9. Air environment

9. Air environment

This chapter presents the results of an air quality assessment of the JRYUP that has been undertaken by Katestone Environmental. This chapter has been prepared to address the requirements for the JRYUP EIS that are specified in Section 3.5 of the Terms of Reference.

The following air quality issues have been addressed:

- Quantifying the potential impact of emissions associated with the JRYUP, in particular:
  - Coal dust emissions from northbound coal trains in transit on the by-pass tracks
  - Oxide of nitrogen and particulate matter emissions from the combustion of diesel fuel by the shunt locomotives
- Highlighting the potential impact of construction activities
- Estimating greenhouse gas emissions
- Detailing of mitigation measures

9.1 Description of environmental values

9.1.1 Climate, meteorology and existing air quality

The nearest meteorological monitoring station to the Jilalan Rail Yard for which data is publicly available is operated by the Bureau of Meteorology at the Mackay Airport and is located approximately 35 km to the north.

The Mackay Airport meteorological monitoring station has been operating as an automated monitoring station for the last 10 years. Before this, the site was a manual station at the airport, beginning operation in the 1950s.

The nearest ambient air quality monitoring station to the Jilalan Rail Yard is located in a light industrial area within West Mackay and is operated by the Queensland Environmental Protection Agency (EPA). This monitoring station records winds and ambient particulate concentrations (as PM_{10}).

The summary of the data presented in the following sections is based on data from these two monitoring sites in Mackay.

9.1.2 Climate

This region has a subtropical climate featuring hot, humid and wet summers. Winters are warm with clear skies and low rainfall. The total annual average rainfall is 2,032 mm based on data collected by the Bureau of Meteorology at Mackay Airport. A large proportion of this rain (about 75 %) falls in the months December through to April, peaking in January and February. The driest months are August and September.

Figure 9.1 shows average, maximum and minimum monthly rainfall totals for the Bureau of Meteorology's station at Mackay Airport.

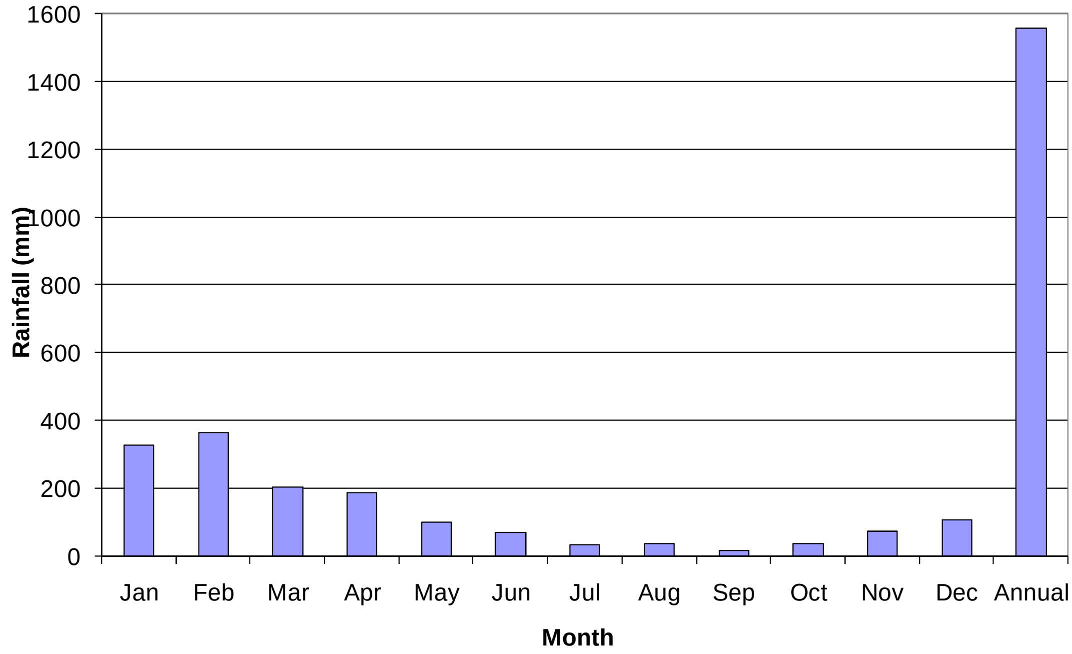


Figure 9.1 Mean monthly and total annual rainfall at Mackay based on data from the Bureau of Meteorology at Mackay Airport (1950-2007)

The maximum daytime temperatures are typically 29 to 30 degrees during the summer and 21 to 25 degrees during the winter months. Minimum overnight temperatures are typically around 23 degrees during the summer (wet) months and 13 to 14 degrees during the winter (dry) months. Mean monthly maximum and minimum temperatures are summarised in Figure 9.2, based on 44 years of data collected by the Bureau of Meteorology at Mackay. Maximum temperatures have reached 39 degrees and minimum temperatures have fallen to less than 4 degrees.

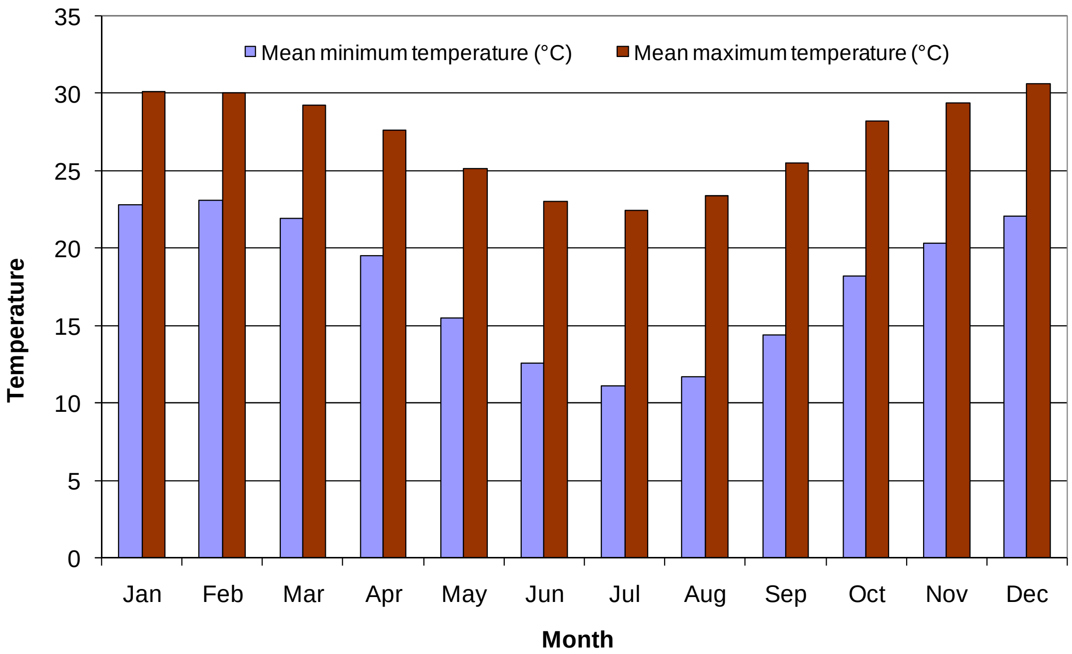


Figure 9.2 Mean maximum and minimum temperatures for Mackay based on data from the Bureau of Meteorology at Mackay Airport (1950-2007)

Mean 9 am relative humidity ranges from 66% in October to 80% in April and May and mean 3 pm relative humidity from 64% in September and October to 73% in February (refer Figure 9.3). Mean 9 am and 3 pm measurements of relative humidity are summarised in Figure 9.3 based on 51 years of data collected by the Bureau of Meteorology at Mackay.

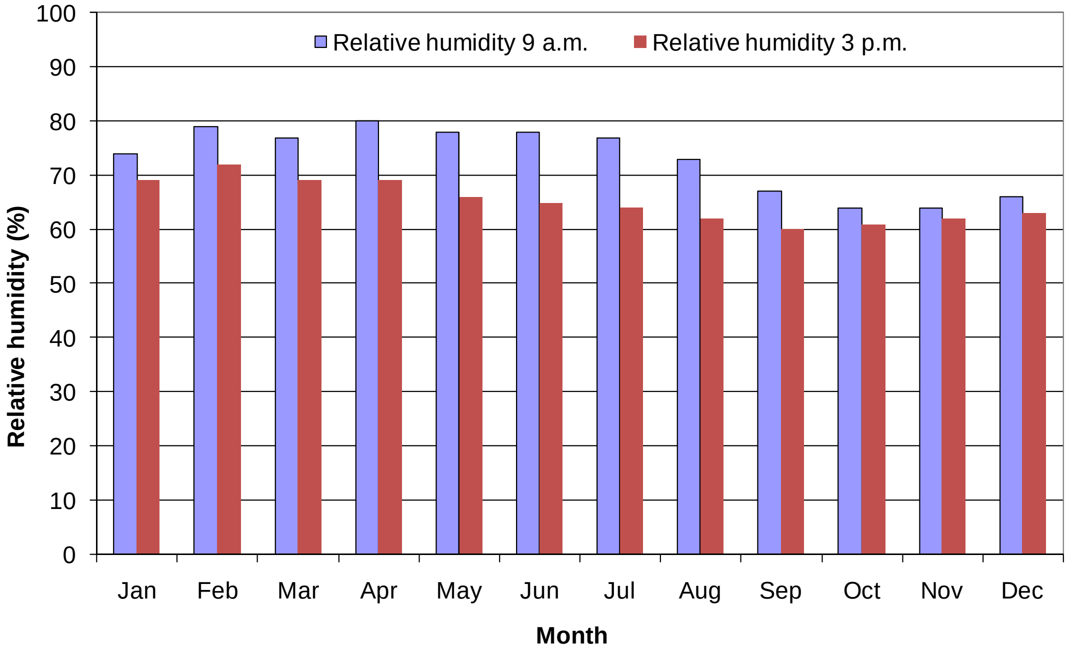


Figure 9.3 Monthly mean 9 am and 3 pm relative humidity at Mackay, based on data from the Bureau of Meteorology at Mackay Airport (1950-2007)

Predominant synoptic winds are from the southeast and are produced by a ridge of high pressure extending from the subtropical high-pressure belt that is frequently associated with a high-pressure system located over the Tasman Sea. Afternoon northeast sea breezes commonly occur during the warmer months. Fresh southeast wind can blow along the coast for lengthy periods during summer and autumn. Gale force winds are rare but do occur with tropical cyclones.

The cyclone season is from December through April with on average, three (3) tropical cyclones occurring every ten years (based on data from BoM from 1969-1999).

The Jilalan region has between 15 and 20 thunder days per year on average with the majority of these occurring from late spring through to early autumn.

Fog occurs on average nine times each year.

9.1.3 Meteorology

Wind data obtained at the Bureau of Meteorology's monitoring site at Mackay Airport between October 1995 and June 2007 is presented in Figures 9.4 to 9.6.

In general, although strong winds are evident from all directions, winds with speeds greater than 10 m/s are most frequent from the east-southeast through to the southeast. Winds from the west are most often light to moderate. Strong winds from the north and south are also observed.

