HEGGIES

REPORT 10-7633-R1

Revision 0

# Figtrees On The Manning Development
# Local Area Plan / Masterplan
# Concept Phase Air Quality & Greenhouse Gas Assessment

PREPARED FOR

Chase Property Investments Pty Ltd
179 Victoria St
Drummoyne NSW 2047

10 SEPTEMBER 2009

**HEGGIES PTY LTD**
ABN 29 001 584 612

# Figtrees On The Manning Development
# Local Area Plan / Masterplan
# Concept Phase Air Quality & Greenhouse Gas Assessment

PREPARED BY:

Heggies Pty Ltd
2 Lincoln Street Lane Cove NSW 2066 Australia
(PO Box 176 Lane Cove NSW 1595 Australia)
Telephone 61 2 9427 8100 Facsimile 61 2 9427 8200
Email sydney@heggies.com Web www.heggies.com



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# 1 INTRODUCTION

Heggies Pty Ltd (Heggies) have been commissioned by Chase Property Investments Pty Ltd (the Proponent) to prepare an Air Quality and Greenhouse Gas Assessment for the *Figtrees on the Manning* development, situated in the Greater Taree Local Government Area, and located approximately 2km northeast of the CBD.

A Local Area Plan (LAP) / Masterplan has been developed, recording the outcomes of the master planning and community consultation process undertaken to date. The proponent is seeking assessment and approval of the Masterplan under Part 3A of the Environmental Planning and Assessment Act 1979.

The NSW Department of Planning (DoP) Director General has issued requirements for assessment (DGRs). The DGRs relating to air quality and greenhouse gas assessment are as follows:

> *"Provide a detailed air quality impact assessment in accordance with Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in NSW, DECC."* [*sic*]
>
> *"Provide a comprehensive assessment of and report on the proposals predicted greenhouse gas emissions ($tCO_2$-e)"*

## 1.1 Scope of Assessment

The scope of this report is limited to a qualitative assessment of the potential for air quality and greenhouse gas impacts from the proposed Masterplan, and details management practices to assist in controlling adverse impacts.

The specific objectives of this report are:

- To assist in identifying all potential sources of emissions to air associated with the proposed development outlined within the Masterplan.
- To develop air quality goals for the development.
- To identify any development options that have the potential to compromise air quality goals.
- To outline measures required to minimise the air quality impacts from development options.
- To provide an overview of Greenhouse Gas emissions likely to be associated with the proposed development, and present opportunities to reduce emissions.

# 2 PROJECT OVERVIEW

The Figtrees on the Manning development (hereafter "the Project") aims to create a high quality mixed used development of regional significance. The Masterplan is comprised of five main precincts, linked by road, pedestrian paths and cycleways, as follows.

- Gateway Residential Precinct
- Figtree Commercial Precinct
- The Dairy Heritage Precinct
- Riverpark Village Precinct
- Marina Commercial Precinct

The first precinct consists of a medium to low residential precinct which fronts Pitt Street on the north and the riverfront to the south and forms the western gateway to the site.

The second precinct is proposed as a business hub comprised of mixed use commercial outcomes such as speciality restaurants and cafes with Green Star rated commercial office space and professional residences.

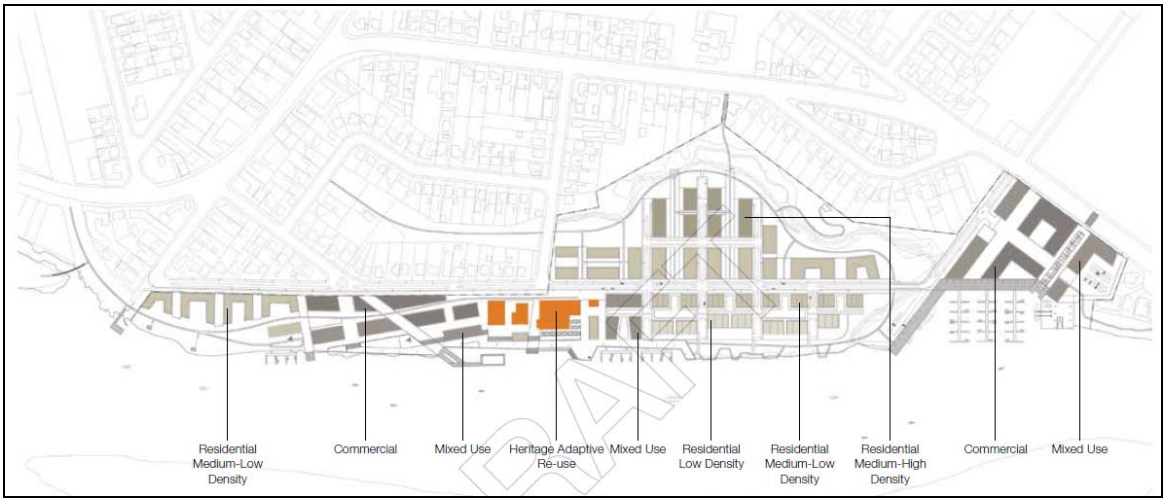
The third precinct is proposed as a heritage enclave with a mixture of new and existing buildings and in particular refurbishment of the unique heritage buildings with an appropriate adaptive reuse function to activate sheds and public open spaces. Primary uses of this area could include multipurpose cultural and educational facilities, taverns, restaurants, fish co-op, fresh produce markets, community facilities, museum and potential hotel and conference facilities.

A residential village is proposed for the fourth precinct, including medium density integrated housing and apartments.

The fifth precinct will involve the creation of a commercial marina with an adjacent commercial/mixed use centre.

An overview of the Masterplan is shown in Figure 1.

**Figure 1 Proposed Masterplan**



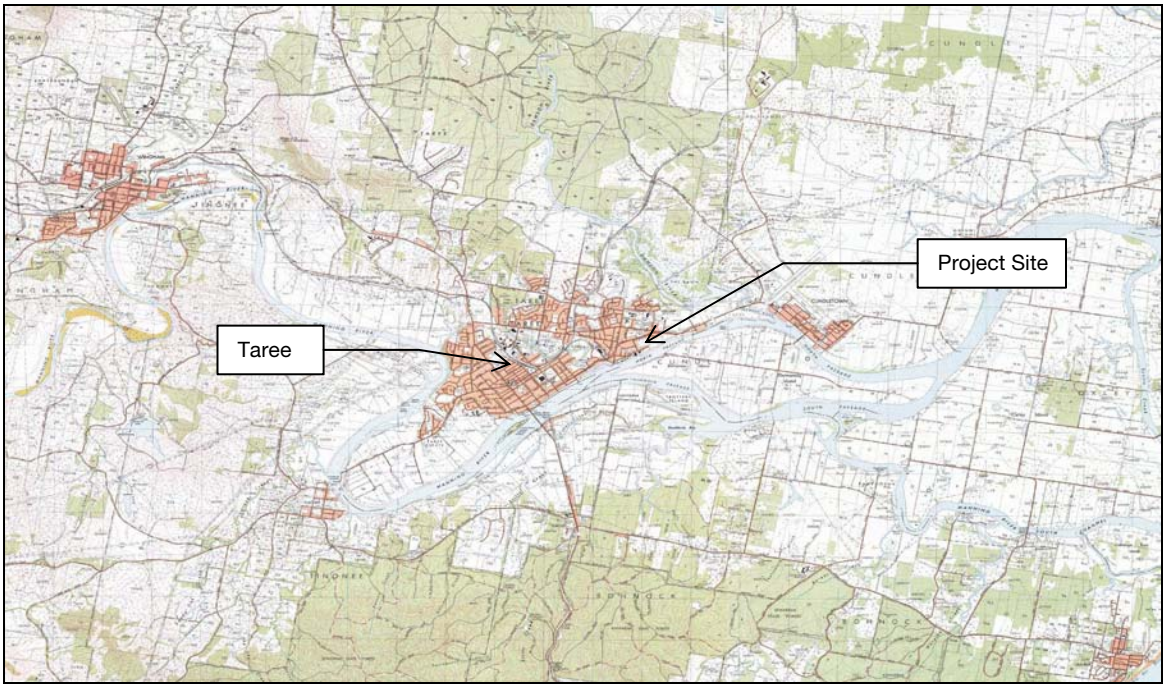
## 2.1 Regional and Local Setting

The Project Site is located between the Manning River (North Arm) and Pitt Street in Chatham, Taree. The site is bordered to the north by Pitt Street, existing residential development and Chatham Avenue and to the south by the Manning River (refer Figure 2) .

Satellite urban areas occur at Cundletown to the east, Taree South and Purfleet to the south, Tinonee to the southwest and parts of Wingham to the west. The surrounding area is characterised by a mixture of low and medium density residential, commercial, light industrial uses and rural agricultural lands.

Commercial uses such as car dealers and motels characterise Chatham Avenue. Chatham Park is located just north of Chatham Avenue.

**Figure 2 Regional Setting of Project Site**



# 3 KEY AIR QUALITY PARAMETERS AND ASSESSMENT CRITERIA

## 3.1 Key Pollutants

The following sections provide a brief overview of the primary pollutants expected to be associated with the construction and operation of the Project.

### 3.1.1 Carbon Monoxide (CO)

Carbon monoxide is an odourless, colourless, but potentially deadly gas that is created from the incomplete combustion of carbon-containing fuel, including petrol and diesel. Carbon monoxide bonds to the haemoglobin in the blood and reduces the oxygen carrying capacity of red blood cells, thus decreasing the oxygen supply to the tissues and organs, in particular the heart and the brain.

The effects of exposure to high levels of carbon monoxide include nausea, dizziness, impaired vision and loss of brain function. People with cardiovascular disease are most at risk. They may experience chest pain and other cardiovascular symptoms if they are exposed to high levels of carbon monoxide, particularly while exercising. People with marginal or compromised cardiovascular and respiratory systems and possibly young infants and foetuses, may also be at greater risk from carbon monoxide pollution. In healthy individuals, exposure to higher levels of carbon monoxide can affect mental alertness and vision.

### 3.1.2 Oxides of Nitrogen ($NO_X$)

Oxides of nitrogen ($NO_X$) is a general term used to describe any mixture of nitrogen oxides formed during combustion. In atmospheric chemistry $NO_X$ generally refers to the total concentration of Nitric Oxide (NO) + Nitrogen Dioxide ($NO_2$).

NO is a colourless and odourless gas that does not significantly affect human health. However, in the presence of oxygen, NO can be oxidised to form $NO_2$ which can have significant health effects including damage to the respiratory tract and increased susceptibility to respiratory infections and asthma. Long term exposure can lead to lung disease.

Oxides of nitrogen also play a role in the formation of photochemical smog. $NO_X$ and Volatile Organic Compounds (VOCs) react with Oxygen ($O_2$), in the presence of sunlight, to form photochemical oxidants or photochemical smog (of which ozone ($O_3$) is the principal component).

### 3.1.3 Sulphur Dioxide ($SO_2$)

Sulphur dioxide ($SO_2$) is a colourless gas with a sharp and irritating odour. The main anthropogenic source of $SO_2$ is from the burning of fossil fuels (coal and oil). Health effects include impacts on the respiratory system, lung function and eye irritation. $SO_2$ can cause irritation of the respiratory tract and aggravates conditions such as asthma and chronic bronchitis in sensitive individuals. $SO_2$ can also attach to particulate matter, causing more serious effects if inhaled.

