actions which rely on people to behave in a particular way. For example requiring staff to restrict certain activities to certain times or to intervene by closing doors or re-directing activities;
  (iii) performance indicators, a review schedule and indicate the responsible person(s) for achieving the aim of the plan;

6.3.2 Guidance for applicants

6.3.2.1 Noise Impacts

(1) Noise is assessed as part of the development application to enhance or protect acoustic environmental values in a manner consistent with the objectives in the *Environmental Protection (Noise) Policy 2008.* This policy identifies environmental values to be enhanced or protected, these being qualities of the acoustic environment that are conducive to:
  (a) The wellbeing of the community of a part of the community, including its amenity;
  (b) The wellbeing of an individual, including the individual's opportunity to have sleep, relaxation and conversations without unreasonable interference from intrusive noise.

(2) Noise can be defined as unwanted sound that unreasonably intrudes into our daily activities and can cause varying degrees of nuisance and annoyance. Noise that occurs at night is more likely to disturb a community than noise that occurs during the day. Noise may contain annoying characteristics, such as -

(1) tonality - "humming" and "whining";
(2) modulation - regular changes in level or pitch such as a siren;
(3) impulsiveness - "hammering".

6.3.2.2 Alternative Noise Criteria

(1) Where noise criteria cannot be achieved the comparison of like parameters can be applied. Table 3 can also be used to provide a qualitative description in relation to changes in sound pressure level at sensitive receptors.

Table 3 - Subjective Effects of Changes in Audible Sound Pressure

Change in Sound Pressure Level (dB)	Change in Apparent Loudness
+3 dB	Just perceptible
+5 dB	Clearly noticeable
+10 dB	Twice as loud
Reference: Bies D.A. & Hansen C.H. (1996) Engineering Noise Control Theory and Practice, Second Edition; Department of Mechanical Engineering, University of Adelaide: South Australia.	

6.3.2.3 Noise Management and Reduction

(1) Applicants are encouraged to take opportunities to reduce noise emissions through the best practice environmental management measures. Such measures include noise minimisation technology, construction, design, location, form, environmental performance, management considerations and alternatives. Examples are given in Table 4.

Table 4 – Methods to minimise impacts from noise emissions

Siting and design	Select an appropriate site for the use considering the proximity to sensitive land uses and the local meteorological conditions
	Design site layout to ensure building openings, roads, parking areas and other major activities and operational areas are located away from current or future sensitive land uses
	Where possible use the layout of the buildings, site infrastructure and natural topography as noise barriers
	Where possible confine noisy processes to areas protected by enclosures or barriers
	Locate noisy processes such as loading bays and entrances/exits away from sensitive land uses
	Locate noise sources such as air compressors, pumps and similar in areas furthest from sensitive land uses, provide effective noise barriers or enclosures, and keep doors on enclosures closed when operating
Construction standards	Vehicle traffic areas are paved, have low gradients and are maintained in good condition
	Install double-glazing to windows and sound locks to doors facing sensitive land uses
	Buildings housing noisy operations, activities or equipment are constructed of suitable materials to reduce noise transmission such as ceilings and walls lined with sound absorbing material
	Reduce structure-borne noise and vibration by mounting equipment on appropriate isolation systems designed by a specialist in this field
Operation standards	Install noise suppression devices to equipment according to the manufacturer's specifications and ensure the efficiency of these devices is maintained

	Design and maintain adequate noise buffers between noise sources and sensitive land uses. In particular, install noise barriers such as screens around noisy equipment, operations and activities
	Fit all diesel engines and noisy vehicles with efficient exhaust mufflers
	Avoid installing machinery that may have humming or whirring components or impulses, or annoying tonal or hammering noises. If such machinery is installed, noise suppression devices are applied to mitigate potential nuisance
	Fit effective inlet and exhaust silencers to air compressors and ensure that air pressure operated controls and air operated valves on silos and hoppers are equipped with silencers
	Where possible, substitute equipment with an equivalent quieter/lower sound power level piece of equipment, for example, electric rather than diesel or air powered
	Where possible replace alarms, horns and telephone bells with visual signs, mobile phones or pagers
	Where blasting of rock or hard ground is involved, use technologies that minimise air blast overpressure and ground vibration
Noise management measures	Ensure that openings including windows and roller-doors facing sensitive land uses are kept closed and all unnecessary openings are sealed. Install signage to alert staff and/or visitors to their responsibilities to minimise the generation and propagation of unnecessary noise
	Limit noisy routine operations to standard working hours of 7am to 6pm Monday to Friday, and 7am to 1pm Saturday. Noisy work should not be carried out on Sundays or public holidays, except where approved as part of the land use or another approval such as an activity under the *Environmental Protection Act (as amended)*
	Conduct noisy activities at times when the likelihood for nuisance is minimised, for example, the middle of the day
	Work outside of standard working hours is limited to quiet "finishing off" work and generally conducted within buildings
	Limit vehicle movements, especially deliveries and truck movements, to standard working hours
	Where possible, activities such as concrete pours are restricted to standard working hours. If activities are required to occur outside of these hours, affected premises are notified of the duration and times in advance of the event
	Employ regular inspection and maintenance programs to ensure noise control fittings such as seals, doors and exhaust systems are in good working order and prompt attention is given to loose or rattling covers, worn bearings and broken equipment
	Develop and implement an Environmental Management Plan including procedures for - (i) noise management; (ii) pollution prevention; (iii) staff training; (iv) customer education where applicable; (v) definition of roles and responsibilities; (vi) monitoring of performance; (vii) contingency actions.

6.3.2.4 Noise Barriers

(1) The use of barriers for noise attenuation is the least preferred option, however, the following should be considered during the design of the development where noise attenuation measures in the form of barriers, fences and vegetated buffers are required.

(a) The design of these noise attenuation measures should not -
(i) compromise the ability to protect property from crime and vandalism;
(ii) obstruct or reduce passage by pedestrians to public transport nor contribute to deterioration of accessibility to public transport;

(iii) create sterile areas that are unusable, unsafe and negatively affect the streetscape;
(iv) result in continuous barrier fencing along roadways which have both visual impacts and also impacts on people and wildlife movement;
(v) obstruct the overland flow of stormwater or cause increased flooding or ponding of stormwater;
(vi) compromise the requirements of State Planning Policy – state interest guideline - Biodiversity;
(vii) compromise the Redland City Council's Koala Conservation Agreement Program.

(b) Noise attenuation measures for dwellings or building façades should be designed as architectural features including the stepping of buildings, angling wall alignments, and roof line variation to add interest to the form and enhance the appearance to the street frontage.

(c) Noise attenuation measures are designed to facilitate wildlife movement while maintaining noise attenuation effectiveness by ensuring -
(i) vegetated earth mounds are considered in preference to fences or barriers;
(ii) suitable vegetation is provided adjacent to noise attenuation mounds, barriers and fences to facilitate wildlife movement;
(iii) attenuation barriers and fencing incorporate wildlife movement measures that are suitable to the species expected to use the area;
(iv) vegetation species selected are locally native species.

(d) Continuous barrier fencing is avoided along trunk collector and sub-arterial roads so as to not create sterile traffic corridors.

(e) Views are retained where possible by using appropriate buffer distances, height, orientation and materials.

(f) Where fencing is used it is articulated, landscaped and incorporates multiple access points for pedestrians and cyclists.

(g) Acoustic fencing is of low maintenance design.

(h) It should be demonstrated that other attenuation measures have been considered first as alternatives to structural barriers. For example, at the design phase of a development, consideration should be given to the use of land between the source and receiver which can increase buffers and assist in attenuation. Such land uses could be minor roads and/or parks.