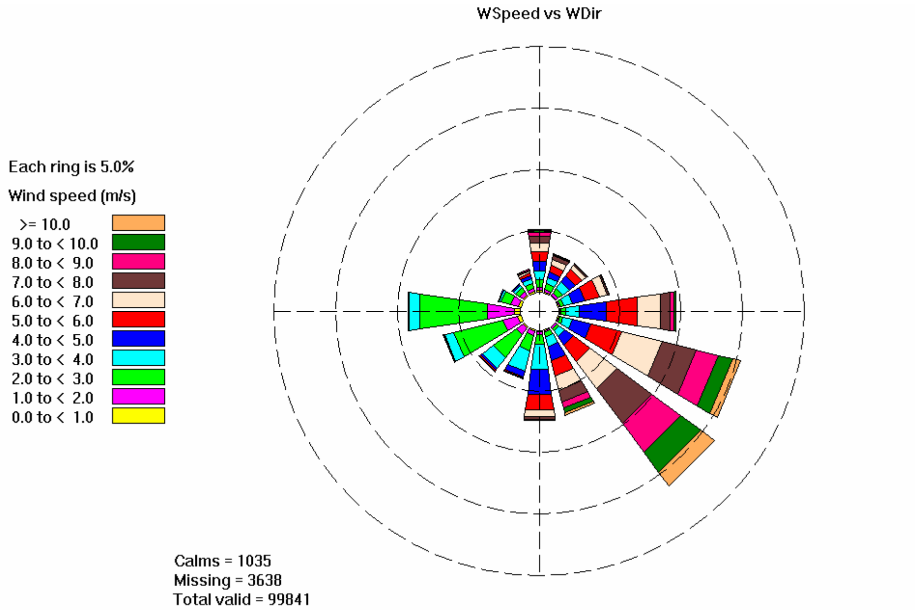


Figure 9.4 Direction and frequency of winds at Mackay, October 1995 to June 2007

A more detailed interpretation of the winds at this site may be obtained from Figure 9.5 which presents wind roses for the ten year period as a function of the time of day.

In general, light winds during the early morning (midnight to 6 am) give way to east-southeast to southeast winds by late morning. These easterly dominated winds persist into the late afternoon and evening before returning to predominantly westerly during the late night to early morning.

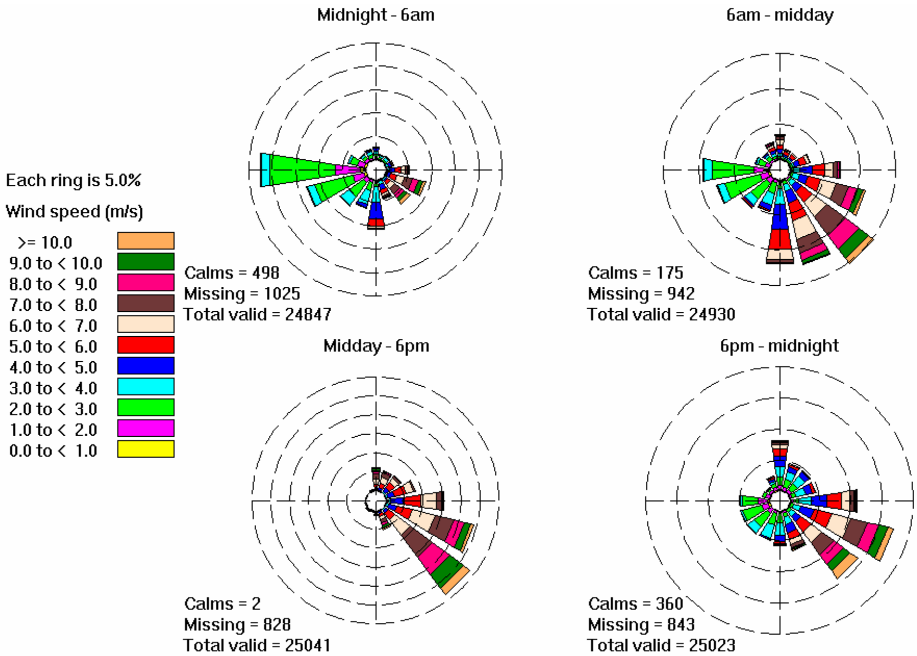


Figure 9.5 Direction and frequency of winds during early morning (upper left), morning (upper right), afternoon (lower left) and night (lower right) at Mackay, October 1995 to June 2007

Presented in Figure 9.6 are the winds as a function of season. Here the presence of strong winds from the north is evident during spring and summer, as were seen to occur in Figure 9.4 and Figure 9.5.

The occurrence of strong southerly winds is observed to occur more frequently during autumn and winter. The light westerly winds are observed to occur during all seasons, but less frequently during the summer.

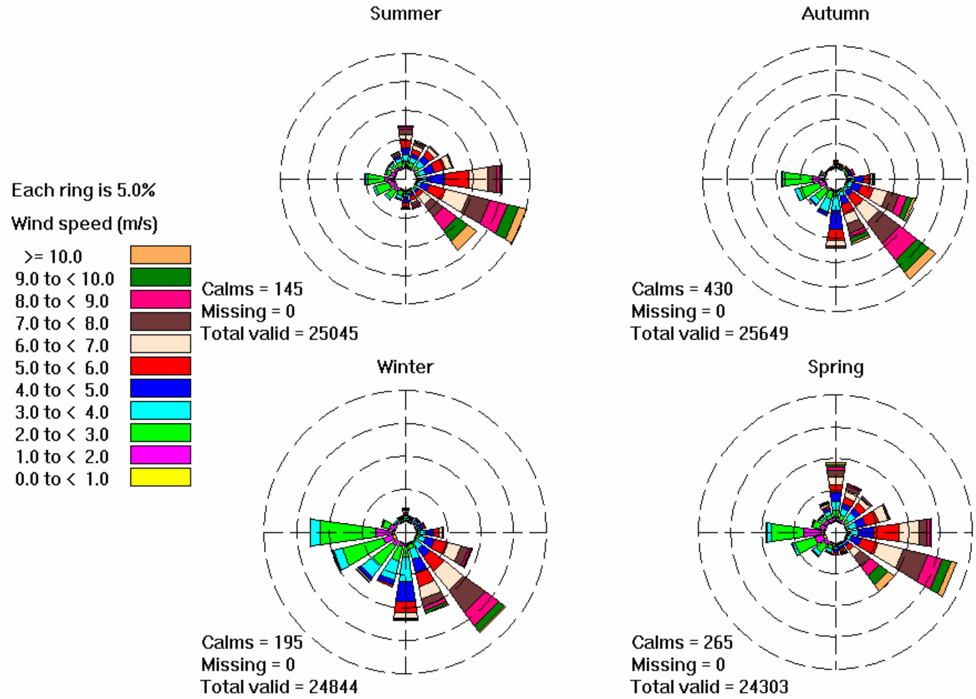


Figure 9.6 Direction and frequency of winds during summer (upper left), autumn (upper right), winter (lower left) and spring (lower right) at Mackay, October 1995 to June 2007

9.1.4 Existing air quality

With respect to the current assessment, particulate matter is the most important air pollutant. Presented in Figure 9.7 is a time series of the 24-hour average concentration of PM_{10} as measured at the EPA's monitoring site in Mackay between January 1998 and June 2007.

A regional dust storm which affected the area on 14 and 25 October 2002 is clearly evident. The Bureau of Meteorology's Monthly Weather Review does not mention any regional or local phenomena (such as dust storms or bushfires) that may have caused the elevated levels of PM_{10} during the 4 and 5 February 2005. Further investigation would be required in order to identify the source of the elevated PM_{10} levels during this period.

During the period from January 1998 to June 2007, there were a total of 24 days for which the EPA's monitoring site at Mackay recorded 24-hour average concentrations of PM_{10} that were greater than 50 $\mu g/m^3$, and 2 days with levels over 150 $\mu g/m^3$.

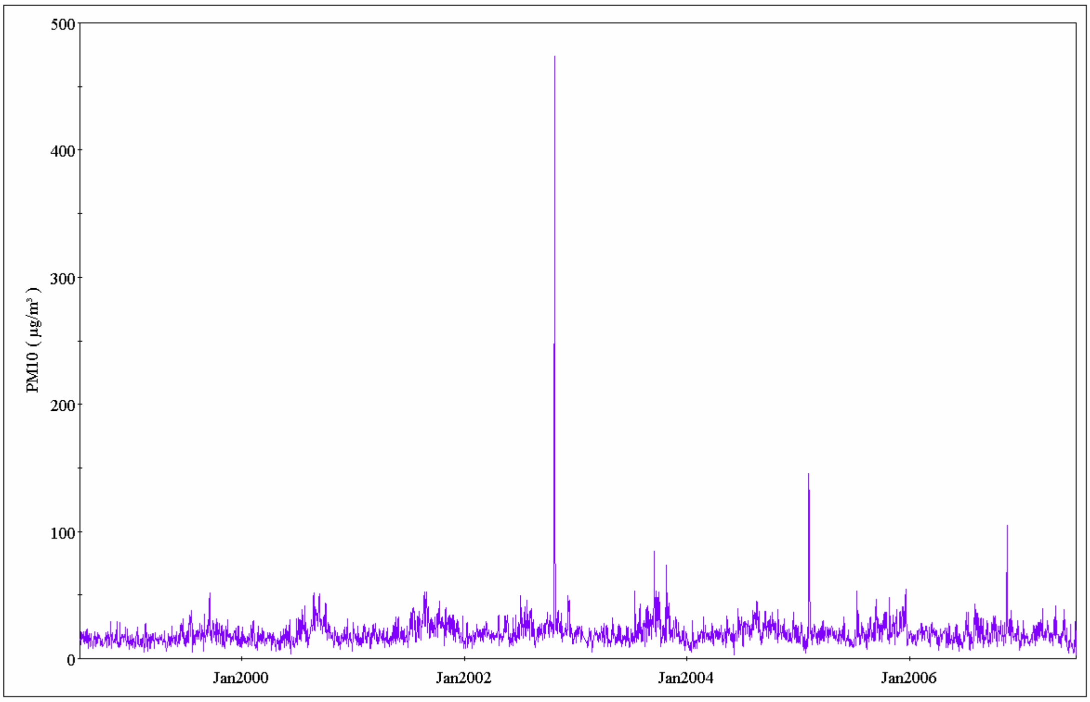


Figure 9.7 Time series of the 24-hour average concentration of PM_{10} based on data from the EPA's monitoring site at Mackay between January 1998 and June 2007

Presented in Figure 9.8 is a cumulative frequency distribution that shows the 24-hour average concentration of PM_{10} for the period from January 1998 to June 2007. The 95th percentile for the 24-hour average concentration of PM_{10} is 34.2 $\mu g/m^3$. The annual average concentration of PM_{10} is 20.4 $\mu g/m^3$. These statistics are commonly used in Queensland to represent the background level of an air pollutant.

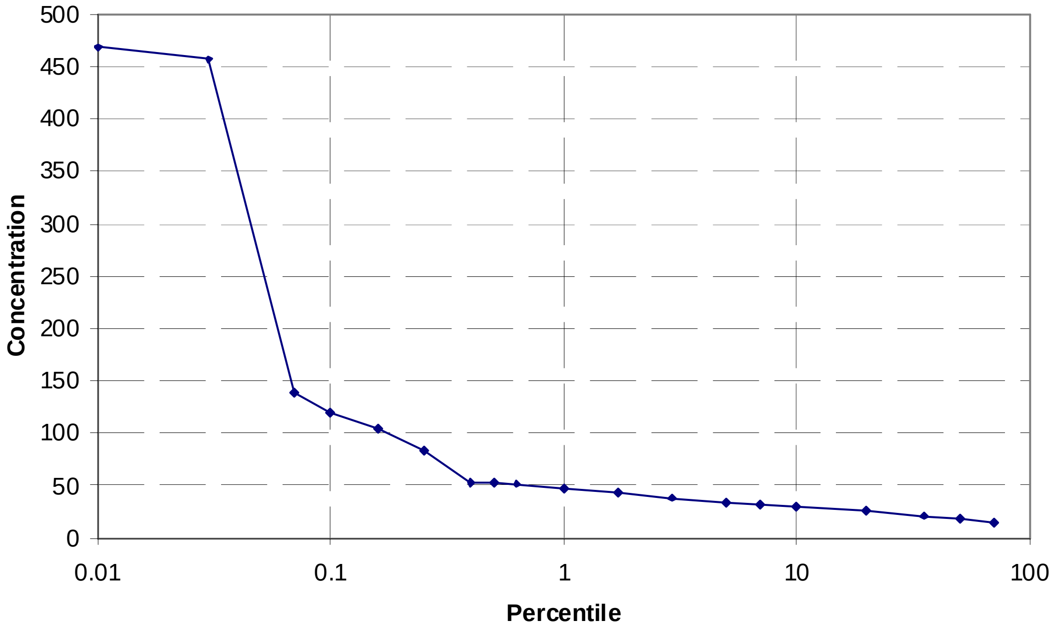


Figure 9.8 Cumulative frequency distribution of the 24-hour average concentration of PM_{10} based on data from the EPA's monitoring site at Mackay between January 1998 and June 2007

There are no measurements of total suspended particulates (TSP) from the EPA's monitoring station. Previous assessments by Katestone Environmental of data from monitoring sites at rural locations suggest that the background concentration of PM_{10} is approximately 50 % of the concentration of TSP.