### 3.1.4 Organic Pollutants

Volatile Organic Compounds (VOCs) are a group of organic pollutants which can be hazardous to human health even at low concentrations. VOCs also contribute to the formation of photochemical smog in urban areas. A group of VOCs, collectively know as BTEX (benzene, toluene, ethylbenzene and xylene) are often assessed in air quality studies. Benzene is of particular concern as it is classified as a human carcinogen. The critical human health effects from long term exposure to benzene are bone marrow depression and leukaemia. It is considered to be a genotoxic carcinogen for which no threshold has been established.

### 3.1.5 Particulate Matter (PM)

Airborne contaminants that can be inhaled directly into the lungs can be classified on the basis of their physical properties as gases, vapours or particulate matter. In common usage, the terms "dust" and "particulates" are often used interchangeably. The term "particulate matter" refers to a category of airborne particles, typically less than 30 microns (µm) in diameter and ranging down to 0.1 µm and is termed Total Suspended Particulate or TSP.

A health based criterion for TSP was developed by the National Health and Medical Research Council (NHMRC) at their 92nd session in October 1981 before the more recent results of epidemiological studies suggested a relationship between health impacts and exposure to $PM_{10}$ and $PM_{2.5}$ concentrations. The TSP criterion has since been rescinded by the NHMRC.

Emissions of Particulate Matter less than 10 and 2.5 microns in diameter (referred to as $PM_{10}$ and $PM_{2.5}$ respectively) are considered important pollutants due to their ability to penetrate into the respiratory system. In the case of the $PM_{2.5}$ category, recent health research has shown that this penetration can occur deep into the lungs. Potential adverse health impacts associated with exposure to $PM_{10}$ and $PM_{2.5}$ include increased mortality from cardiovascular and respiratory diseases, chronic obstructive pulmonary disease and heart disease, and reduced lung capacity in asthmatic children.

In December 2000, the National Environment Protection Council (NEPC) initiated a review to determine whether a new ambient air quality criterion for $PM_{2.5}$ was needed in Australia, and the feasibility of developing such a criterion. The review found that:

- there are health effects associated with fine particles;
- the health effects observed overseas are supported by Australian studies; and
- fine particle standards have been set in Canada and the USA, and an interim criterion proposed for New Zealand.

The review concluded that there is sufficient community concern regarding $PM_{2.5}$ to consider it an entity separate from $PM_{10}$.

## 3.2 Air Quality Assessment Criteria

The following sections detail state and federal ambient air quality assessment criteria applicable to developments such as the Project.

### 3.2.1 National Environment Protection Measure

In June 1998, the National Environment Protection Council (NEPC) of Environment Ministers agreed to set uniform standards for ambient air quality to apply to all States and Territories. These standards are contained in the National Environment Protection Measure (NEPM) for Ambient Air Quality (NEPM AAQ) and are summarise in **Table 1**.

**Table 1 National Environment Protection Measure Ambient Air Quality Goals**

| Pollutant | Averaging Time | Maximum Concentration | Maximum Allowable exceedances |
|---|---|---|---|
| Carbon Monoxide (CO) | 8 Hour | 9.0 ppm | 1 day a year |
| Nitrogen dioxide ($NO_2$) | 1 Hour<br>Annual | 0.12 ppm (246 µg/m$^3$)<br>0.03 ppm (62 µµg/m$^3$) | 1 day a year<br>none |
| Photochemical oxidants (as Ozone) | 1 Hour<br>4 Hours | 0.1 ppm (200 µg/m$^3$)<br>0.08 ppm (160 µg/m$^3$) | 1 day a year<br>1 day a year |
| Particulate matter <10 µm ($PM_{10}$) | 24 Hours | 50 µg/m$^3$ | 5 days a year |
| Particulate Matter <2.5 µm ($PM_{2.5}$) | 24 Hours<br>Annual | 25 µg/m$^3$<br>8 µg/m$^3$ | Not Applicable |
| Sulphur Dioxide ($SO_2$) | 1 Hour<br>24 Hours<br>Annual | 0.2 ppm (570 µg/m$^3$)<br>0.08 ppm (240 µg/m$^3$)<br>0.02 ppm (60 µg/m$^3$) | 1 day a year<br>1 day a year<br>None |

The NEPM ambient air quality goals are intended to apply only to performance monitoring stations that satisfy the criteria for siting incorporated into the NEPM AAQ. The siting criteria stipulates that performance monitoring stations should be located in a manner such that they contribute to obtaining a *representative measure of air quality likely to be experienced by the general population in a region or sub-region*. The aim of the NEPM AAQ is to achieve compliance within 10 years of their inception in 1998 (i.e. by 2008).

It should be noted that the NEPM AAQ goals are not intended to be used in areas impacted by local pollutant sources, such as in the vicinity of major roads or industry sources. They are also intended as a long-term reporting goal, and to guide the formulation of strategies for managing human activities that may affect the environment.

### 3.2.2 NSW Air Quality Assessment Criteria

The NSW Department of Environment and Climate Change (DECC) has established ground level air quality impact assessment criteria for key air pollutants to achieve appropriate environmental outcomes and to minimise associated risks to human health as published in the 2005 DECC document the Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (the Approved Methods). A summary of the impact assessment criteria is given in **Table 2**.

The impact assessment criteria are required to be applied as follows:

- At the nearest existing or likely future off-site sensitive receptor.
- The incremental impact (predicted impacts due to the pollutant source alone) for each pollutant must be reported in units and averaging periods consistent with the impact assessment criteria.
- Background concentrations must be included using the procedures specified in Section 5 in the Approved Methods.
- Total impact (incremental impact plus background) must be reported as the 100$^{th}$ percentile in concentration or deposition units consistent with the impact assessment criteria and compared with the relevant impact assessment criteria.

The dust deposition criterion is given for an annual average dust deposition rates expressed in g/m$^2$/month.

**Table 2 Key Air Quality Impact Assessment Criteria specified by the NSW DECC**

| Pollutant | Averaging Period | Concentration | | Source |
|---|---|---|---|---|
| | | pphm | µg/m³ | |
| Sulfur dioxide ($SO_2$) | 10 minutes | 25 | 712 | NHMRC (1996) |
| | 1 hour | 20 | 570 | NEPC (1998) |
| | 24 hours | 8 | 228 | NEPC (1998) |
| | Annual | 2 | 60 | NEPC (1998) |
| Nitrogen dioxide ($NO_2$) | 1 hour | 12 | 246 | NEPC (1998) |
| | Annual | 3 | 62 | NEPC (1998) |
| Photochemical oxidants (as ozone) | 1 hour | 10 | 214 | NEPC (1998) |
| | 4 hours | 8 | 171 | NEPC (1998) |
| Lead | Annual | - | 0.5 | NEPC (1998) |
| $PM_{10}$ | 24 hours | - | 50 | NEPC (1998) |
| | Annual | - | 30 | EPA (1998) |
| Total suspended particulates (TSP) | Annual | - | 90 | NHMRC (1996) |
| | | **Maximum Increase** | **Maximum Total** | |
| Deposited dust (g/m²/month) | | 2 | 4 | NERDDC (1988) |
| | | **ppm** | **mg/m³** | |
| Carbon monoxide (CO) | 15 minutes | 87 | 100 | WHO (2000) |
| | 1 hour | 25 | 30 | WHO (2000) |
| | 8 hours | 9 | 10 | NEPC (1998) |
| | | **µg/m³** | **µg/m³** | |
| Hydrogen fluoride | 90 days | 0.5 | 0.25 | ANZECC (1990) |
| | 30 days | 0.84 | 0.4 | ANZECC (1990) |
| | 7 days | 1.7 | 0.8 | ANZECC (1990) |
| | 24 hours | 2.9 | 1.5 | ANZECC (1990) |

The Approved Methods also provides assessment criteria for a wide range of individual toxic and odourous air pollutants and impacts from complex mixtures of odourous pollutants.

## 3.3 Legislative Requirements

In addition to compliance with the ground level concentration criteria detailed above, the Project must also meet the requirements of the *Protection of the Environment Operations Act 1997* (POEO Act). Schedule 1 of the POEO Act details a range of operations and the associated qualifiers that determine whether the operation is a Scheduled Activity and therefore requiring an Environment Protection Licence (EPL) from the NSW DECC.

The following clause from Schedule 1 of the POEO Act is applicable to Marinas and Boat Repairs:

- **Boat construction/maintenance (dry/floating docks)**, meaning the use of dry docks or floating docks for the construction, repair and maintenance of vessels.
- **Boat construction/maintenance (general)**, meaning the use of facilities (whether water-based or land-based) for the construction, repair and maintenance of vessels (other than dry docks, floating docks and facilities not having frontage to a waterway).

- **Boat mooring and storage**, meaning the use of pontoons, jetties, piers or other structures (whether water-based or land-based) designed or utilised to provide moorings or dry storage (other than swing moorings and facilities not having frontage to a waterway).

| ***Activity*** | ***Criteria*** |
|---|---|
| *Boat construction/maintenance (dry/floating docks)* | *Capacity to handle vessels 25 metres or longer* |
| *Boat construction/maintenance (general)* | *Capacity to handle more than 5 vessels longer than 5 metres (excluding rowing boats, dinghies and other small craft) at any time* |
| *Boat moorings and storage* | *Capacity to handle more than 80 vessels (excluding rowing boats, dinghies and other small craft) at any time* |

It is likely that the Project will qualify as a Scheduled Activity against all of the above criteria and require the provision of an EPL. Consequently, the standards of concentrations for Scheduled Activities, presented in Schedule 4 of the *Protection of the Environment Operations (Clean Air) Regulation 2002* (the "Regulation") would apply to all emission points associated with the Project. The applicable Regulation standards for emission sources at the Project are summarised in **Table 3**

**Table 3 POEO Amendment Regulation 2002 Ambient Air Quality Goals (General Activities and Plant)**

| **Pollutant** | **Maximum in-stack concentration** |
|---|---|
| Total Solid Particulates | 50 mg/m$^3$ |
| Nitrogen dioxide ($NO_2$) or Nitric oxide (NO) or both, as $NO_2$ equivalent | 350 mg/m$^3$ – Any Activity or Plant (excluding below)<br>450 mg/m$^3$ – Stationary Reciprocating Internal Combustion Engines |
| Sulfuric acid mist ($H_2SO_4$) or sulfur trioxide ($SO_3$) or both, as $SO_3$equivalent | 100 mg/m$^3$ |
| Hydrogen sulfide ($H_2S$) | 5 mg/m$^3$ |
| Fluorine ($F_2$) and any compound containing fluorine, as total fluoride (HF) equivalent | 50 mg/m$^3$ |
| Chlorine ($Cl_2$) | 200 mg/m$^3$ |
| Hydrogen chloride (HCl) | 100 mg/m$^3$ |
| Type 1 substances and Type 2 substances (in aggregate) | 5 mg/m$^3$ |
| Cadmium (Cd) or mercury (Hg) individually | 0.2 mg/m$^3$ |
| Volatile organic compounds (VOCs), as n-propane | 40 mg/m$^3$ VOCs or 125 mg/m$^3$ CO |

# 4 BASELINE AIR QUALITY ENVIRONMENT

No air quality monitoring data was available for the greater Taree region. In order to provide an an indication of the potential existing air quality environment in the region, historical data obtained at the NSW DECC ambient air quality monitoring stations situated in the Lower Hunter region.

Each year, the NSW DECC compiles a summary report based on data from their state-wide air quality monitoring network as part of the requirements of the NEPM for Ambient Air Quality. Within this report, the NSW DECC presents the monitoring results obtained throughout the year and the level of compliance with the assorted NEPM AAQ air quality criteria.