Similarly, there are no measurements of dust deposition at this site. Based on estimates of background levels used for similar projects located in rural areas, an estimated background dust deposition rate of 20-30 mg/m^2/day has been used for the current study.

In order to estimate background levels of oxides of nitrogen, consideration has been given to other EPA monitoring sites that may be representative of the rural environment surrounding the Jilalan Rail Yard. Although potentially influenced by more urban activities than would be the case at Jilalan, the data from the EPA monitoring site at Toowoomba has been used to provide an estimate of the 1-hour average and an annual average background concentration of nitrogen dioxide. The 1-hour average background concentration of 46.2 μg/m^3 represents the 95th percentile concentration for the period July 2003 to January 2005. The concentration of 14.4 μg/m^3 represents the annual average for 2004.

The background concentrations of air pollutants used in the current study are summarised in Table 9.1. A summary of the air quality goals and standards for the listed pollutants is shown in Table 9.2.

Table 9.1 Background concentrations

Pollutant	Averaging period	Units	Concentration
Nitrogen dioxide	1-hour	μg/m^3	46.2
	Annual	μg/m^3	14.4
Total suspended particulates	Annual	μg/m^3	40.8[1]
PM_{10}	24-hour	μg/m^3	34.2
	Annual	μg/m^3	20.4
Dust deposition rate	Annual	mg/m^2/day	20-30

Table Note:
1 It has been assumed that 50% of background levels of TSP is in the form of PM_{10}.

There are no records of QR receiving any air quality (dust) complaints for the Jilalan area.

9.2 Ambient air quality criteria

The *Environmental Protection Act 1994* (EP Act) provides for the management of the air environment in Queensland. The legislation applies to government, industry and individuals and provides a mechanism for the delegation of responsibility to other government departments and local government and provides all government departments with a mechanism to incorporate environmental factors into decision-making.

The EP Act gives the Environment Minister the power to create Environmental Protection Policies that identify and aim to protect environmental values of the atmosphere that are conducive to the health and well-being of humans and biological integrity. The Environmental Protection (Air) Policy (EPP(Air)) was gazetted in 1997. The administering authority must consider the requirements of the EPP(Air) when it decides an application for an environmental authority, amendment of a licence or approval of a draft environmental management plan. Schedule 1 of the EPP(Air) specifies air quality indicators and goals for Queensland. Indicators and goals that are relevant for this project are reproduced in Table 9.2.

The National Environment Protection Council defines national ambient air quality standards and goals in consultation, and with agreement from, all state governments. These were first published in 1997 in the National Environment Protection (Ambient Air Quality) Measure (NEPM(Air)). Compliance with the NEPM(Air) standards is assessed via ambient air quality monitoring undertaken at locations prescribed by the NEPM(Air) and that are representative of large urban populations. The goal of the NEPM(Air) is for the ambient air quality standards to be achieved at these monitoring stations within ten years of commencement (ie in 2008).

A summary of these ambient air quality goals and standards are presented in Table 9.2.

Dust nuisance can occur due to the deposition of dust particles in residential areas. Elevated dust deposition rates can cause reduced public amenity through, for example, soiling of clothes, building surfaces and other surfaces. The dust deposition standard commonly used in Queensland as a benchmark for avoiding amenity impacts due to dust is presented in Table 9.2. The dust deposition standard is not defined in the EPP(Air) and is therefore not enforceable by legislation, but is recommended by the EPA as a design goal (pers. comm. Mr. David Wainwright Qld EPA Air Services Manager).

Table 9.2 Ambient air quality standards and goals relevant to the assessment of Jilalan Rail Yard Upgrade Project

Pollutant	Averaging period	Standard/goal	Units	Source of standard or goal
Nitrogen dioxide	1-hour	246 320	µg/m³	NEPM(Air) EPP(Air)
	Annual	62	µg/m³	NEPM(Air)
Total suspended particulates TSP	Annual	90	µg/m³	EPP(Air)
Particulate matter as PM_{10}	24-hour	50 150	µg/m³	NEPM(Air) EPP(Air)
	Annual	50	µg/m³	EPP(Air)
Dust deposition rate	Annual	120	mg/m² /day	Recommended EPA

9.3 Methodology

The aspects of the proposed upgrade of the Jilalan Rail Yard that are relevant to the air quality assessment include:

- New wagon maintenance tracks to the east of existing tracks
- New by-pass and provisioning rail lines to the east of the new wagon maintenance lines
- The relocating of wagon maintenance activities to the new wagon maintenance shed
- The relocating of provisioning activities to the new provisioning shed
- The expansion of the locomotive workshop to include the existing wagon maintenance facility
- The increase in train capacity through the yard, as well as
- Yard activities and changes in the frequency and duration of yard activities

The main sources of potential emissions associated with the operation of the Jilalan Rail Yard include:

- Coal dust emissions from coal wagons associated with northbound trains
- Emissions associated with the combustion of diesel fuel by the shunt locomotives used in the yards and sheds

9.3.1 Emission rates

Estimates of emission rates used for the assessment of the JRYUP were based on industry recognised methodologies (refer Appendix J).

Emission rates of TSP and particulate matter as PM_{10} emitted from coal wagons in transit that were used in the dispersion modelling are summarised in Table 9.3.

Table 9.3 Summary of emission rates of particulate matter from coal wagons in transit

Pollutant	Units	Current	Future
TSP	g/km/hour	570.9	728.4
PM_{10}	g/km/hour	199.8	254.9

Emission rates of oxides of nitrogen, TSP and particulate matter as PM_{10} emitted from coal wagons in transit that were used in the dispersion modelling are summarised in Table 9.4.

Table 9.4 Emission rates of particulate matter and oxides of nitrogen used in the modelling of the impacts of shunt locomotives activities on air quality

Pollutant	Units	Switch-cycle		Line-cycle	
		1-hour	24-hour and annual	1-hour	24-hour and annual
Total suspended particulates	g/s/loco	0.05	0.03	0.04	0.02
Particulate matter as PM_{10}	g/s/loco	0.05	0.03	0.04	0.02
Oxides of nitrogen	g/s/loco	1.44	0.81	0.98	0.55

Appendix J contains further details on project information, emission rates and meteorological data included in the air quality dispersion modelling.

9.3.2 Odour

The JRYUP is not expected to emit significant quantities of odorous air pollutants and consequently is unlikely to adversely impact on odour levels in the vicinity of the existing and proposed maintenance sheds and yards.

There are no activities that are major sources of odour associated with operations at the yard. A small amount of odour may be released as a result of the sewage treatment plants and combustion of diesel fuel by the shunt locomotives. However, this is expected to be minor in the vicinity of the shunt trains when operating and immeasurable at the location of the sensitive receptors.

Further quantitative assessments of potential odour impacts are unnecessary.

9.3.3 Dispersion modelling

The dispersion modelling of the impacts of the JRYUP on local air quality was conducted using a combination of the dispersion models Cal3QHCR and Ausplume.

Cal3QHCR has been used extensively in Queensland and New South Wales and is currently recommended by AusRoads and Australian regulatory agencies as being an appropriate dispersion model for estimating near-field impacts in the proximity of major roads. It has been used in the current project to model dust emissions from the loaded coal wagons that travel northbound through the rail yard to the port. The meteorological file used by Cal3QHCR was generated using the CSIRO's advanced meteorological model TAPM (The Air Pollution Model). Katestone Environmental frequently uses advanced numerical models to provide reliable simulated meteorological data for areas where there are no existing monitoring sites such as those maintained by the EPA.

Ausplume is a Gaussian plume dispersion model based on the Victorian Environment Protection Authority's "Plume Calculation Procedure" (EPAV 1985), that is itself an extension of the US ISC3 model of Bowers *et al* (1979). The model is designed to predict the concentrations or deposition of pollutants emitted from sources that may be stacks, area sources, volume sources, or any combination of these. Ausplume was used to model the impact of emissions of particulate matter and oxides of nitrogen from the combustion of diesel fuel by the shunt locomotives.

9.3.4 Limitations of the air quality assessment

The main limitations of the air quality assessment are associated with:

- The inherent assumptions associated with the development and application of the numerical modelling tools Cal3QHCR and AUSPLUME.
- Estimates and assumptions that were necessarily applied as a result of limited information on some aspects of the problem modelled.

These limitations include (but are not limited to):

- The methodology used to estimate dust and oxides of nitrogen emission rates, as well as the modelling approach. Both have been designed to provide a worst-case picture of the possible impact of activities at the rail yard. Such a worst-case approach aids in the identification of possible problem areas and/or meteorological conditions that may lead to elevated levels of criteria pollutants, in order to aid in the design process. Thus the results of the air quality assessment represent an upper bound on the potential impact of emissions from the Project on air quality, and are not indicative of precise ground-level concentrations that would occur during operation of the Project.
- The current assessment of the preferred alignment for the upgrade of the Jilalan Rail Yard is based on concept design information that has not yet been finalised.
- Due to limited observational data a synthesised meteorological data file was used to run the models.

The documentation that accompanies AUSPLUME identifies the following technical limitations of Gaussian plume models:

- Ignore or only partly account for horizontal and vertical variation in turbulence, wind speed and wind direction within the boundary layer.
- Predict ensemble-average concentrations but not the transient peaks caused by downdrafts in thermal convection eddies.
- Assume quasi-steady conditions. This precludes simulation of events such as inversion breakup fumigation.
- Ignore longitudinal diffusion (parallel to the plume axis), which restricts applications to wind speeds above about 0.5 m/s or so.
- Are unsuitable for most cases involving atmospheric chemistry.
- Use empirical dispersion parameters sigma y and sigma z that are difficult to determine experimentally beyond about 10 km from a source and become meaningless at distances sufficiently large for advection effects to dominate over diffusion (which may be only a kilometre or so in complex terrain).
- Cannot precisely parameterise the complex flow in the wakes of buildings or other obstacles.

Finally, it is important to note that all numerical models that are based on approximating a governing set of equations will inherently be associated with some degree of uncertainty. The more complex a physical scenario a numerical model is meant to represent, the greater the number of physical processes which must necessarily be parameterised. This frequently results in a large number of tune-able parameters within the model. There exists extensive in-house expertise in the use of Cal3QHCR and AUSPLUME within Katestone Environmental and our modellers make every reasonable attempt to ensure that model results are of the highest possible quality.

9.4 Potential construction impacts

9.4.1 General considerations and meteorology

The construction phase of the JRYUP has the potential to generate dust. Air quality management strategies will be established in order to mitigate and manage the potential impacts of construction activities on the degradation of local air quality, particularly with respect to increasing the number of potential sources of dust.

Activities which may lead to elevated levels of dust as a result of the construction during the Jilalan Rail Yard upgrade may include, but are not limited to:

- Clearing of vegetation and topsoil
- The demolition of dwellings and/or buildings and the removal of construction material
- Excavation and transport of materials
- Loading and unloading of trucks
- Movement or queuing of construction vehicles
- Re-entrainment of deposited dust by vehicle movements
- Wind erosion of stockpiles and unsealed roads

High wind conditions would increase the emission rates of airborne dust from stockpiles and exposed areas, while reducing the concentration of vehicle fumes. During high wind conditions, particular attention will be paid to dust suppression.

Dust generated by erosion from stockpiles requires sufficient wind speed over the stockpile surface to raise dust from the surface. Parrett (1992) notes that threshold friction velocities (at the material surface) of 0.15 m/s to 0.3 m/s are typically found for bulk materials, equating to a wind speed of 1.5 m/s to 3 m/s as measured at the standard of 10 m height.

A summary of wind speeds greater than 1.5 m/s and greater than 3 m/s as predicted by TAPM for the Jilalan site is presented in Table 9.5. Winds passing over a stockpile would direct emissions towards a given receptor location up to 16.6% of the time for 1.5 m/s winds, and up to 14.8% of the time for winds over 3 m/s.

In general, larger particles will deposit within a short distance of a stockpile, and will tend to not be emitted offsite, assuming that the boundaries of the site are located a sufficient distance from the stockpile.

Table 9.5 Percentage of 10 m level winds over 1.5 m/s and 3 m/s for each direction range for Jilalan generated by TAPM

Wind speed (m/s)	Wind direction by sector (percentage)																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total
Over 1.5m/s	2.9	3.8	3.9	3.8	8.2	13.3	16.6	8.6	8.1	6.5	6.6	2.6	1.9	2.0	3.7	3.3	95.7
Over 3.0m/s	1.6	2.4	2.3	2.2	6.0	10.9	14.8	7.2	6.7	5.2	5.5	1.9	0.8	0.7	1.9	1.9	72.3

9.5 Potential operational impacts

9.5.1 Methodology

Dispersion modelling was conducted using Cal3QHCR and AUSPLUME using one year of simulated meteorological data. Coal wagon emissions of particulate matter as well as diesel shunt train emissions of particulate matter and nitrogen dioxide have been explicitly modelled.

Nitrogen dioxide

In presenting results from the dispersion modelling it has been assumed that the conversion ratio of nitrogen dioxide to oxides of nitrogen is 30% for both the 1-hour and annual averaging periods.

However, the actual degree of conversion of oxides of nitrogen in the plume to nitrogen dioxide will depend on atmospheric conditions at the time that the emissions occur. The percentage of nitrogen dioxide within the plume exiting a stack is usually 5-10%. After release from the stack, nitric oxide gradually oxidises to form nitrogen dioxide. The rate and extent to which this occurs depends on the presence of other atmospheric pollutants such as ozone and volatile organic compounds, and on the presence of sunlight. Measurements around power stations in Central Queensland show, under worst-case conditions, that a conversion rate of 25% to 40% can occur within the first 10 km of plume travel and suggest a rate of 30% at distances less than 10 km. During days with elevated background levels of hydrocarbons (generally originating from bushfires), the conversion is usually below 50% in the first 30 km of travel (Bofinger *et al* 1986).

As the impacts from emissions from the shunt train locomotive are much more localised than the distances noted above, it is anticipated that the assumption of a 30% conversion rate of oxides of nitrogen to nitrogen dioxide will result in a conservative estimate of ground-level concentrations.

TSP and particulate matter as PM_{10}

For the modelling of dust emissions from the coal wagons in transit, results from the dispersion modelling for the ground-level concentration of total suspended particulates were used to calculate the maximum 24-hour average and annual average ground-level concentration of particulate matter as $PM_{10.}$ The NSW Mineral Council's Particulate Matter and Mining Interim Report (2000), Table 2.2 presents a comparison of NSW and US particle size data for coal, including the ratio of PM_{10} to TSP. Results from NSW suggest an average PM_{10} to TSP ratio of 39.1% but results presented do not differentiate between mining activities (ie blasting, truckloading, haul trucks etc). Results from US studies present ratios of PM_{10} to TSP for these different activities. In particular, for haul trucks, a ratio of PM_{10} to TSP of 31% is presented. Taking into consideration the results from both the US studies (for hauling activities) and the Australian studies, when presenting results for the assessment of the JRYUP, it has been assumed that 35% of TSP consists of particles within the PM_{10} range.

For the modelling of emissions of particulate matter resulting from the combustion of diesel in the shunt locomotives, results for the ground-level concentration of PM_{10} were used to calculate the annual particulate average ground-level concentration of TSP assuming that all particulate matter emitted from the diesel locomotive consists of particles within the PM_{10} range.

9.5.2 Interpretation of results

The objective of the current assessment is to aid in the project development process by identifying any possible air quality issues associated with the JRYUP. As such, a conservative approach has been adopted that aims to quantify worst-case impacts associated with activities at the rail yard based on future operating practices. The methodologies and/or aspects of the modelling of the JRYUP that have been applied in order to ensure a modestly conservative result include but are not limited to:

- The form of Perrett's equation used does not take into account the affect of rain to inhibit dust emissions.
- Although Cal3QHCR does incorporate hourly variations in wind speed and direction in order to predicted concentrations of pollutants, the emission rate of coal dust from trains was fixed at a constant value. This value was based on a worst case wind speed of 8.4 m/s that represents the maximum value for the wind that was predicted by TAPM in the vicinity of the Jilalan Rail Yard at any time during the one year period. This worst case emission rate has been assumed to be occurring at all hours of the day and all days of the year. The implications of these assumptions are particularly important when considering the predicted annual average concentrations of particulate matter.

- Emissions from diesel shunt trains have assumed that the shunt locomotives are stationary and closely located. Actual shunting activities will not be as localised as modelled.
- Shunt train activities are assumed to continue 24 hours/day, 365 days/year.

When considering results presented, it is important to note that the results from the dispersion modelling for the 1-hour average ground-level concentration of nitrogen dioxide and the 24-hour average ground level concentration of particulate matter are based on the maximum concentration of an air pollutant that is predicted at each of the receptors over the one-year period and thus represent a peak-impact scenario. The plots are constructed such that at each point in the domain, the maximum value is obtained and stored. As these maximum values may occur at different times for receptors at different locations, these figures do not represent a single snapshot of conditions at any given time.

It is also important to note that Cal3QHCR has been developed to estimate concentrations of pollutants at locations near major roadways with receptors required to be placed outside the 'mixing zone'. For the railway lines this restriction on the proximity of receptors to the railway equates to minimum distance of 4.6 m from the centre of the railway tracks which are assumed to be 3.2 m wide. Results presented within these boundaries are therefore not considered to be strictly valid. Visualisation packages such as the one used to present the results of the current study, interpolate results over a uniform domain, which includes the railway lines themselves. Therefore, only results presented that are outside the 'mixing zone' should be interpreted as being a valid estimate of concentration levels at that site.

9.5.3 Nitrogen dioxide

Results of the dispersion modelling using AUSPLUME are summarised in Table 9.6 for the 99.9th percentile 1-hour average and annual average ground-level concentration of nitrogen dioxide, at the location of the most affected receptors. Results for all sensitive receptor locations are included in the Technical Report, Katestone (2007).

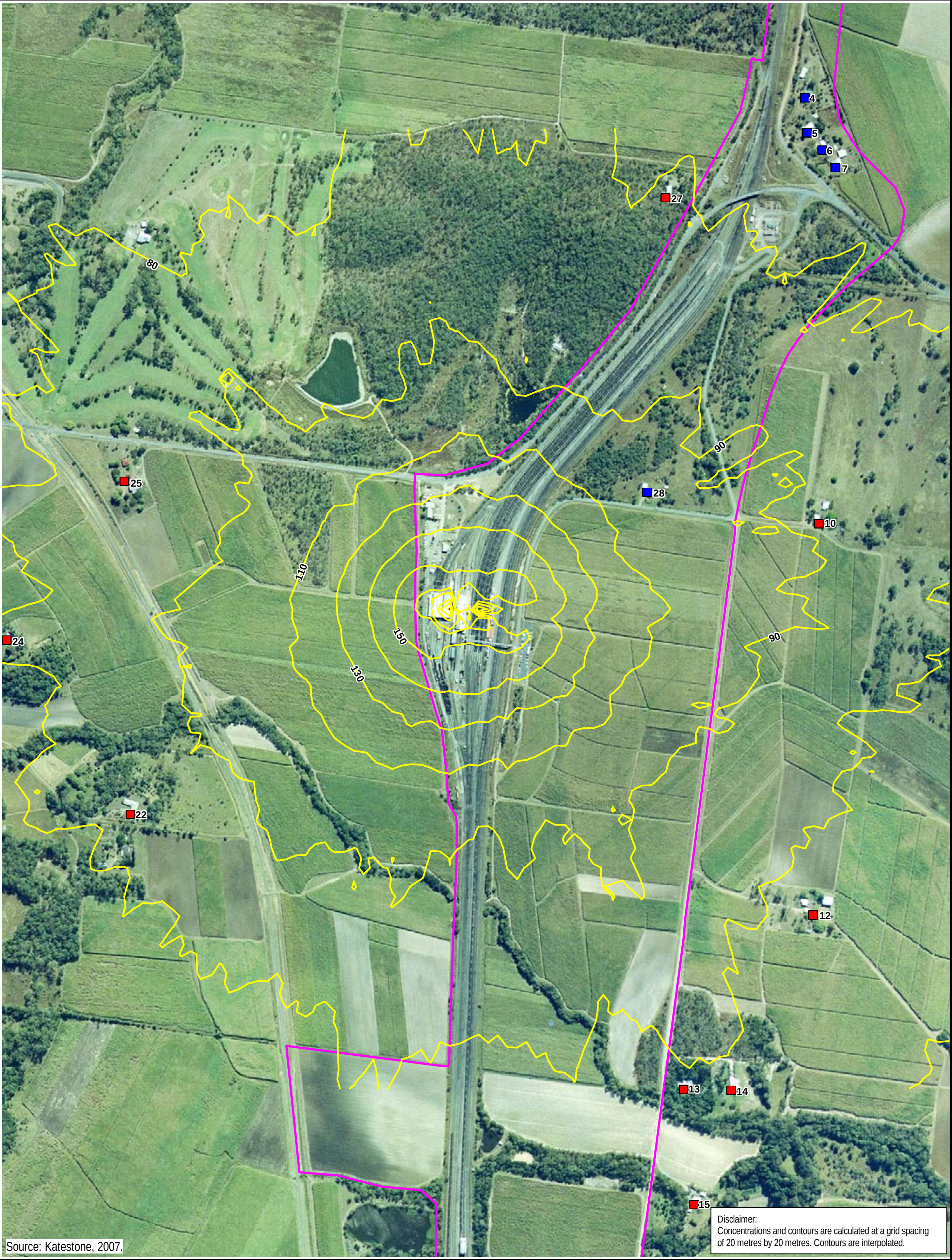
Results suggest that the 99.9th percentile 1-hour average ground-level concentration of nitrogen dioxide will remain below the NEPM(Air) standard of 246 $\mu g/m^3$ and EPP(Air) goal of 320 $\mu g/m^3$ at all sensitive receptor locations. The combustion of diesel fuel by the shunt locomotives is predicted to add between 30.8 $\mu g/m^3$ and 136.8 $\mu g/m^3$ (residential dwelling 10) to background levels of 46.2 $\mu g/m^3$.

Figure 9.9 provides a contour plot showing 1-hour average concentrations of nitrogen dioxide due to the combustion of diesel fuel by shunt locomotives. Results from the dispersion modelling suggest that magnitude of the impact is a function of the radial distance of the receptor to the shunting activities with little dependence on direction.

The annual average concentration of nitrogen dioxide is also predicted to remain well below the NEPM(Air) standard of 62 $\mu g/m^3$ at all sensitive receptor locations. Shunt locomotive emissions are predicted to add between 0.2 $\mu g/m^3$ and 4.4 $\mu g/m^3$ (residential dwelling 25) to background levels of 14.4 $\mu g/m^3$.