The NSW NEPM AAQ Compliance Reports (NEPM DECC 2003 to NEPM DECC 2008) compiled between 2002 and 2007 were reviewed as part of this assessment. The maximum and median recorded concentrations were obtained for the following stations and pollutants:

- Newcastle (CO (8-hour), $NO_2$ (1-hour), $SO_2$ (1-hour) and $PM_{10}$ (24-hour)) – located approximately 130 km south-southwest of the Project Site;
- Wallsend ($NO_2$ (1-hour) and $SO_2$ (1-hour)) – located approximately 135 km south-southwest of the Project Site; and
- Beresfield ($PM_{10}$ (24-hour)) – located approximately 125 km south-southwest of the Project Site.

It is noted that the location of the three NSW DECC Lower Hunter air quality monitoring stations are significantly more urbanised than Taree, both with respect to industrial and residential development. Consequently, the measured concentrations presented in the following sections should be viewed as a conservative representation of likely ambient air quality conditions in the greater Taree area.

Potential polluting operations in the region surrounding the Project Site were also considered. A review of the National Pollutant Inventory (NPI) database and other resources indicates a number surrounding operations in the local area that have the potential impact upon local air quality, as listed in **Table 4**.

**Table 4 Identified Surrounding Industries**

| Name | Location | Distance / Direction from Project Site | Assumed Primary Pollutants |
|---|---|---|---|
| Impress Aerosols Packing Factory | Hallstrom Ave, Kolodong | 6 km / WNW | PM, $NO_X$, CO and VOCs |
| Taree Airport | Airport Dr, Taree | 3 km / ENE | PM, $NO_X$, $SO_2$, CO and VOCs |
| Dawson Wastewater Treatment Plant | Myuna Cl, Taree | 3 km / NNW | Odour |
| Ridley Agriproducts | Lansdowne Rd, Taree | 6 km / NNE | PM, $NO_X$ and VOCs |

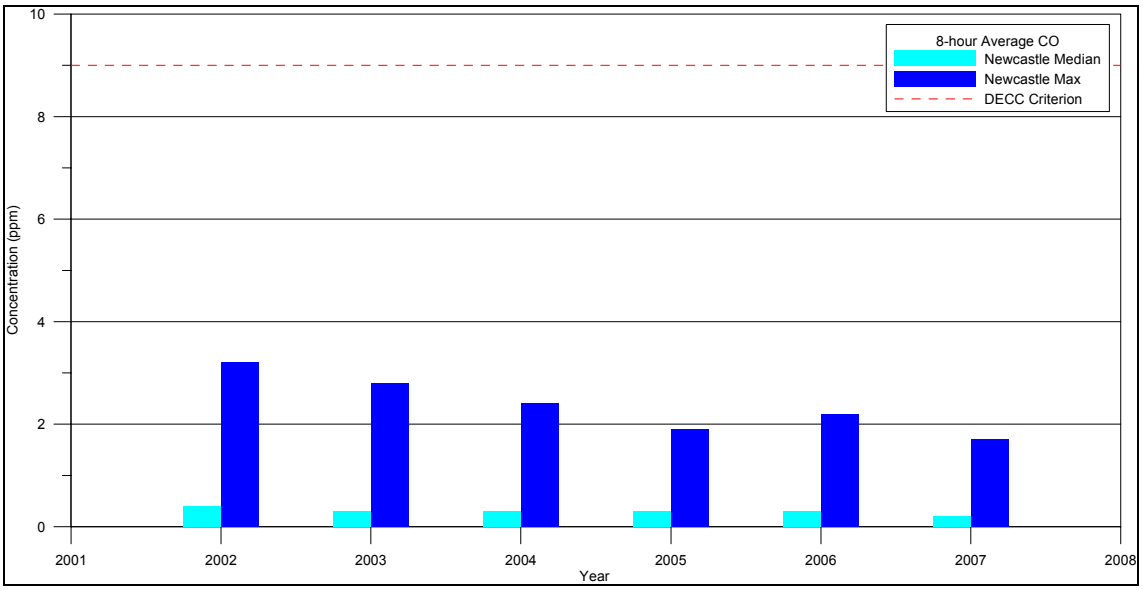
The potential of the operations listed in **Table 4** to adversely impact upon the local air shed is not considered comparable with the level and magnitude of operations in the vicinity of the Lower Hunter monitoring stations.

The Taree air shed is also likely to be influence by emissions generated by agricultural activities, local vehicle exhaust, domestic heating during cooler periods and natural sources such as bushfires and sea spray (with regards to particulate matter).

## 4.1 Carbon Monoxide

**Figure 3** summarises historical 8-hour average maximum and median ambient CO concentrations recorded at the NSW DECC Newcastle monitoring station between 2002 and 2007. No exceedances of the 8-hour NSW DECC CO criterion were recorded at the Newcastle station at any time between 2002 and 2007.

**Figure 3 Historic 8-hour Average Carbon Monoxide Concentrations – Newcastle 2002-2007**

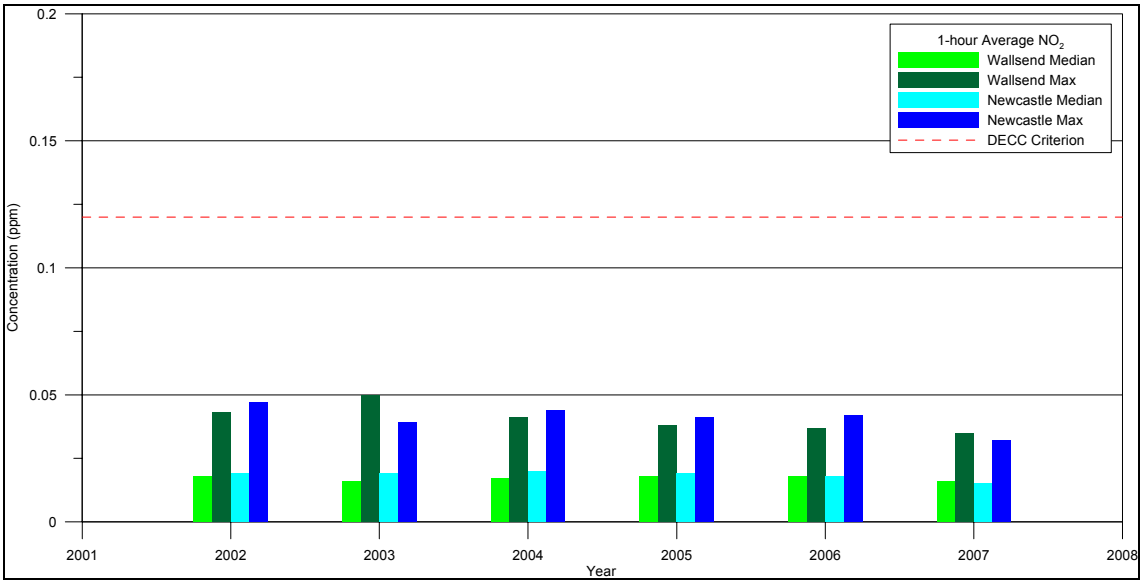



NOTE: NSW DECC Criterion – 9 ppm

## 4.2 Nitrogen Dioxide

**Figure 4** summarises historical 1-hour average maximum and median $NO_2$ concentrations historically recorded at the DECC Wallsend and Newcastle ambient monitoring stations between 2002 and 2007. No exceedances of the 1-hour NSW DECC $NO_2$ criterion were recorded at the Newcastle or Wallsend stations at any time between 2002 and 2007.

**Figure 4 Historic 1-hour Average Nitrogen Dioxide Concentrations – Newcastle and Wallsend 2002-2007**



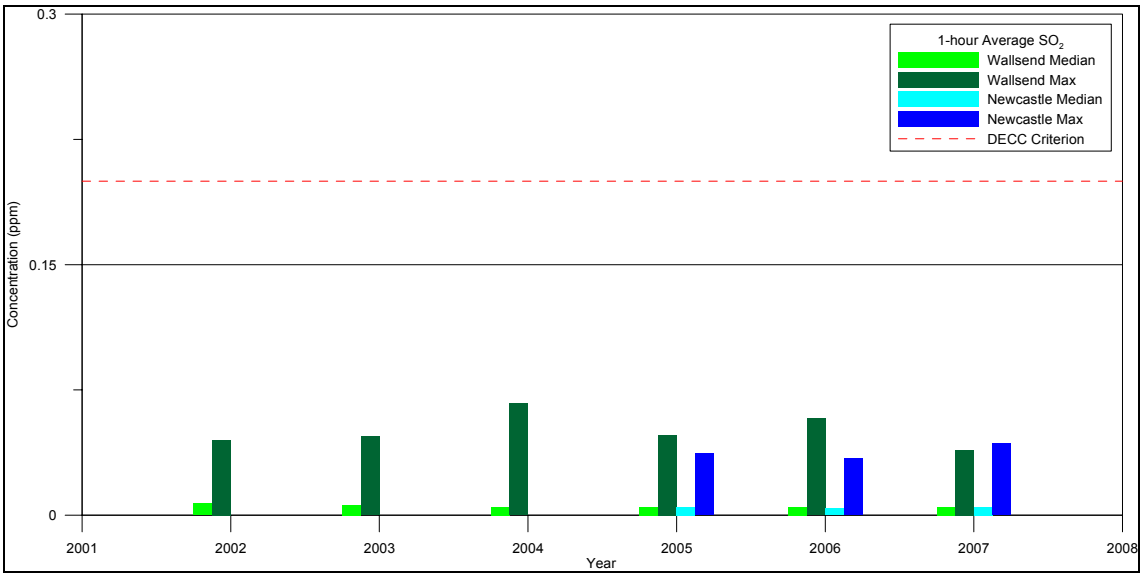

NOTE: NSW DECC Criterion – 0.12 ppm

The maximum 1-hour $NO_2$ concentration recorded at Monash in 2007 was 0.039 ppm. For the year 2007, there were no exceedances of the NEPM reporting goal for $NO_2$ at Monash.

## 4.3 Sulphur Dioxide

**Figure 4** summarises historical 1-hour average maximum and median $SO_2$ concentrations historically recorded at the NSW DECC Wallsend and Newcastle ambient monitoring stations between 2002 and 2007. No exceedances of the 1-hour NSW DECC $SO_2$ criterion were recorded at the Newcastle or Wallsend stations at any time between 2002 and 2007.