Estimates of the impact of shunting activities on the annual average ground-level concentration of nitrogen dioxide (refer Figure 9.10), highlights the importance of the predominant southeast wind with the area of maximum impact located to the northwest of the rail yard.

Jilalan Rail Yard Upgrade Project



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Scale 1 : 7500 (m) (@ A3 size)

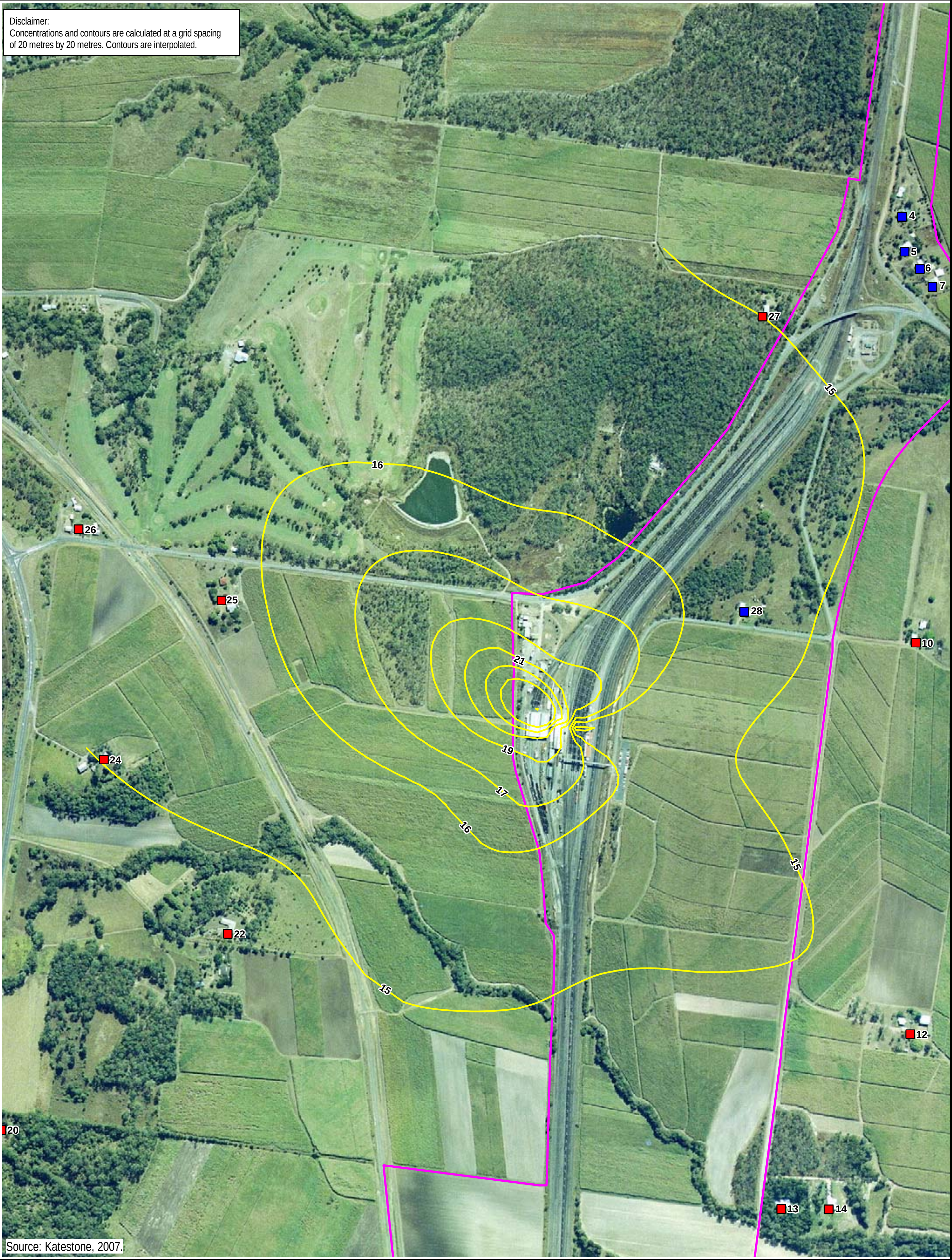
LEGEND

- Project Area
- Concentration Contour
- Residential Dwelling
- Residential Dwelling to be removed by QR

THE 99.9th PERCENTILE 1 HOUR AVERAGE GROUND-LEVEL CONCENTRATION OF NITROGEN DIOXIDE (µg/m³) DUE TO DIESEL CONSUMPTION BY SHUNT LOCOMOTIVES

Figure 9.9

Jilalan Rail Yard Upgrade Project



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N

0 375 (m)

Scale 1 : 7500 (m) (@ A3 size)

LEGEND

Project Area

Concentration Contour

Residential Dwelling

Residential Dwelling to be removed by QR

ANNUAL AVERAGE GROUND-LEVEL CONCENTRATION OF NITROGEN DIOXIDE (µg/m³) DUE TO DIESEL CONSUMPTION BY SHUNT LOCOMOTIVES

Figure 9.10

Table 9.6 Predicted 99.9th percentile 1-hour average and annual average ground-level concentration of nitrogen dioxide in $\mu g/m^3$ for the Jilalan Rail Yard Upgrade Project

Residential dwelling	Averaging period	Goal	Background	Shunt Locos	Shunt locos + background	Percent of standard
3	1-hour	246 or 320	46.2	49.9	96.1	39
	annual	62	14.4	0.6	15.0	24
10	1-hour	246 or 320	46.2	136.8	183.0	74
	annual	62	14.4	1.4	15.8	26
12	1-hour	246 or 320	46.2	105.1	151.3	62
	annual	62	14.4	1.4	15.8	26
13	1-hour	246 or 320	46.2	105.2	151.4	62
	annual	62	14.4	1.0	15.4	25
14	1-hour	246 or 320	46.2	107.2	153.4	62
	annual	62	14.4	1.0	15.4	25
15	1-hour	246 or 320	46.2	83.4	129.6	53
	annual	62	14.4	0.7	15.1	24
16	1-hour	246 or 320	46.2	75.5	121.7	49
	annual	62	14.4	0.6	15.0	24
25	1-hour	246 or 320	46.2	129.9	176.1	72
	annual	62	14.4	4.4	18.8	30
27	1-hour	246 or 320	46.2	118.4	164.6	67
	annual	62	14.4	2.0	16.4	26

9.5.4 Particulate matter as PM_{10} and TSP

In general, results from the dispersion modelling using Cal3QHCR and AUSPLUME, suggests that ground-level concentrations of particulate matter (TSP and PM_{10}) will remain below the relevant standard or goal (refer Table 9.7).

The proximity of a residence to either the by-pass rail lines or the existing locomotive shed will determine the relative contribution of emissions of particulate matter from either the coal wagons or shunt locomotives, to predicted ground-level concentrations of TSP and/or PM_{10}. In general, emissions of particulate matter associated with the coal wagons is the dominant source at the majority of residential locations.

The 24-hour average ground-level concentration of PM_{10} is predicted to reach a maximum of 71% of the NEPM(Air) standard of 50 $\mu g/m^3$ (residential dwellings 10, 13 to 16, and 27), or equivalently, 23.7% of the EPP(Air) goal of 150 $\mu g/m^3$. Of the 35.6 $\mu g/m^3$ maximum 24-hour average concentration of PM_{10} predicted at residential dwellings 10, 13 to 16 and 27, a range of only 1.11 to 1.43 $\mu g/m^3$ (or 2.2% to 2.8% of the NEPM(Air) standard) is attributed to activities at the rail yard and 34.2 $\mu g/m^3$ attributed to background levels.

The annual average ground-level concentration of PM_{10} is predicted to be up to 41% of the EPP(Air) goal of 50 $\mu g/m^3$ (or 20.7 $\mu g/m^3$) at the location of residential dwellings 13, 16 and 27. The background concentration is estimated to be 20.4 $\mu g/m^3$. Of the 0.3 to 0.34 $\mu g/m^3$ attributed to rail yard activities 0.27 to 0.29 $\mu g/m^3$ is predicted to be associated with dust from the coal wagons on the by-pass rail lines.

The contribution of rail yard activities to the annual average ground-level concentration of TSP is predicted to be up to 0.78 $\mu g/m^3$ at the location of residential dwellings 13 and 27. When combined with an estimated background concentration of 40.8 $\mu g/m^3$, air quality is predicted to remain well below the EPP(Air) goal of 90 $\mu g/m^3$.

Presented in Figures 9.11 and 9.12 are contour plots of the contribution of emissions of particulate matter from coal wagons and shunt locomotives, to the 24-hour average ground-level concentration of PM_{10}.

Presented in Figures 9.13 and 9.14 are contour plots of the contribution of emissions of particulate matter from coal wagons and shunt locomotives, to the annual average ground-level concentration of PM_{10}.

Presented in Figures 9.15 and 9.16 are contour plots of the contribution of emissions of particulate matter from coal wagons and shunt locomotives, to the annual average ground-level concentration of TSP.

Table 9.7 Predicted maximum ground-level concentrations of TSP and PM_{10} in $\mu g/m^3$ for the Jilalan Rail Yard Upgrade Project