**Figure 5 Historic 1-hour Average Sulphur Dioxide Concentrations – Newcastle and Wallsend 2002-2007**



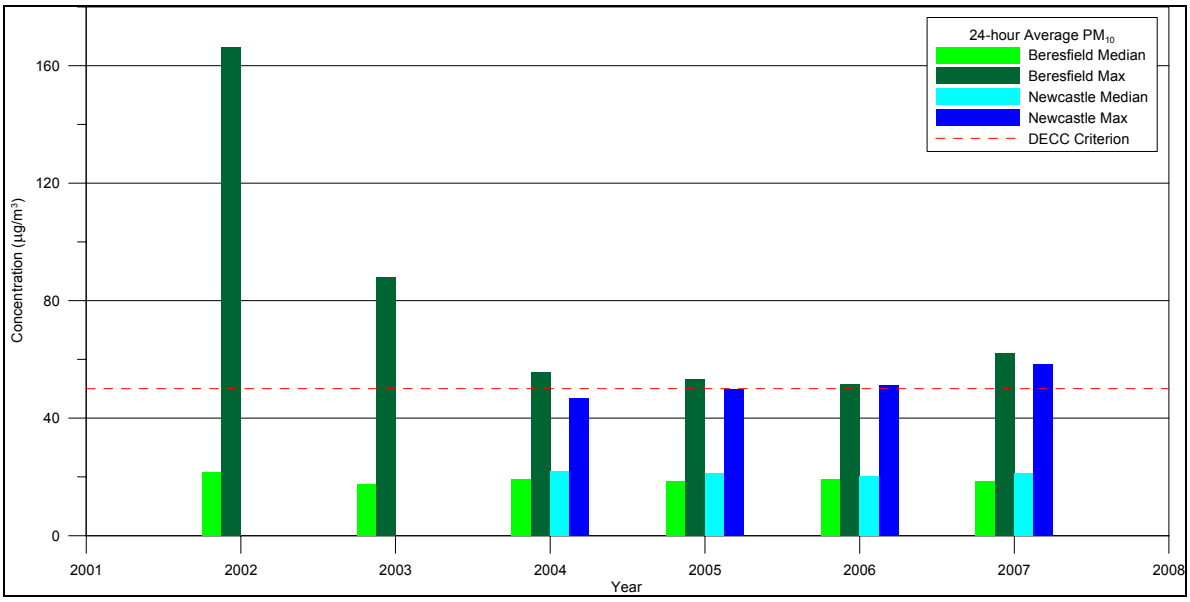

NOTE: NSW DECC Criterion – 0.2 ppm

## 4.4 Particulate Matter

**Figure 6** summarises historical 24-hour average maximum and median $PM_{10}$ concentrations historically recorded at the NSW DECC Beresfield and Newcastle ambient monitoring stations between 2002 and 2007.

It is clear from **Figure 6** that exceedances of the 24-hour average criterion were experienced at both the Beresfield and Newcastle monitoring stations between 2002 and 2007. Indeed, multiple exceedances of the 24-hour were recorded at each station, as per **Table 5**.

**Figure 6 Historic 24-hour Average $PM_{10}$ Concentrations – Beresfield and Newcastle 2002-2007**




NOTE: NSW DECC Criterion – 50 µg/m$^3$

**Table 5 Number of Exceedances by Year and Station**

| Year | Number of Exceedances | |
|---|---|---|
| | **Beresfield** | **Newcastle** |
| 2002 | 25 | ND |
| 2003 | 5 | ND |
| 2004 | 1 | 0 |
| 2005 | 1 | 0 |
| 2006 | 2 | 1 |
| 2007 | 5 | 2 |

ND – No Data

Ongoing drought conditions across southeast Australia and associated natural events, including bushfires and dust storms, had a significant influence on recorded $PM_{10}$ concentrations at all other stations across the NSW DECC network.

Under suitable meteorological conditions, elevated concentrations of ambient particulate can be attributed to large scale regional events, as a result of long range transportation of particulate matter. Specific examples would include extensive bushfires in the Victorian Alps region during late 2006 influencing air quality across NSW.

The NEPM AAQ Compliance Reports indicate that that in the absence of extreme natural events, the $PM_{10}$ assessment criteria is generally satisfied across the state-wide monitoring network. Taking the general lack of heavy industry in the Taree region into consideration, it is considered that, with the exception of episodic natural events such as bushfires, the typical ambient concentrations of $PM_{10}$ in the local air shed are likely to be significantly lower than those recorded in the Lower Hunter region.

## 4.5 Summary

The discussion and results presented in the preceding sections indicate that, assuming the Lower Hunter air quality monitoring data provides a highly conservative representation of existing ambient air quality in the Taree region, there is a capacity within the local air shed for atmospheric emissions generated by the Project to be assimilated without compromising air quality goals.

Given the relatively minor level of industry and residential development in the local surrounding area when compared with that established in the Lower Hunter region, it is considered highly likely that the existing air quality in the Taree region would be not be compromised by the addition of the proposed Project, assuming all suitable emission mitigation and control techniques were applied.

# 5 LOCAL CLIMATE

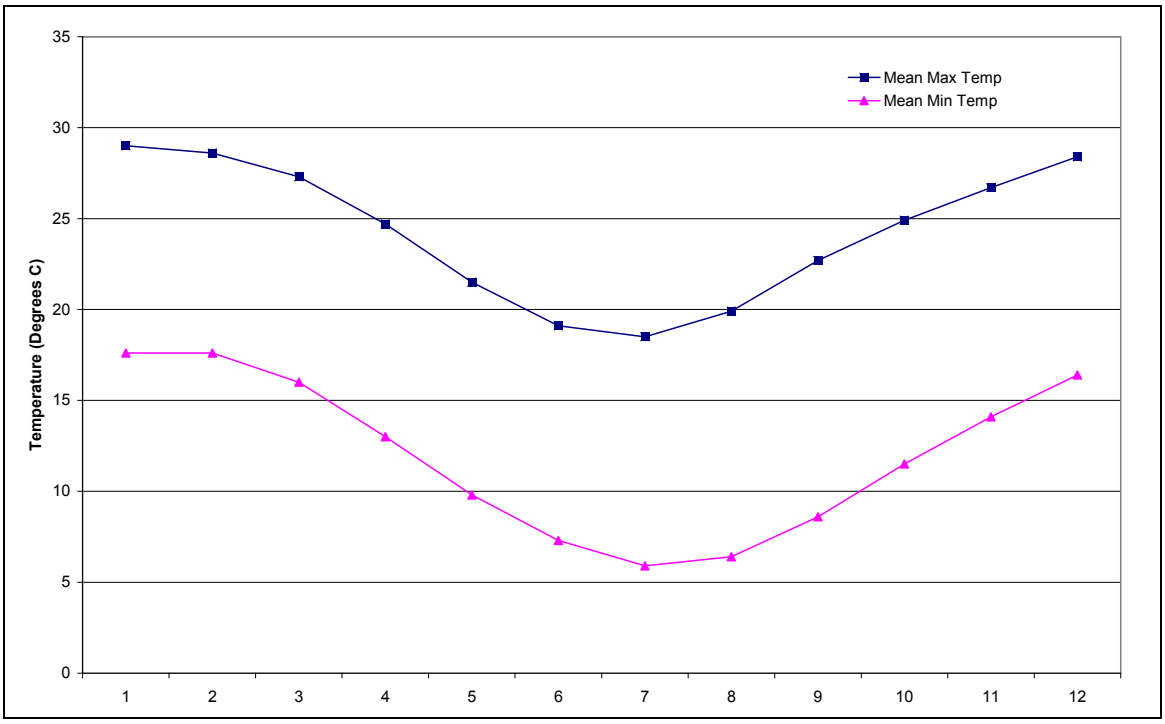
## 5.1 Climate Averages

In order to provide an indication of local climate and meteorological conditions, data has been sourced from the following Bureau of Meteorology (BoM) sources:

- Long term climate records from Taree (Robertson St) weather station, approximately 3 km west-northwest of the Project Site, recorded between 1881 and 2009;
- Hourly meteorological conditions for 2005 and 2006 and long term climate records between 1997 and 2009 from the Taree Airport Automatic Weather Station (AWS), approximately 3 km east-northeast of the Project Site,

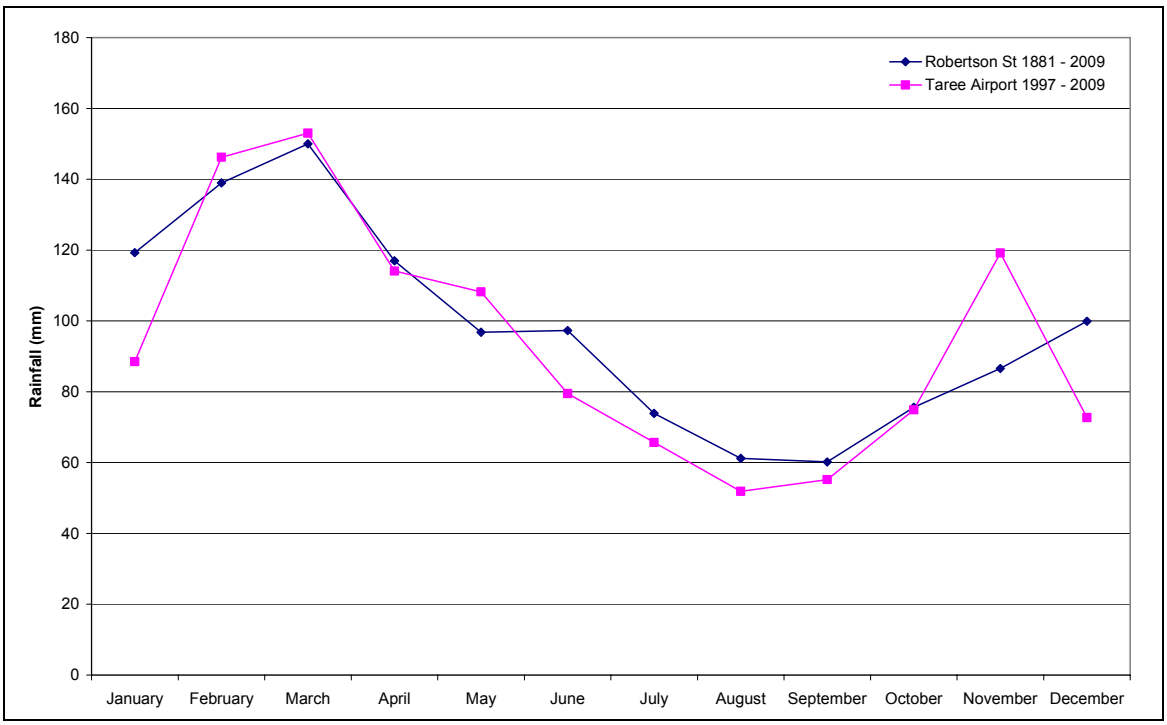
Climatic averages from the BoM Robertson St station, suggest that the Taree region generally experiences warm wet summers with cooler and dryer conditions in winter. A graph of the mean maximum and mean minimum monthly average temperature variation is shown in **Figure 7**.

**Figure 7 Mean Monthly Temperature Variation for Taree**




The rainfall experienced in Taree can be described as moderate, with an annual rainfall of approximately 1100 mm. A graph of monthly mean rainfall at Robertson Street and Taree Airport AWS is shown in **Figure 8**. On average Taree experiences wetter summers and dryer winters.

**Figure 8 Mean Rainfall for Taree**

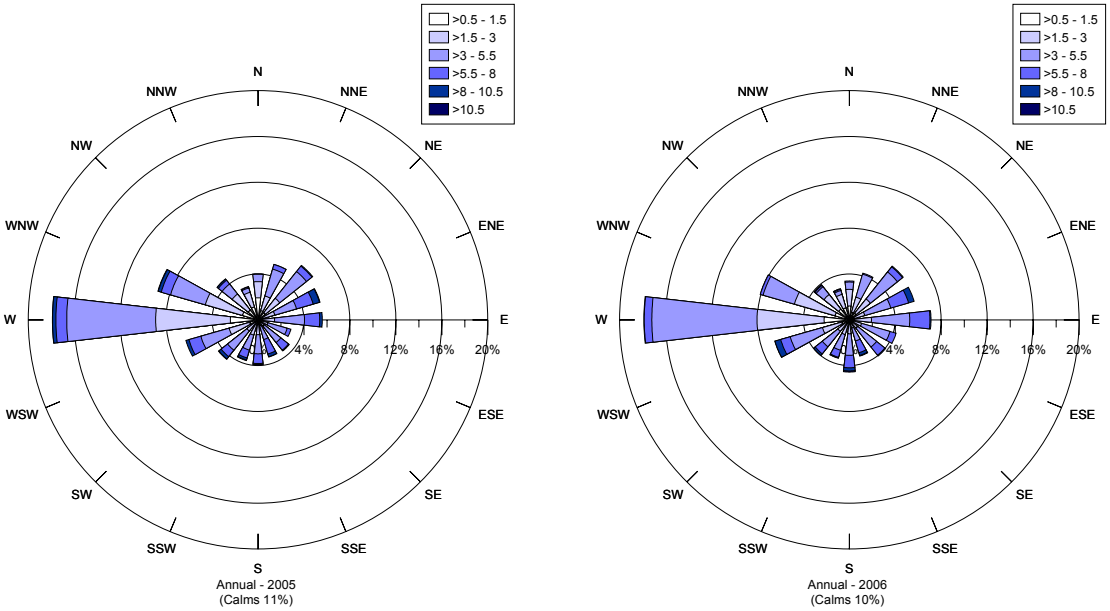



## 5.2 Local Wind Conditions

As stated previously, hourly meteorological data for 2005 and 2006 has been obtained from the Taree Airport AWS. Annual wind roses for these years are presented in **Figure 9**. Comparison of the two annual wind roses indicates little variation between the 2005 and 2006, with dominant light to moderate westerly winds occurring for 15% to 20% of the time. Calm wind conditions (less than 0.5 m/s) occur reasonably frequently at Taree (approximately 10 % of the year). Average wind speed at Taree is 3.2 m/s.

It is noted that the dominant westerly wind component typical of the Taree area would transport emissions from the Project Site away from the closest surrounding residential receptors, situated adjacent to the north and west.

**Figure 9 Wind Roses – BoM Taree Airport AWS – 2005 and 2006**



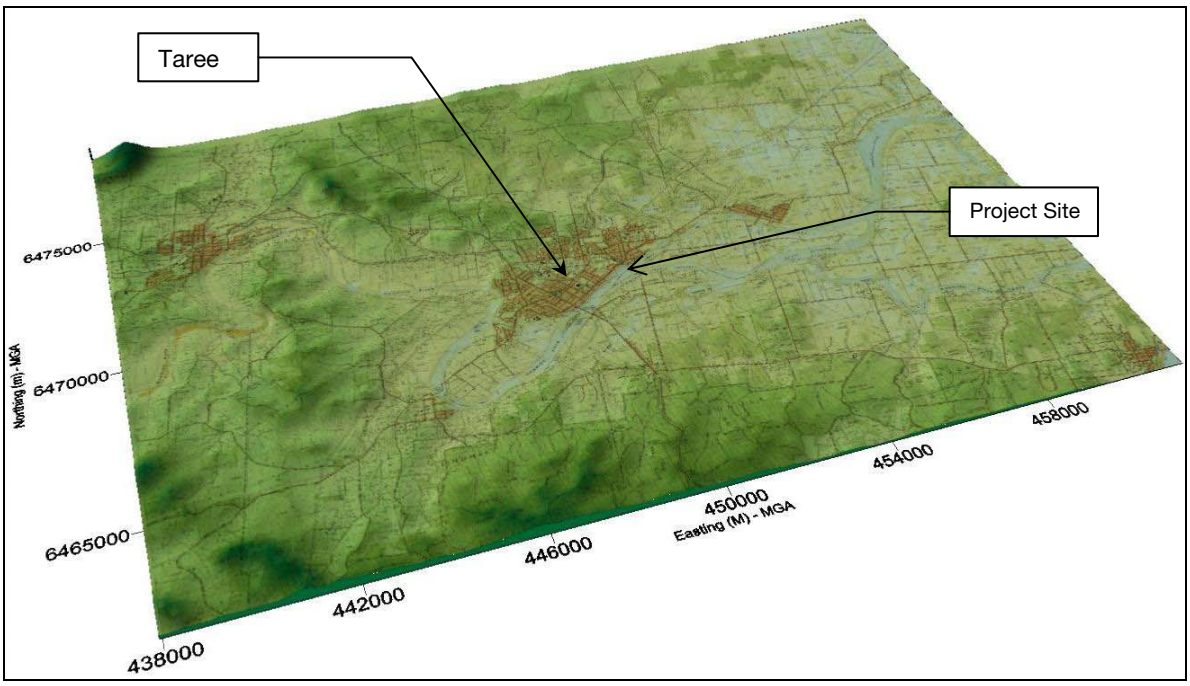

Annual Wind Rose for 2005 | Annual Wind Rose for 2006

## 5.3 Surrounding Topography

Topography plays an important role in atmospheric dispersion of pollutants by allowing or obstructing the free movement of air and mechanically forcing the circulation of air masses. Air pollutants emitted into the lowest layers of the atmosphere can show complex behaviour as a result of the influence of local and regional scale terrain features such as night-time katabatic drainage flows from elevated terrain or channelling effects in valleys or gullies.

The local and regional topography in the vicinity of Taree is generally uncomplicated and is characterised by mildly rolling and open terrain (refer **Figure 10**). Topography is therefore not considered likely to influence the dispersion of any emissions from the Project Site.

**Figure 10 Regional Topography**




Vertical Exaggeration of 2 applied to emphasise topographic features

# 6 CONSTRUCTION PHASE EMISSIONS

A comprehensive Project-specific construction dust management plan will be developed prior to issuing of the construction certificate. The following provides a general overview of emissions likely to be associated with the construction phase of the Project and mitigation measures that should be implemented to reduce such emissions.

## 6.1 Likely Construction Phase Emissions and Sources

The principal emissions from construction of the Project will be that of dust and particulate matter, generated during dry conditions.

The following activities are those identified as a specific potential source of dust generation, as a result of the construction works:

- Bulk earthworks including earthmoving and excavation during site preparation, vegetation clearing and topsoil removal.
- Stockpiling of construction waste.
- Movement of vehicles and construction machinery, both within and in/out of the construction site.
- Trucks unloading construction waste / materials.
- Graders, Rollers and compactors working onsite.
- Wind erosion from exposed ground and stockpiles of materials.

## 6.2 Mitigation Measures

The following list provides a general list of emission control methods that can be applied during construction operations:

- Retaining existing vegetation where possible.
- Stripping areas progressively and only where it is necessary for works to occur.
- Employing stabilisation methods such as matting, grassing or mulch.
- Dampening the ground with a light water spray.
- Roughening the surface of exposed soil.
- Covering stockpiles and locating them in areas that are protected from the wind.
- Restricting vehicle movements.
- Covering loads when transporting material.
- Constructing appropriate wind breaks such as wind fences.
- Sealing of roads where possible.
- Trucks entering and leaving the site should be well maintained in accordance with the manufacturer's specification to comply with all relevant regulations, including smoke emission standards.
- Truck movement should be controlled on site and restricted to designated roadways.
- Truck wheel washes or other dust removal procedures should be installed to minimise transport of dust offsite.
- If necessary, amending of construction during periods of high wind.

# 7 OPERATIONAL PHASE EMISSIONS - MARINA

Emissions to air resulting from the operation of a marina can be grouped into the following categories:

- Vessel Maintenance Activities, including
  - Surface Preparation.
  - Surface Coating.
  - Fibreglass work.
- Fuel Storage and Vessel Refuelling.
- Sewage Removal from Vessels.
- Exhaust emissions from recreational vessels berthed within the Marina and from road traffic in and around the Marina.

The National Pollution Inventory (NPI) Emission Estimation Technique Manual for Shipbuilding Repair and Maintenance (NPI, 1999), lists potential emissions from the repair and maintenance of ships, barges and non-ocean going recreational vessels. A summary of the potential activities occurring at the proposed Marina and the associated potential emissions and emission controls, are outlined as follows.

## 7.1 Vessel Maintenance Activities

It is proposed that the marina will involve a landing stage, maintenance areas, dry dock, dry storage and boat building facility in the eastern area of the Project Site. Consequently, it is likely that periodic vessel maintenance operations may occur at the Project Site, including surface preparation, surface coating and fibreglass work. The NSW DECC provide general guidance on such operations and mitigating associated emissions to air within the Local Government Air Quality Toolkit document, *Spray Painting Operations* (DECC, 2007a).

### 7.1.1 Surface Preparation

Surface preparation techniques are used to remove surface contaminants such as scale, rust, dirt, salt, paint, grease and fouling from vessels prior to repainting or surface coating. Surface preparation techniques often include cleaning using solvents, detergents or chemicals or abrasive blasting.

Emissions to air from cleaning processes include VOCs from solvents and paint strippers. Emissions from abrasive blasting include particulates.

To reduce dust and particulates during surface preparation the following mitigation measures should be implemented:

- Sanding and abrasive blasting activities should be conducted in the workshop with a suitable dust extraction system fitted;
- Outdoor sanding and abrasive blasting activities should be surrounded with shrouding fences of steel, plastic or fabric; and
- Following sanding and abrasive blasting activities waste material should be managed to reduce fugitive emission to the atmosphere through wind suspension.

Emissions to air of VOCs from solvents and paint strippers can be controlled through the correct application and combination of emissions capture and ventilation systems, similar to those for surface coating operations.

### 7.1.2 Surface Coating

Surface coating operations in vessel repair has the potential to result in emissions to air of VOCs from solvents used in the paints and cleaning products.

Surface coating work should predominately be conducted in enclosed areas in accordance with the following relevant Australian Standards:

- AS/NZS 4114.1: 2003 *Spray painting booths, designated spray painting areas and paint mixing rooms, Part 1: Design, construction and testing*
- AS/NZS 4114.2: 2003 *Spray painting booths, designated spray painting areas and paint mixing rooms, Part 2: Installation and maintenance.*

It is noted that these standards focus on occupational health and safety issues for spray painting booths.

To reduce VOC and particulate emissions during painting the following measures can be implemented:

- Outside painting and respraying is to be restricted to minor repair and detailing work, and covered as much as possible;
- Avoiding spray painting operations during late evening or night will help to avoid dispersion conditions in which odour is likely to have greatest impact (ie cooler, calm conditions);
- Use of low VOC paint mix formulation to avoid the use of particularly odourous solvents;
- Paint application through efficient methods, such as high-volume low-pressure (HVLP) spray guns, reduces the amount of solvent evaporation and subsequent emissions; and
- Spray painting workshop areas should be fitted with suitable ventilation in accordance with AS/NZS 4114.1 and 4114.2. Exhaust air should treated with necessary filters and scrubbers, prior to ambient release.

### 7.1.3 Fibreglass Work

Emissions from fibreglass work include styrene, contained within resin and gels, and other assorted VOCs present in paints, thinners and solvents used in cleaning.

The following measures can assist in reducing emissions from any fibreglass work undertaken at the Project Site:

- Fibreglassing work carried out in an enclosed area fitted with appropriate ventilation controls. Ambient exhaust air should be treated prior to release;
- Materials and equipment should be appropriately stored and covered to minimise fugitive releases.

## 7.2 Fuel Storage and Vessel Refuelling

Proposed fuel storage and vessel refuelling operations at the Project Site have the potential to generate emissions of various VOCs into the local air shed. Through the implementation of best practices methods, such as vapour recovery technology, these emissions can be significantly reduced.

Delivery of fuel to the Project Site has the greatest potential of vapour emissions. As a means of preventing vapour release from the fuel tanks at refilling, vapour check valves and locking caps should be implemented at the unloading point. This closed system prevents the loss of product as vapour is reclaimed.

Refuelling facilities at the Project Site should be designed in accordance with AS 1940: 2004 *The Storage and Handling of flammable and combustible liquids*.

It is noted that as the Project is located outside the greater Sydney Metropolitan Area, there are currently no requirements under *"Control of Volatile Organic Liquids"* (Part 5) of the Regulation regarding fuel storage and handling operations, with which the Project must comply.