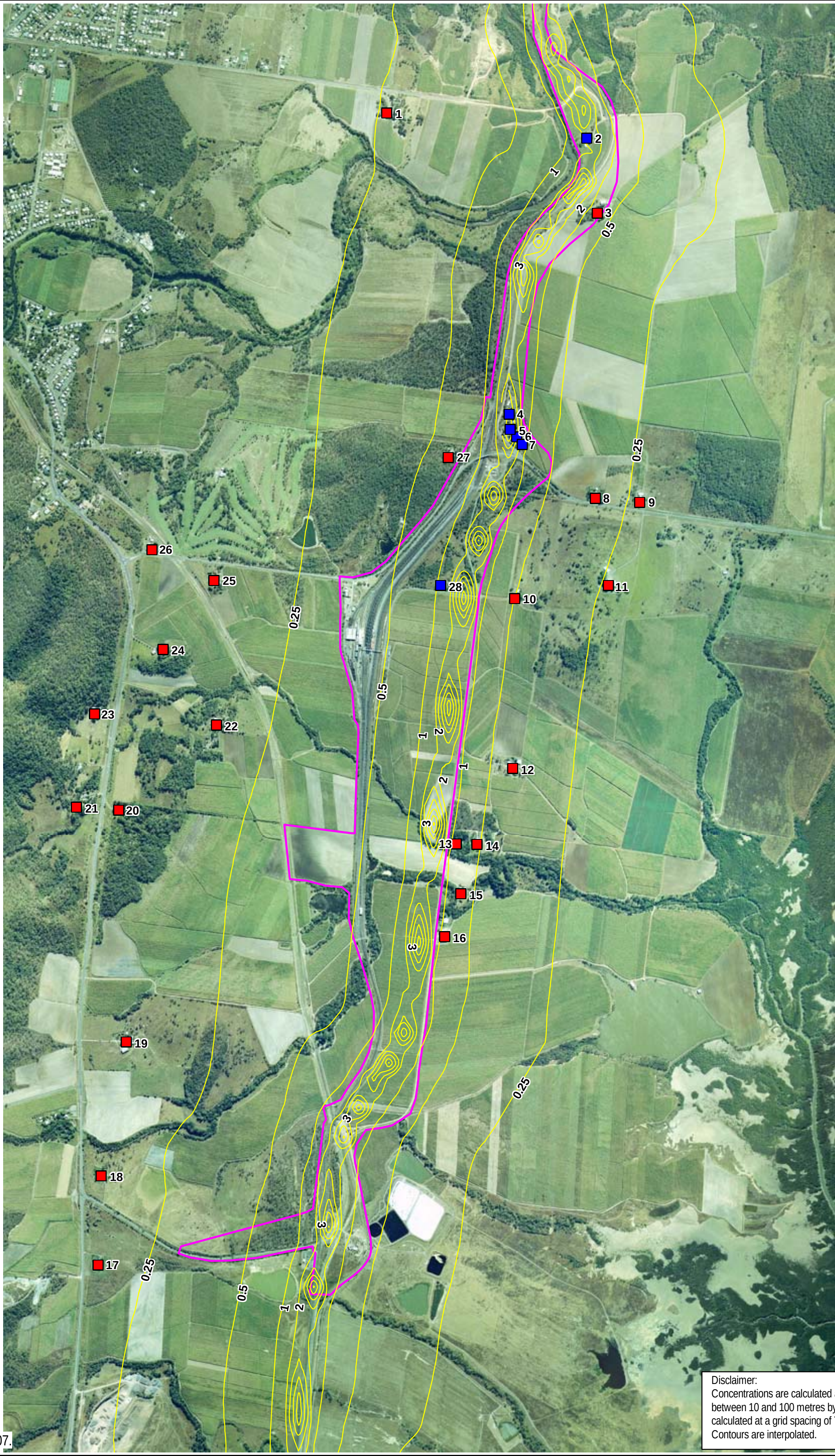
Residential dwelling	Pollutant	Averaging period	Goal	Background	Coal Wagons	Shunt Trains	Rail Yard	Rail Yard + background	Percent of standard
3	TSP	annual	90	40.8	0.56	0.02	0.58	41.4	46
	PM_{10}	24-hour	50 or 150	34.2	0.93	0.28	1.21	35.4	71
		annual	50	20.4	0.21	0.02	0.24	20.6	41
10	TSP	annual	90	40.8	0.44	0.05	0.49	41.3	46
	PM_{10}	24-hour	50 or 150	34.2	0.59	0.80	1.39	35.6	71
		annual	50	20.4	0.17	0.05	0.22	20.6	41
12	TSP	annual	90	40.8	0.31	0.05	0.37	41.2	46
	PM_{10}	24-hour	50 or 150	34.2	0.42	0.55	0.96	35.2	70
		annual	50	20.4	0.12	0.05	0.17	20.6	41
13	TSP	annual	90	40.8	0.75	0.04	0.78	41.6	46
	PM_{10}	24-hour	50 or 150	34.2	1.00	0.42	1.42	35.6	71
		annual	50	20.4	0.29	0.04	0.32	20.7	41
14	TSP	annual	90	40.8	0.47	0.04	0.50	41.3	46
	PM_{10}	24-hour	50 or 150	34.2	0.61	0.49	1.11	35.3	71
		annual	50	20.4	0.18	0.04	0.21	20.6	41
15	TSP	annual	90	40.8	0.57	0.03	0.59	41.4	46
	PM_{10}	24-hour	50 or 150	34.2	0.78	0.38	1.16	35.4	71
		annual	50	20.4	0.22	0.03	0.24	20.6	41
16	TSP	annual	90	40.8	0.74	0.02	0.76	41.6	46
	PM_{10}	24-hour	50 or 150	34.2	1.00	0.43	1.43	35.6	71
		annual	50	20.4	0.28	0.02	0.30	20.7	41
25	TSP	annual	90	40.8	0.21	0.16	0.37	41.2	46
	PM_{10}	24-hour	50 or 150	34.2	0.24	1.26	1.50	35.7	71
		annual	50	20.4	0.08	0.16	0.24	20.6	41
27	TSP	annual	90	40.8	0.71	0.07	0.78	41.6	46
	PM_{10}	24-hour	50 or 150	34.2	0.69	0.68	1.37	35.6	71
		annual	50	20.4	0.27	0.07	0.34	20.7	41

9.5.5 Dust deposition

Dust deposition is predicted to remain well below the EPP(Air) recommend rate of 120 $mg/m^2/day$ at all locations (refer Table 9.8). A maximum dust deposition rate of 38.1 $mg/m^2/day$ is predicted at the location of residential dwelling 13 with coal wagons the primary source of particulate matter.

Jilalan Rail Yard Upgrade Project

Connell HATCH



Source: Katestone, 2007.

Disclaimer:
Concentrations are calculated at a variable grid spacing of between 10 and 100 metres by 30 metres. Contours are calculated at a grid spacing of 70 metres by 70 metres. Contours are interpolated.

N

0 1000 (m)

Scale 1 : 20 000 (m) (@ A3 size)

LEGEND

Project Area

Concentration Contour

Residential Dwelling

Residential Dwelling to be removed by QR

CONTRIBUTION OF EMISSIONS FROM COAL WAGONS IN TRANSIT TO MAXIMUM 24hr AVERAGE GROUND-LEVEL CONCENTRATION OF PM10 ($\mu g/m^3$)

Figure 9.11

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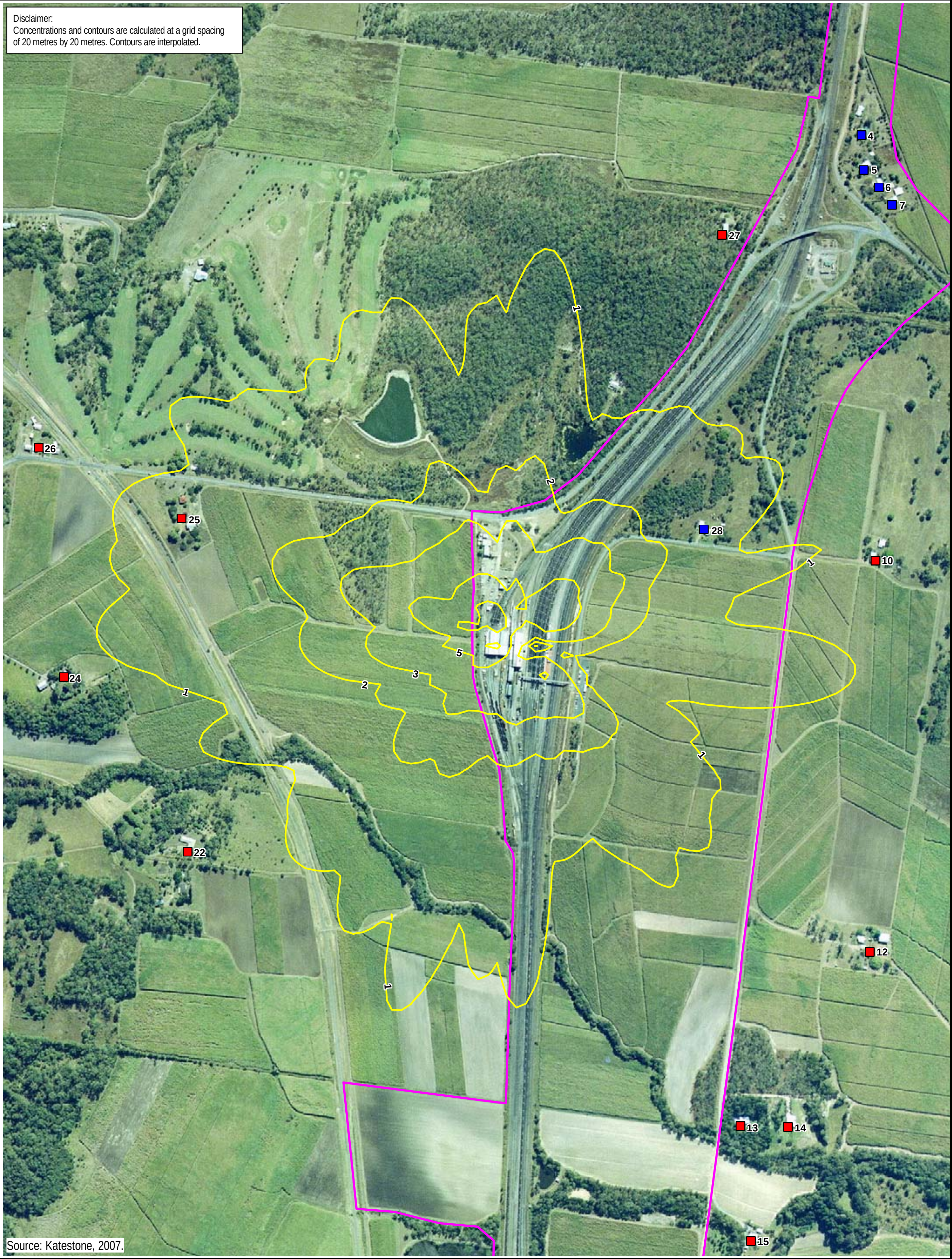
Jilalan Rail Yard Upgrade Project

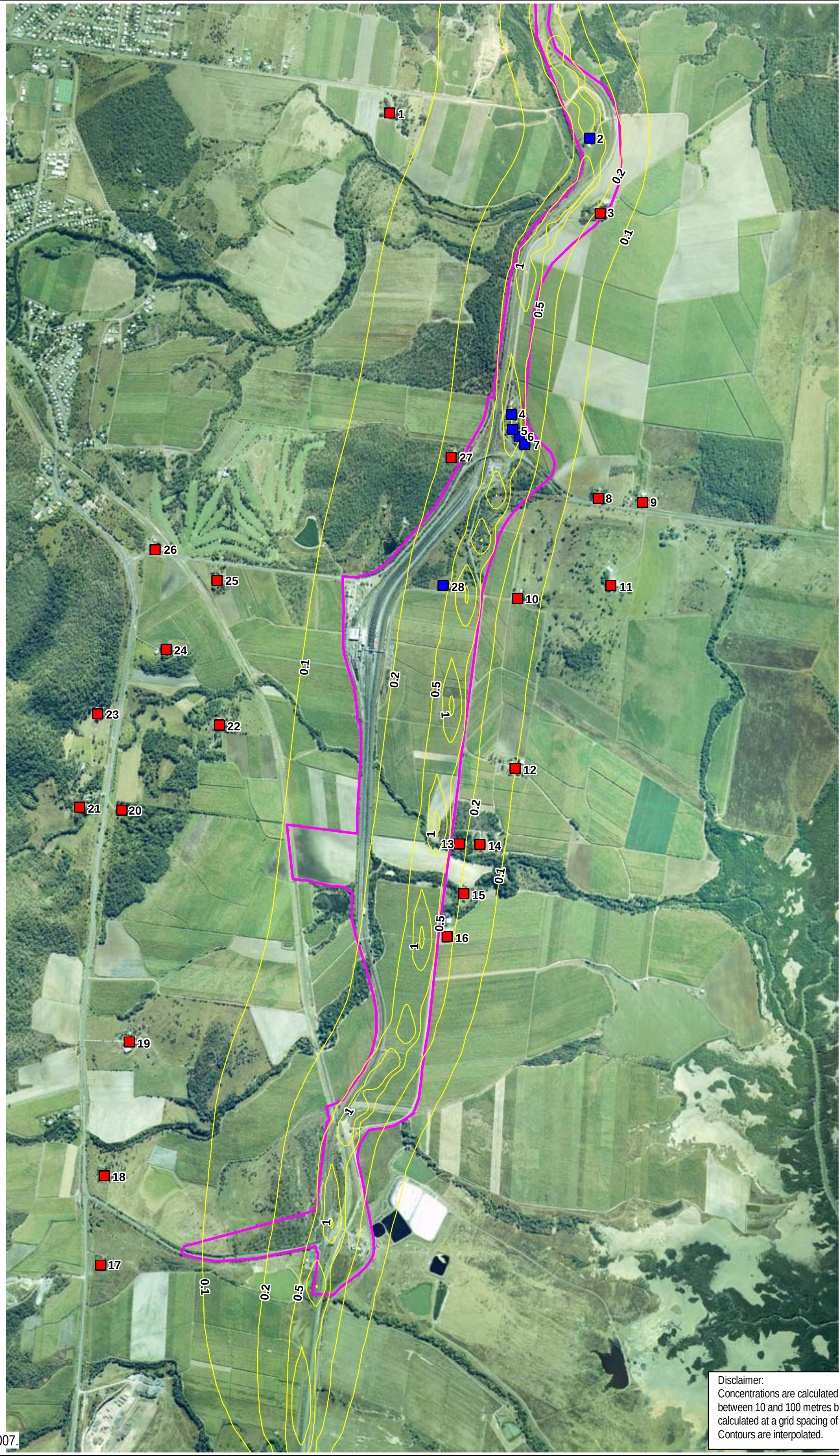


LEGEND
- Project Area
- Concentration Contour
- Residential Dwelling
- Residential Dwelling to be removed by QR

CONTRIBUTION OF EMISSIONS FROM THE COMBUSTION OF DIESEL FUEL BY SHUNT LOCOMOTIVES TO THE MAXIMUM 24hr AVERAGE GROUND-LEVEL CONCENTRATION OF PM10 (µg/m³)

Figure 9.12

Jilalan Rail Yard Upgrade Project



Source: Katestone, 2007.