## 7.3 Sewage Removal from Vessels

In addition to refuelling, the Project may provide a means for the removal of sewage from vessels into the main sewer line. Such operations have the potential to generate odourous emissions which if not managed suitably, can impact upon the immediate surrounding area.

Emissions can be managed by the installation of best practice sewage removal technology. A typical sewage pump-out system would comprise of a single-action diaphragm pump, creating a closed vacuum link between the on-board sewage tank and the land based sewer line. Due to its fully enclosed nature, the release of odour emissions from this process would be minimal, significantly reducing the potential for odour emission impact on the surrounding area.

## 7.4 Exhaust Emissions

### 7.4.1 Recreational Vessels

To estimate the total emissions from the recreational vessels using the marina, information is needed on the level of likely activity as well as engine type, power and load.

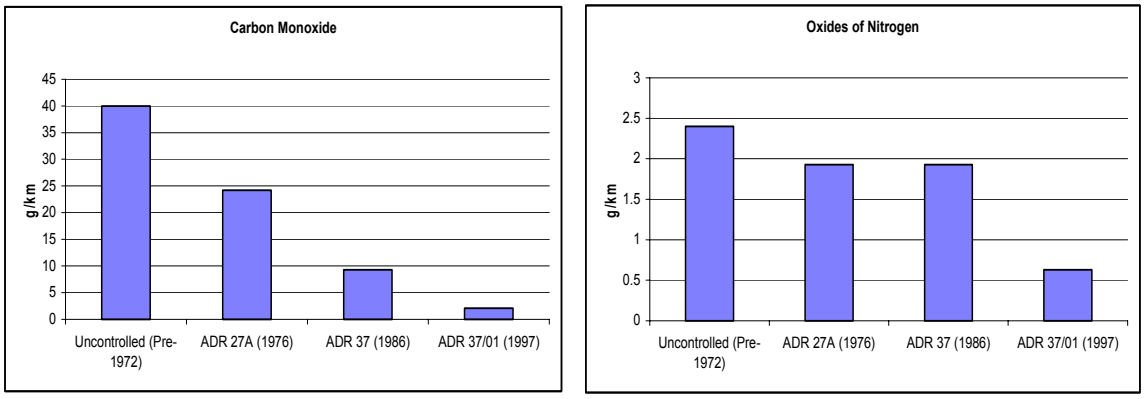
While this information is not available at the time of writing, it is likely that emissions to airshed from vessels operating within the marina will be small. Vessel activity is unlikely to be significant with only a small fraction of the potential capacity being in operation at any one time. As such it is assumed that exhaust emissions would be easily assimilated within the existing airshed.

### 7.4.2 Road Traffic

It is anticipated that the average vehicle kilometres travelled (VKT) in the local area will increase slightly as a result of the Project. This increase has the potential to impact on the ambient air quality in the local area.

At the same time however, it is noted that within Australia as a whole there will be significant long-term changes between current and future motor vehicle emissions; in particular the off-setting trends between increased overall VKT levels and tighter emissions standards brought about by changes to Australian Design Rule (ADR) regulations. Currently, ADR 37/01 covers CO, $NO_X$ and VOC emissions from new light-duty passenger vehicles, and ADR 70/00 covers the above pollutants, plus particulates, from new diesel vehicles. Changes in the ADR for passenger vehicles between 1972 and 1997 are shown in **Figure 11**.

**Figure 11 ADR Emission Standards for Passenger Vehicles for CO and $NO_X$ (g/km)**




The graphs within **Figure 11** indicate that a 19-fold reduction in emissions of CO occurred between 1997 vehicles compared to those produced pre-1972. There was also a three-fold reduction in $NO_X$ emissions for vehicles produced over the same period. Emission standards are continuing to be refined into the future, and an improvement in air quality is therefore expected (offset against increased vehicles on roads) as older vehicles are removed from circulation.

# 8 OPERATIONAL PHASE EMISSIONS - OTHER

As stated previously in this report, sections of the Project are proposed to be Commercial and Mixed Use. This may incorporate food outlets such as cafés and restaurants, operations which have the potential to impact on the air quality of the local area. The NSW DECC provide guidance on such operations within the Local Government Air Quality Toolkit document, *Air Quality Guidance Note for Food Outlets* (DECC, 2007b). The following emissions are associated with food outlets:

- Cooking odours;
- Greasy fume and fallout;
- Fine particulate matter as both solid and aerosol material; and
- VOCs and air toxics.

The NSW DECC (2007b) identifies a range of methods that may be used in combination to control emissions from food outlets:

- Capturing the cooking fumes at source;
- Removing oil and grease by filtration, impingement or scrubbing;
- Modifying the method of cooking, where feasible;
- Dispersing emissions through a stack;
- Separating the source from receptors;
- Good housekeeping, to avoid odours typically associated with a build-up of rancid fats and putrefaction of foods and food wastes;
- Regular cleaning and maintenance of filters;
- Implementation of advanced control technologies, such as carbon absorbers, where required.

Mechanical ventilation is required in most food shops, compliant with Clause F4.12 of the *Building Code of Australia* and *Australian Standard AS 1668 Parts 1 & 2*. Of particular relevance to air quality and contaminant control are the air capture velocities and air exhaust rates. AS 1668.2 defines exhaust from kitchen hoods and cooking processes as Type B effluent. Type B effluent is further defined as *objectionable*, only if the exhaust flow rate is greater than 1000 L/s. All food outlets fitted with mechanical ventilation should provide a report certified by a mechanical ventilation engineer indicating compliance.

Provided best practice emission control technologies are implemented, impacts from food outlets are expected to be minimal.

# 9 GREENHOUSE GAS ASSESSMENT

Construction and operation of the Project Site have the potential to generate greenhouse gas emissions. This assessment of greenhouse gas emissions are generally conducted in accordance with the methodologies established in a number of policies and guidelines, which are detailed in **Appendix A**.

It should be noted that there are three greenhouse gas emission scopes, which are defined as follows:

- Scope 1 emissions are those which result from activities under a company's control or from sources which they own (e.g. on-site generation of electricity, use of fuel in company owned vehicles). Scope 1 emissions are also termed '*direct emissions*'.
- Scope 2 emissions are those which relate to the generation of purchased electricity consumed in its owned or controlled equipment or operations.
- Scope 3 emissions are defined as those which do not result from the activities of a company although arise from sources not owned or controlled by the company (e.g. off-site transportation of purchased fuels, the use of sold products and services). Scope 2 and 3 emissions are also termed '*indirect emissions*'.

Project-related greenhouse gas sources would include the following:

During Construction of the Project:

- Emissions associated with the purchase of electricity (Scope 2);
- Diesel fuel consumed during the construction of the Project (Scope 1);
- Emissions associated with raw materials extraction and product manufacture (Scope 3);
- Emissions associated with waste generation / disposal (including wastewater) (Scope 3); and
- Emissions arising from land-use changes (Scope 3).

During Operation of the Project:

- Emissions generated during combustion of fuel (Natural gas, LPG, Diesel) (Scope 1);
- Emissions associated with the purchase of electricity (Scope 2);
- Emissions associated with waste generation / disposal (including wastewater) (Scope 3);
- Emissions arsing as a result of product use and product disposal (Scope 3); and
- Diesel and petrol use in vehicles (tenant / customer) (Scope 3).

Carbon dioxide ($CO_2$) is produced during fuel combustion as a result of the oxidation of the fuel carbon content. $CO_2$ is likely to make the largest contribution to greenhouse gas emissions from fuel combustion as approximately 99% of diesel fuel is oxidised during the combustion process (DCC, 2009).

Other greenhouse gases emitted as a result of construction and operations at the Project Site may include carbon monoxide (CO), methane ($CH_4$), oxides of nitrogen ($NO_X$) and non-methane volatile organic compounds (NMVOCs). These are produced by incomplete fuel combustion, reactions between air and fuel constituents during fuel combustion, and post-combustion reactions. Fugitive emissions of NMVOCs may also be expected due to fuel evaporation.

In accordance with the Department of Climate Change document, *National Greenhouse Accounts (NGA) Factors* (June 2009) (hereafter, "NGA Workbook"), the greenhouse gas emissions that are required for measurement from the Project are Direct (Scope 1) emissions relating to fuel combustion (for stationary energy and transport purposes), and Indirect (Scope 2) emissions resulting from emissions associated with the purchase of electricity.

For comparative purposes, non-$CO_2$ greenhouse gases are awarded a "$CO_2$-equivalence" based on their contribution to the enhancement of the greenhouse effect. The $CO_2$-equivalence of a gas is calculated using an index called the Global Warming Potential (GWP). The GWPs for a variety of non-$CO_2$ greenhouse gases are contained within Table 24 of the NGA Workbook. The GWPs of relevance to this assessment are:

- **Methane ($CH_4$)**: GWP of 21 (21 times more effective as a greenhouse gas than $CO_2$); and
- **Nitrous Oxide ($N_2O$)**: GWP of 310 (310 times more effective as a greenhouse gas than $CO_2$).

The short-lived gases such as CO, $NO_2$, and NMVOCs vary spatially and it is consequently difficult to quantify their global radiative forcing impacts. For this reason, GWP values are generally not attributed to these gases.

A quantitative assessment of the predicted greenhouse gas emissions from the construction and operation of the Project Site cannot be undertaken at this stage due to the unknown quantities of fuel, electricity, materials etc. to be consumed.

This assessment represents a more qualitative approach; a Greenhouse Gas management plan has been constructed with the aim of identifying opportunities for minimisation of emissions during the construction and operational phases of the Project.

## 9.1 The NSW Greenhouse Plan

Published in November 2005, the NSW Greenhouse Plan is a strategic document which sets out the NSW Government's aims and initiatives in terms of greenhouse gas emissions abatement over the next 20 to 45 years. The NSW Government state that it would like to meet the following criteria:

- A 60% reduction in greenhouse gas emissions by 2050; and
- Cutting greenhouse gas emissions to year 2000 levels by 2025.

The NSW Greenhouse Plan does not set out a methodology for reporting greenhouse gas emissions, rather seeks to:

- Increase awareness among those expected to be most affected by the impacts of climate change.
- Begin to develop adaptation strategies to those unavoidable climate change impacts.
- Put NSW on track to meeting the targets set out above.

The Plan seeks to promote climate change partnerships by Government, individuals, industry, business and community groups. The NSW Greenhouse Plan is due to be replaced with the NSW Climate Action Plan in mid 2009. In the interim period, the NSW Greenhouse Plan remains current government policy.

## 9.2 Implication for the Project

The NSW Greenhouse Plan seeks to limit the growth of greenhouse emissions, enhance the establishment of carbon offsets and facilitate industry take up of low emissions good and products. Opportunity therefore exists within the Masterplan framework to minimise greenhouse gas emissions from the project. To this end, greenhouse gas emission minimisation opportunities have been identified within the Sustainability Report (Draft, June 2009), prepared by Arup, the Project sustainability coordinator.

These opportunities have been identified for all Project phases (Planning and design, Construction and Operation) and for various elements (Environment, Natural Resources and Economic).

Relevant identified actions and projected outcomes are presented in the following Sections.

## 9.3 During Construction

Opportunities for Greenhouse Gas emission minimisation during the construction of the Project can be related to both Scope 1, 2 and 3 emissions.

### Scope 1 (Direct) Emissions Minimisation

Emissions associated with the use of diesel in construction vehicles should be reduced by considering the following:

- optimise and schedule vehicle operations to reduce fuel consumption;
- maintain engines according to manufacturers guidelines and keep tyres at optimum pressure to maximise fuel efficiency;
- reduce vehicle idling time; and
- consider the use of alternative fuels with a reduced carbon content, such as biodiesel, for mobile plant.

### Scope 2 (Indirect) Emissions Minimisation

Emissions associated with the consumption of purchased electricity should be reduced by considering the following:

- implement solar-powered lighting about site where possible.

### Scope 3 (Indirect) Emissions Minimisation

The Project Sustainability report provides measures which may reduce Scope 3 emissions of Greenhouse Gases, as outlined in Table 6.

Table 6 Greenhouse Gas Minimisation Measures during Construction

| Action | Projected Outcome |
|---|---|
| Remediation of creek and adjoining green space with 100% native species | Reduction in the amount of cleared land and an increase in the sequestration capacity of the development |
| Reuse materials such as steel from rail line, concrete and timber | Avoids the use of natural resources and emissions associated with the extraction, harvesting, production and transport of materials |
| Sustainable materials to be specified in design and construction (timber, rubber and gravel, concrete and steel with recycled content) | Use of recycled content reduces embodied energy which subsequently reduces emissions of greenhouse gases |
| Minimise embodied energy | As above |
| Maximise use of local products | Reduces the need for extensive transportation and reduces emissions associated with fuel combustion |
| Construction waste recycling target of 80% by weight – preference for on-site reuse against offsite recycling | Reduces the need for resource depletion (and emissions associated with material extraction etc.). On-site reuse reduces the need for offsite transportation and reduces emissions from transport fuels. |
| Comprehensive waste strategy for the site | Increase in recycled material leading to a reduction in emissions associated with natural materials extraction etc. |

Source: Taree Manning Riverside Masterplan and Development Control Plan – Draft Sustainability Report, Arup, June 2009

## 9.4 Operation

During operation of the Project, opportunities for Greenhouse Gas emissions reductions can be related to Scope 1, 2 and 3 emissions as follows:

### Scope 1 (Direct) Emissions Minimisation

Emissions associated with the use of diesel, LPG or other fuels during Project operations should be reduced by considering the following:

- Consider the use of alternative fuels with a reduced carbon content, such as biodiesel, for mobile plant.

### Scope 2 (Indirect) Emissions Minimisation

Emissions associated with the consumption of purchased electricity should be reduced by considering the following:

- Implementing solar-powered lighting about site where possible.
- Implementing building management systems to track electricity consumption to identify areas where reductions can be targeted.

### Scope 3 (Indirect) Emissions Minimisation

The Project Sustainability report provides measures which may reduce Scope 3 emissions of Greenhouse Gases during Project operation.

These are reproduced in **Table 7**.

**Table 7 Greenhouse Gas Minimisation Measures during Operation**

| Action | Projected Outcome |
|---|---|
| Possible green roofing (if not in conflict with photovoltaic cells) | Provide insulation and reduces heating/cooling energy use. Provides minor sequestration |
| Minimum 4 Star Green Star Multi Unit Residential and ABGR | Reduce energy consumption for heating/cooling etc. |
| Solar Energy preferred – photovoltaics and solar hot water systems to be installed on roof surfaces where feasible | Reduce electricity, gas and/or LPG consumption through use of renewable energy |
| Maximise daylighting within buildings during design | Reduce electricity consumption for lighting |
| Energy metering and monitoring and real time feedback | Allows peak electricity demand to be reduced |
| Recycling bins in appropriate areas, in addition to green waste | Reduce natural resource consumption, extraction and production of materials and reduces transport of materials to landfill (biomass recycling onsite) |
| Central composting area | As above |
| Residential units supplied with individual compost collection units | As above |
| Community garden to use residential and commercial organic and greenwaste | As above |
| Greywater recycling onsite | Reduces emissions associated with wastewater processing |
| Pedestrian links to existing bus route, cycleway | Encourage use of public transport rather than single occupancy car journeys |
| No significant carparks included in masterplan | As above |
| Specification for glass on north facing windows to reduce solar radiation and air conditioning load | Reduces energy consumption associated with cooling of space |

# 10 CONCLUSIONS

Heggies have been commissioned by Chase Property Investments Pty Ltd to prepare an Air Quality and Greenhouse Gas Assessment for the Figtrees on the Manning development, situated in the Greater Taree Local Government Area, and located approximately 2km northeast of the CBD.

Review of the local setting of the development, characteristics of the existing environment and meteorological profile and likely air pollutant emissions have been considered within this report.

Given the nature of the proposed development, it is considered that assuming appropriate emission control methods and technologies are employed at all applicable points, the potential for adverse impact on the existing air shed and surrounding environment is considered low.

The development has the potential to generate greenhouse gas emissions, principally through the consumption of fuel and purchased electricity. A Sustainability Report has been prepared for the Masterplan with highlights the commitment to the principles of sustainable development and also presents a commitment to reducing greenhouse gas emissions from the early stages of planning.

Opportunities for greenhouse emission reductions have been outlined with recommendations listed for implementation during project planning.

# 11 REFERENCES


- ANZECC (1990). *National Goals for Fluoride in Ambient Air and Forage,* Australian and New Zealand Environment and Conservation Council, Canberra.
- AS 1668.2 (2002) *The use of ventilation and air-conditioning in buildings. Part 2: Ventilation design for indoor air contaminant control (excluding requirements for the health aspects of tobacco smoke exposure).*
- AS 1940: -2004 *The Storage and Handling of flammable and combustible liquids*
- AS/NZS 4114.1: 2003 *Spray painting booths, designated spray painting areas and paint mixing rooms, Part 1: Design, construction and testing*
- AS/NZS 4114.2: 2003 *Spray painting booths, designated spray painting areas and paint mixing rooms, Part 2: Installation and maintenance.*
- Bureau of Meteorology, Meteorological observations and climate data from the Taree Airport and Robertson Street stations.
- Department of Climate Change, Australian Government (2009), *National Greenhouse Accounts (NGA) Factors, June 2009*.
- EPA (1998). *Action for Air*: *The NSW Government's 25-year Air Quality Management Plan,* NSW Environment Protection Authority, Sydney.
- NEPC (1998). *Ambient Air – National Environment Protection Measure for Ambient Air Quality*, National Environment Protection Council, Canberra.
- NEPC (2003). *National Environmental Protection Measure for Ambient Air Quality*, National Environmental Protection Council.
- NEPM DECC (2003). New South Wales Annual Compliance Report 2002
- NEPM DECC (2004). New South Wales Annual Compliance Report 2003
- NEPM DECC (2005). New South Wales Annual Compliance Report 2004
- NEPM DECC (2006). New South Wales Annual Compliance Report 2005
- NEPM DECC (2007). New South Wales Annual Compliance Report 2006
- NEPM DECC (2008). New South Wales Annual Compliance Report 2007
- NERDDC (1988). *Air Pollution from Surface Coal Mining: Measurement, Modelling and Community Perception*, Project No. 921, National Energy Research Development and Demonstration Council, Canberra.
- NHMRC (1996). *Ambient Air Quality Goals Recommended by the National Health and Medical Research Council*, National Health and Medical Research Council, Canberra.
- NPI (1999), Emission Estimation Technique Manual for Shipbuilding Repair and Maintenance
- NSW DECC (2005). *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*.
- NSW DECC (2007a) Local Government Air Quality Toolkit "Air Quality Guidance Note for Spray Painting Operations"
- NSW DECC (2007b) Local Government Air Quality Toolkit "Air Quality Guidance Note for Food Outlets"
- WHO (2000). *WHO Air Quality Guidelines for Europe*, 2nd Edition, World Health Organisation, Geneva.

# 12 GLOSSARY

| | |
|---|---|
| AS | Australian Standard |
| ADR | Australian Design Rule |
| Approved Methods | Approved Methods for the Modelling and Assessment of Air Pollutants in NSW |
| AWS | Automatic Weather Station |
| BoM | Bureau of Meteorology |
| $CH_4$ | Methane |
| $CO_2$ | Carbon Dioxide |
| $CO_2$-e | $CO_2$ Equivalent |
| DECC | NSW Department of Environment and Climate Change |
| DGRs | Director General Requirements |
| DOP | NSW Department of Planning |
| EPL | Environment Protection Licence |
| GWP | Global Warming Potential |
| Heggies | Heggies Pty Ltd |
| HVLP | High-pressure Low-volume |
| LAP | Local Area Plan |
| µg | Microgram (g X $10^{-6}$) |
| µm | Micrometre or micron (metre X $10^{-6}$) |
| $m^3$ | Cubic metre |
| NEPC | National Environment Protection Council |
| NEPM | National Environment Protection Measure |
| NEPM AAQ | NEPM for Ambient Air Quality |
| NGA Workbook | National Greenhouse Accounts (NGA) Factors (June 2009) |
| $N_20$ | Nitrous Oxide |
| NMVOCs | Non-methane volatile organic compounds |
| $NO_2$ | Nitrogen Dioxide |
| $NO_X$ | Oxides of Nitrogen |

| | |
|---|---|
| NPI | National Pollution Inventory |
| $O_3$ | Ozone |
| $PM_{2.5}$ | Particulate matter with an aerodynamic diameter of less than 2.5 micron |
| $PM_{10}$ | Particulate matter with an aerodynamic diameter of less than 10 micron |
| POEO Act | Protection of the Environment Operations Act 1997 |
| The Project | Figtrees on the Manning |
| The Proponent | Chase Property Investments Pty Ltd |
| The Regulation | Protection of the Environment Operations (Clean Air) Regulation 2002 |
| $SO_2$ | Sulphur Dioxide |
| TSP | Total Suspended Particulate |
| VOC | Volatile organic compound |
| VKT | Vehicle Kilometres Travelled |
| WHO | World Health Organisation |

# A1 LEGISLATIVE FRAMEWORK

The Greenhouse Gas Protocol Initiative (hereafter the GHG Protocol) is a multi-stakeholder partnership of businesses, non-governmental organizations (NGOs), governments, and others convened by the World Resources Institute (WRI), a U.S.-based environmental NGO, and the World Business Council for Sustainable Development (WBCSD), a Geneva-based coalition of 170 international companies. Launched in 1998, the Initiative's mission is to develop internationally accepted greenhouse gas (GHG) accounting and reporting standards for business and to promote their broad adoption. (WBCSD, 2005).

The GHG Protocol comprises two separate but linked standards:

- *GHG Protocol Corporate Accounting and Reporting Standard* (this document, which provides a step-by-step guide for companies to use in quantifying and reporting their greenhouse gas emissions).
- *GHG Protocol Project Quantification Standard* (forthcoming; a guide for quantifying reductions from greenhouse gas mitigation projects).

There are three scopes of emissions that are established for greenhouse gas accounting and reporting purposes, defined as follows.

## A1.1 Scope 1 Emissions – Direct GHG Emissions

The GHG Protocol defines Scope 1 emissions as those which result from activities under the company's control or from sources which they own. They are principally a result of the following activities.

- Generation of electricity, heat or steam. These emissions result from the combustion of fuels in stationary sources, eg boilers, furnaces or turbines.
- Physical or chemical processing. The majority of these emissions result from the manufacture or processing of chemicals and materials eg the manufacture of cement, aluminium, adipic acid and ammonia, or waste processing.
- Transportation of materials, products, waste, and employees. These emissions result from the combustion of fuels in company owned/controlled mobile combustion sources (eg trucks, trains, ships, airplanes, buses, and cars).
- Fugitive emissions. These emissions result from intentional or unintentional releases, eg equipment leaks from joints, seals, packing, and gaskets; carbon dioxide and methane emissions from coal mines and venting; hydrofluorocarbon (HFC) emissions during the use of refrigeration and air conditioning equipment; and methane leakages from gas transport.