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N

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Scale 1 : 20 000 (m) (@ A3 size)

LEGEND

Project Area

Concentration Contour

Residential Dwelling

Residential Dwelling to be removed by QR

CONTRIBUTION OF EMISSIONS FROM COAL WAGONS IN TRANSIT TO THE ANNUAL AVERAGE GROUND-LEVEL CONCENTRATION OF PM10 (µg/m³)

Figure 9.13

Jilalan Rail Yard Upgrade Project

Connell HATCH

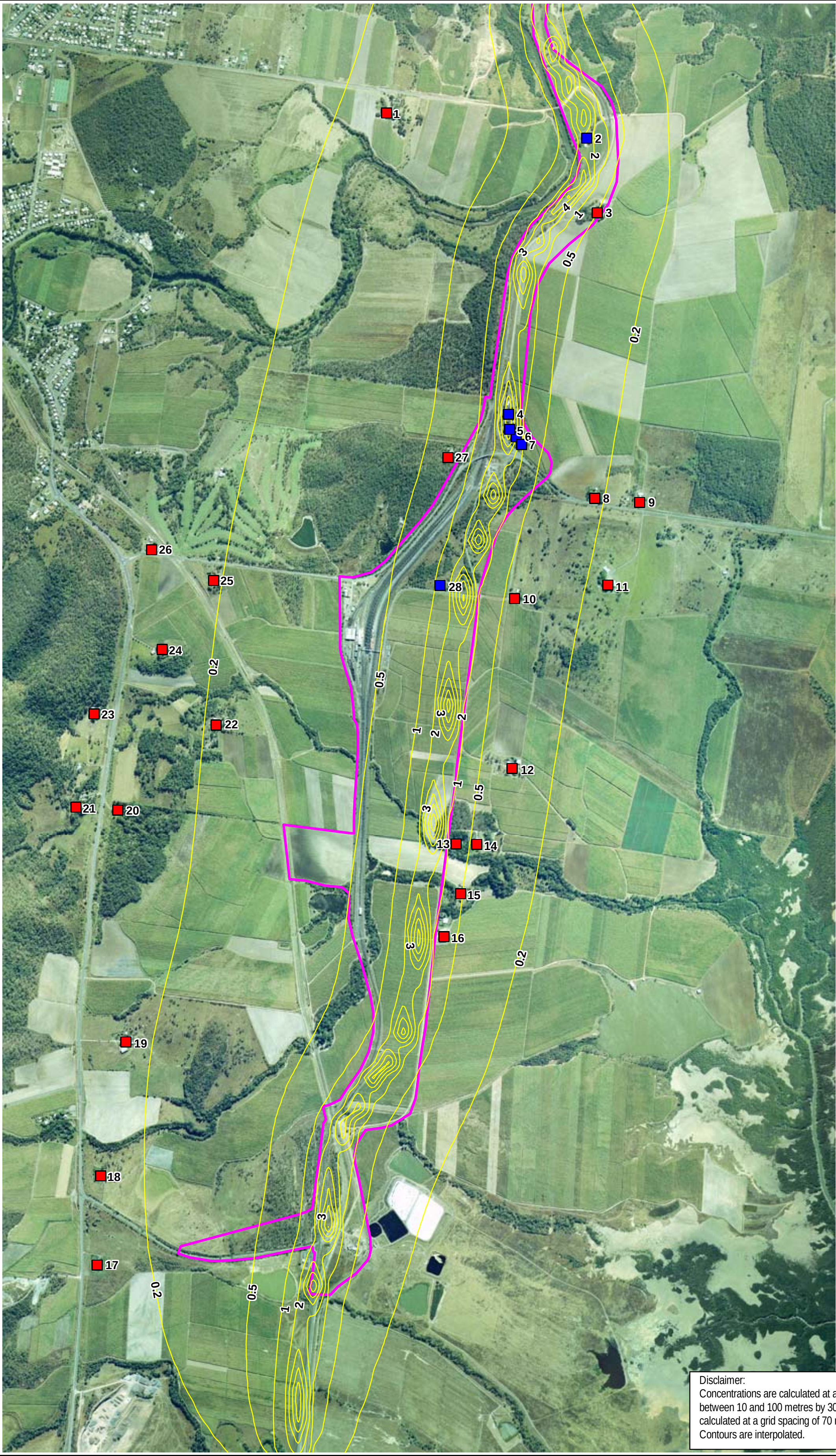
LEGEND

- Project Area
- Concentration Contour
- Residential Dwelling
- Residential Dwelling to be removed by QR

CONTRIBUTION OF EMISSIONS FROM THE COMBUSTION OF DIESEL FUEL BY SHUNT LOCOMOTIVES TO THE ANNUAL AVERAGE GROUND-LEVEL CONCENTRATION OF PM10 (µg/m³)

Figure 9.14

Jilalan Rail Yard Upgrade Project



Source: Katestone, 2007.

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N

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Scale 1 : 20 000 (m) (@ A3 size)

LEGEND

Project Area

Concentration Contour

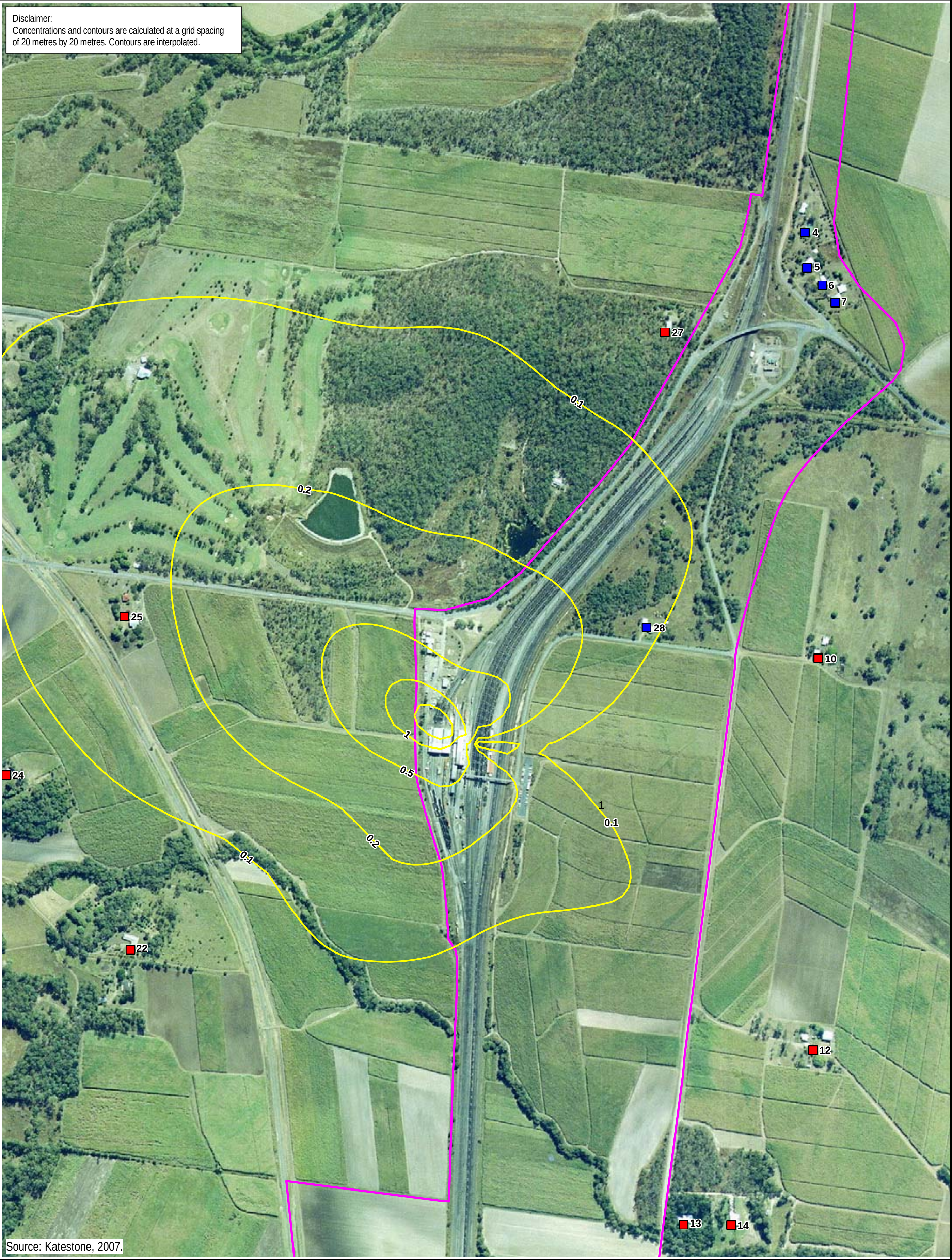
Residential Dwelling

Residential Dwelling to be removed by QR

CONTRIBUTION OF EMISSIONS FROM COAL WAGONS IN TRANSIT TO THE ANNUAL AVERAGE GROUND-LEVEL CONCENTRATION OF TSP (µg/m³)

Figure 9.15

Jilalan Rail Yard Upgrade Project



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N

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Scale 1 : 7500 (m) (@ A3 size)

LEGEND

Project Area

Concentration Contour

Residential Dwelling

Residential Dwelling to be removed by QR

CONTRIBUTION OF EMISSIONS FROM THE COMBUSTION OF DIESEL FUEL BY SHUNT LOCOMOTIVES TO THE ANNUAL AVERAGE GROUND-LEVEL CONCENTRATION OF TSP ($\mu g/m^3$)

Figure 9.16

Table 9.8 Predicted maximum dust deposition rate in $mg/m^2/day$ for the Jilalan Rail Yard Upgrade Project

Receptor	Coal Wagons	Shunt Trains	Rail Yard	Rail Yard + background	Percent of goal
3	6.1	0.0	6.1	36.1	30
10	4.8	0.0	4.8	34.8	29
12	3.4	0.0	3.4	33.4	28
13	8.1	0.0	8.1	38.1	32
14	5.1	0.0	5.1	35.1	29
15	6.1	0.0	6.2	36.2	30
16	8.0	0.0	8.0	38.0	32
25	2.3	0.1	2.4	32.4	27
27	7.7	0.0	7.8	37.8	31

Table Note:
The background deposition rate is estimated at 30 $mg/m^2/day$.

9.6 Greenhouse gas assessment

The major activities of the proposed upgrade of the Jilalan Rail Yard that are associated with the release greenhouse gases are the result of direct and indirect sources such as the burning of fossil fuels and electricity usage.