## A1.2 Scope 2 Emissions – Electricity indirect GHG Emissions

Scope 2 emissions are those which relate to the generation of purchased electricity consumed in owned or controlled equipment or operations. For many companies, purchased electricity represents one of the largest sources of GHG emissions and the most significant opportunity to reduce these emissions.

## A1.3 Scope 3 Emissions – Other indirect GHG Emissions

The GHG protocol states that Scope 3 reporting is optional and covers all other indirect GHG emissions. Scope 3 emissions are defined as those which do not result from the activities of a company although arise from sources not owned or controlled by the company. Examples of Scope 3 emissions include the extraction and production of purchased materials, transportation of purchased fuels and the use of sold products and services.

In the case of the coal mining industry, Scope 3 emissions may include the transportation of sold coal and the use of this coal, either in Australia or overseas.

The GHG protocol flags the issue that the reporting of Scope 3 emissions may result in the double counting of emissions. A second problem is that as their reporting is optional, comparisons between countries and / or projects may become difficult. The GHG protocol also states that compliance regimes are more likely to focus on the "point of release" of emissions (direct emissions) and / or indirect emissions from the use of electricity. However, for GHG risk management and voluntary reporting, double counting is less important.

## A2 NATIONAL GREENHOUSE AND ENERGY REPORTING ACT

The National Greenhouse and Energy Reporting Act (the NGER Act) was passed on 29 September 2007, establishing a mandatory reporting system for company greenhouse gas emissions and energy production and consumption.

The first reporting period under the Act commenced on 1 July 2008.

The NGER Act seeks to provide a national framework for the reporting of greenhouse gas emissions, abatement actions, energy consumption and production by corporations. The data generated under the Act will lay the foundation for Australia's Carbon Pollution Reduction Scheme and assist Australia to meet its relevant international reporting obligations.

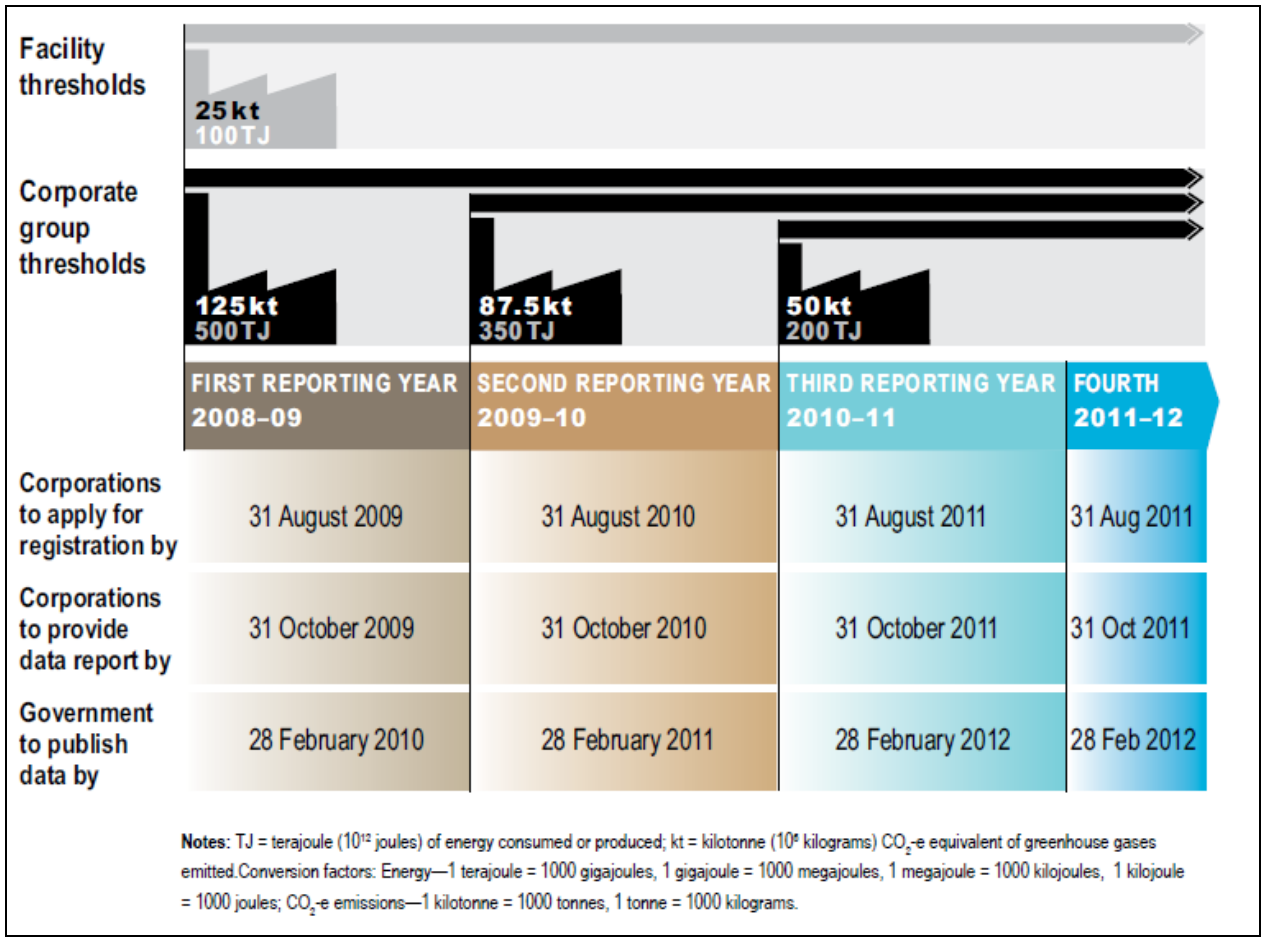
From 1 July 2008, corporations are required to register and report for the 2008 – 2009 financial year where they exceed the reporting thresholds. There are two levels of thresholds at which corporations are required to apply for registration and report, namely, facility thresholds and corporate thresholds, as follows:

- They control a **facility** that emits 25 kilotonnes (kT) or more of greenhouse gases (CO2 equivalent), or produces or consumes 100 Terajoules (TJ) or more of energy.
- Their **corporate group** emits 125kT or more greenhouse gases (CO2 equivalent), or produces or consumes 500TJ or more of energy.

When a controlling corporation's group meets a facility or corporate threshold, the controlling corporation must apply for registration and report its greenhouse gas emissions and energy data to the Greenhouse and Energy Data Officer.

The corporate group threshold progressively reduced into the second and third reporting year, as outlined in **Figure A1**.

**Figure A1 NGER Reporting Thresholds**




Source: NGER Reporting guidelines

The National Greenhouse and Energy Reporting Guidelines have been developed to help corporations understand their obligations. The Reporting Guidelines are applicable across industry sectors and cover important concepts under the Act and Regulations, including scheme participation, determining corporate, facility and operational control, registration and reporting obligations. The National Greenhouse and Energy Reporting (Measurement) 2008 provides methods and criteria for calculating greenhouse gas emissions and energy data under the act.

The range of emission sources covered in the Determination include:

- The combustion of fuels for energy
- Fugitive emissions from the extraction of coal
- Oil and gas
- Industrial processes (such as producing cement and steel)
- Waste management

Reporting under the NGER is required for Scope 1 emissions and Scope 2 emisisons, while reporting of Scope 3 emissions is voluntary.

## A3 CARBON POLLUTION REDUCTION SCHEME

In December 2008, the Australian Federal Government published a white paper outlining its intention to commence a Carbon Pollution Reduction Scheme on the 1 July 2010. The white paper (*Carbon Pollution Reduction Scheme - Australia's Low Pollution Future*) sets the policy framework for achieving a medium term emission reduction target and the means to achieve this reduction through the Carbon Pollution Reduction Scheme.

The government is committed to achieving a long term reduction target of 60% (from 2000 levels) by 2050. The white paper commits to an emission reduction target of between 5% and 15% by 2020. A 5% reduction is outlined as the minimum to be achieved while the 15% target is a commitment to reduce in line with the global agreements, should they come in force during this period.

The Carbon Pollution Reduction Scheme (CPRS) will employ a "cap and trade" mechanism, whereby GHG emissions are capped at a level and emitters will have to acquire and trade permits for every tonne of GHG gas emitted.

The threshold for participation in the CPRS is a facility that has direct (scope 1) emissions of 25,000 tonnes of CO2-e a year or more. Indirect or 'Scope 2' emissions from electricity usage will not be covered.

The quantity of emissions produced will be monitored, reported and audited (through NGERS). Emitters of GHG need to acquire a permit for every tonne of greenhouse gas that they emit and at the end of the year, surrender a permit for every tonne of emissions produced in that year. Firms will compete on the open market to purchase the permits they require.

The cap sets a limit on the aggregate annual emissions from all types and sources of emissions that are covered by the scope. The number of tradable permits will be equal to the CPRS cap, for any compliance period. Entities responsible for emissions covered by the CPRS will have to surrender a permit for every tonne of $CO_2$-e that they emit during the compliance period. There is no cap on an individual company or facility, they are free to emit as such as they wish, provided they surrender an eligible permit for every tonne emitted. Permits will be tradeable with the price determined by the market.

The CPRS covers all six greenhouse gases that are covered by the Kyoto protocol, carbon dioxide, methane, nitrous oxide, sulphur hexafluoride, hydrofluorocarbons and perfluorocarbons.

## A4 NATIONAL GREENHOUSE ACCOUNTS (NGA) FACTORS

The Federal Department of Climate Change have prepared the National Greenhouse Accounts (NGA) *Factors* (June 2009) which replaces the previously used Australian Greenhouse Office (AGO) Factors & Methods Workbook.

The NGA *Factors* are used to estimate greenhouse gas emissions for reporting under various government programs, including the NGERS. The methods described for calculating emissions listed in the NGA Factors are "Method 1" from the National Greenhouse and Energy Reporting (Measurement) Determination 2008 and the National Greenhouse and Energy Reporting (Measurement) Technical Guidelines 2008 v1.1, which have been designed to support reporting under the National Greenhouse and Energy Reporting Act 2007.

The methods described for deriving emissions in the NGA factors are consistent with international guidelines (such as the GHG Protocol).

## A5 DRAFT GUIDELINES FOR ENERGY AND GREENHOUSE IN EIA

The Draft NSW EIA Guidelines were prepared in August 2002 by the NSW Sustainable Energy Development Authority (SEDA) and Planning NSW (now the Department of Planning (DoP)). The guidelines state that they are an advisory document and should principally be applied to projects which require an EIS under Part 4 and Part 5 of the Environmental Planning and Assessment Act 1979 (NSW) but can also be used for the assessment of other projects.

The Draft NSW EIA Guidelines define four scopes of emissions, the first three being adopted along the lines of the GHG Protocol with the fourth relating to emission abatement.

## A6 REFERENCES

- Australian Government Department of Climate Change (2008a), Australia's National Greenhouse Accounts, The Australian Government's Initial Report under the Kyoto Protocol
- Australian Government Department of Climate Change (2008b), Australia's National Greenhouse Accounts, State and Territory Greenhouse Gas Inventories 2006
- Australian Government Department of Climate Change (2009), National Greenhouse Accounts (NGA) Factors Workbook, June 2009.
- Intergovernmental Panel on Climate Change (IPCC) (1996), Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories.
- World Business Council for Sustainable Development / World Resources Institute (2005), The Greenhouse Gas Protocol for Project Accounting