9.6.1 Background to greenhouse gases

Greenhouse gases such as carbon dioxide have been implicated in gradual global climatic changes as they affect the balance between incoming solar energy and losses due to radiation from the earth and atmosphere. Australia is committed to monitor and report greenhouse gas emissions and has set a target level for emissions in 2010 to be no more than 8% higher than the emissions for 1990.

Pollutants of importance to global warming are water vapour (H_2O), nitrous oxide (N_2O), carbon dioxide (CO_2) and methane (CH_4). Indirect greenhouse gases such as carbon monoxide (CO), nitrogen oxides other than N_2O and non-methane volatile organic compounds (NMVOCs) do not have a strong radiative forcing effect in themselves, but influence atmospheric concentrations of the direct greenhouse gases.

Water vapour is the major contributor to the greenhouse effect but is not normally considered because fluxes are dominated by the day-to-day precipitation cycle. Carbon dioxide is the next most significant greenhouse gas and the major anthropogenic contributor.

The relative importance of a greenhouse gas is measured in terms of its global warming potential (GWP), usually related to a GWP of 1 for carbon dioxide. Nitrous oxide and carbon dioxide are greenhouse gases that are associated with combustion activities, such as occur in diesel fuelled vehicles and the combustion of fossil fuels to generate electricity. Carbon dioxide tends to remain active for a lifetime of around 150 years and has a GWP of 1 on a 100 year time frame. Nitrous oxide has a lifetime of 120 years and a GWP of 310 on a 100 year time frame. Methane has a lifetime of 14.5 years and a GWP of 21 on a 100 year time frame. Whilst nitrous oxide and methane have a greater potential to cause global warming, carbon dioxide is produced in far greater quantities by anthropogenic activities than nitrous oxide and methane and consequently, carbon dioxide is the most important greenhouse gas.

Greenhouse gas emissions are reported in terms of tonnes of carbon dioxide equivalent (tCO_{2-e}). Carbon dioxide equivalents are calculated as the sum of the emission rate of each greenhouse gas multiplied by the global warming potential.

As follows: tCO_{2-e} = tonnes CO_2 x 1.0 + tonnes CH_4 x 21 + tonnes N_2O x 310.

9.6.2 Greenhouse Challenge Plus and emissions estimation

The Greenhouse Challenge Plus programme is part of the Federal Government's climate change strategy and is managed by the Australian Greenhouse Office (AGO). The Greenhouse Challenge Plus programme is designed to:

- Reduce greenhouse gas emissions
- Accelerate the uptake of energy efficiency
- Integrate greenhouse gas issues into business decision making, and
- Provide more consistent reporting of greenhouse gas emission levels.

The AGO is a part of the Department of the Environment and Water Resources. The AGO monitors and compiles databases on anthropogenic activities that produce greenhouse gases in Australia. The AGO has published greenhouse gas emission factors for a range of anthropogenic activities. The AGO methodology for calculating greenhouse gas emissions is published in the AGO Factors and Methods Workbook (AGO 2005) and is based on Australian data. This workbook is updated regularly to reflect current compositions in fuel mixes and evolving information on emission sources.

The AGO Workbook defines three scopes of emission categories for calculating greenhouse gas emissions. These are as follows:

- Scope 1: This covers the direct emission sources within the boundary of an organisation such as the emissions from fuel combustion of vehicles and ships
- Scope 2: This covers indirect emissions from consuming purchased electricity, steam or heat that is produced by another organisation
- Scope 3: This covers all other indirect emissions from sources that are not owned or controlled by an organisation but occur as a consequence of the organisations activities

Scope 1, Scope 2 and some Scope 3 emissions are commonly reported. Scope 3 emissions that are usually reported include emissions from off-site waste disposal, emissions associated with production of fuels and emissions from transmission, distribution and generation of electricity.

9.6.3 Greenhouse gas producing activities and emission factors

The major activities for the Jilalan Rail Yard that produce greenhouse gas emissions are:

- Scope 1: diesel consumption by the shunt locomotives
- Scope 2: electricity consumption
- Scope 3: production, transport and distribution of fuel and electricity.

Table 9.9 summarises the greenhouse gas emission factors used to quantify greenhouse gas emissions from fuel and electricity consumption associated with rail yard activities.

Table 9.9 Greenhouse gas emission factors (AGO 2005)

Activity/ source	Units	Scope 1	Scope 2	Scope 3	Total
Diesel combustion	t CO_{2-e}/kL	2.7	-	0.3	3.0
Electricity consumption	t CO_{2-e}/KWh	-	0.000903	0.000143	0.001046

9.6.4 Greenhouse gas emissions

A summary of the greenhouse gas emissions calculated for the JRYUP are shown in Table 9.10.

Table 9.10 Greenhouse gas emissions ($MtCO_2$-e per annum) associated with the operation of the Jilalan Rail Yard

Source	Current	Future	Increase	Increase %
Diesel consumption	0.003	0.004	0.001	33.3
Electricity consumption	0.012	0.014	0.002	17.1
Total	0.015	0.018	0.003	20.6

Results of the greenhouse gas assessment suggest that greenhouse gas emissions will increase by 0.00303 $MtCO_2$-e (or 20.6%).

During 2005 the net greenhouse gas emissions in Australia were reported as approximately 559 $MtCO_2$-e (http://www.greenhouse.gov.au/inventory/index.html). Thus once upgraded, activities at the Jilalan Rail Yard are estimated to add an additional 0.003% to the Australian total.

9.7 Mitigation measures

9.7.1 Construction phase

In order to control dust emissions related to construction activities and thus reduce the risk of dust nuisance at the location of nearby residences, a number of dust control measure should be taken, including:

- Development of a Dust Management Sub Plan prior to construction commencing.
- Minimising significant dust generating activities during high wind speeds where practicable and unwatered.
- Restricting vehicle speeds on unsealed haul roads to reduce dust generation.
- Avoiding spillages and prompt cleanup of any that occur.
- Covering haul vehicles moving outside the construction site.
- Stockpiled material should be treated appropriately to prevent wind erosion from the prevailing southeast wind.
- Regular cleaning of machinery and vehicle tyres will prevent track-out of dust to public roads
- Minimising onsite burning or incineration.
- Ensuring that roads are appropriately surfaced as soon as possible after the commencement of site activities.
- Routing roads away from sensitive areas wherever possible.
- Revegetating disturbed areas as soon as possible.
- Vehicles and equipment are to be appropriately maintained to minimise air emissions.
- Visual monitoring of dust to occur on a daily basis.
- Dust deposition gauges and real time air quality monitoring will occur at nearby residential dwellings, only if all operational ways of reducing dust levels have been investigated and exhausted.

During construction, emissions of greenhouse gases may be minimised by implementing a variety of mitigation and management measures including:

- Minimising haul distances between construction sites to spoil sites
- Implementing regular maintenance program for equipment and construction fleet
- Using appropriately sized equipment for construction activities
- Minimising waste from construction

9.7.2 Operation

The proposed upgrade of the Jilalan Rail Yard will have a positive impact on operations at the yard. The increased capacity of the facility is anticipated to be offset by improved ease of operations with the addition of the wagon maintenance tracks and maintenance shed, as well as the expansion of the existing locomotive maintenance facility. There will be an overall reduction in the amount of unnecessary shunting of trains and wagons. The new by-pass tracks and provisioning facility will aid in the efficient management of activities at the yard and the minimisation of train stoppages within the yards.

In regards to the impact of emissions associated with activities at the yard, these may be minimised by implementing a variety of mitigation techniques, including:

- Regular maintenance of all equipment.
- Minimising unnecessary travel between sheds.
- Minimising the duration that multiple shunt locomotives operate in close proximity.
- In order to reduce the potential for impact of dust emissions from the northbound coal wagons, the duration that fully-loaded coal trains are held ‘in-transit’ at the facility (ie while waiting for access to the port unloading facility) should be minimised, particularly during periods of strong wind conditions.
- Only minimal amounts of reclaimed coal dust are held on site. During adverse wind conditions visual inspection of stockpiles should be conducted and mitigation procedures implemented if required.
- Maintain a complaints register relating to air quality, including remedial actions.
- Implement corrective actions if dust levels exceed the nominated non compliance level, including identification of the source.
- Notify residents, commercial operators and the community if dust generating maintenance activities will be undertaken. A minimum of 48 hours notice should be given to residents.
- Air quality should be compliant with the requirements of the *Environmental Protection Policy (Air) 1997.*
- Ensure all operational personnel are aware of the sensitivities with regard to elevated dust levels within and adjacent to the project area.

QR is currently undertaking a Coal Loss Environmental Evaluation which includes identifying strategies to reduce the risk of coal loss from loaded coal wagons in Central Queensland. The evaluation will include consultation with key stakeholders. An interim report will be provided to the EPA by 31 January 2008, and the final report is due 31 March 2008.

During the operation of the upgraded rail yard, emissions of greenhouse gases may be minimised by implementing a variety of mitigation and management measures, including:

- Minimising electrical consumption
- Selecting of fuel efficient motorised equipment
- Ensuring that all equipment is maintained regularly
- Using appropriately sized equipment for yard activities
- Minimising unnecessary operation of equipment
- Segregation of general waste into recycling materials and general waste
- Energy conservation and greenhouse audits in accordance with the requirements of the National Greenhouse Challenge Plus annual progress reports

9.8 Conclusion

An air quality assessment has been undertaken for the JRYUP. In general, results suggest that operations at the rail yard are not predicted to adversely affect air quality at the location of the sensitive receptors with air quality remaining well below the relevant standards and goals at all sites.

In particular, the assessment has found the following:

- The main source of emissions of particulate matter are the fully-loaded coal wagons that by-pass the rail yard via the proposed by-pass rail lines to the east of the existing lines.
- Emissions of particulate matter and oxides of nitrogen are also associated with the combustion of diesel fuel by the shunt locomotives.
- In general, results from the air quality assessment of the proposed upgrade to the Jilalan Rail Yard suggests that air quality will remain below the relevant air quality standards and goals at the location of the sensitive receptors.
- The maximum contribution of rail yard activities to the 1-hour average ground-level concentration of nitrogen dioxide is 136.8 $\mu g/m^3$. The background concentration is estimated at 46.2 $\mu g/m^3$. The NEPM(Air) standard is 246 $\mu g/m^3$. The EPP(Air) goal is 320 $\mu g/m^3$.
- The maximum contribution of rail yard activities to the annual average ground-level concentration of nitrogen dioxide is 4.4 $\mu g/m^3$. The background concentration is estimated at 46.2 $\mu g/m^3$. The NEPM(Air) standard is 62 $\mu g/m^3$.
- Of the maximum 24-hour average concentration of PM_{10} predicted, 2.9 $\mu g/m^3$ is attributed to activities at the rail yard and 34.2 $\mu g/m^3$ is attributed to background. The NEPM(Air) standard is 50 $\mu g/m^3$. The EPP(Air) goal is 150 $\mu g/m^3$.
- The annual average ground-level concentration of PM_{10} is predicted to be up to 21.6 $\mu g/m^3$. The background concentration is estimated to be 20.4 $\mu g/m^3$. The EPP(Air) goal is 50 $\mu g/m^3$.
- Contribution of rail yard activities to the annual average ground-level concentration of TSP is predicted to be up to 3.2 $\mu g/m^3$. When combined with an estimated background concentration of 40.8 $\mu g/m^3$, air quality is predicted to remain well below the EPP(Air) goal of 90 $\mu g/m^3$.
- Dust deposition is predicted to remain well below the EPP(Air) recommend guideline of 120 mg/m^2/day at all locations. A maximum dust deposition rate of 38.1 mg/m^2/day is predicted at the location of residential dwelling 13 with dust from the coal wagons the primary source.
- During 2005 the net greenhouse gas emissions in Australia were reported as approximately 559 $MtCO_2$-e. Once operating, activities associated with the expanded Jilalan Rail Yard are estimated to contribute an additional 0.003% to Australia's total.