Qualitative Air Quality Assessment

Proposed Marina Expansion, Jones Bay Wharf

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Prepared for

Peloton Group

Prepared by

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Quality Information

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1.0 Introduction

AECOM Pty Ltd (AECOM) was commissioned to undertake a qualitative air quality impact assessment (AQIA) for Peloton Group to progress an application for a proposed marina expansion at Jones Bay Wharf, Pyrmont (the development). The purpose of the investigation was to analyse key air quality characteristics and identify potential development constraints relating to the development.

This report consists of a qualitative desktop review of potential issues based on existing air quality, local meteorological data, proximity of local industries, and the location of sensitive receptors, together with a review of the likely air pollutants that would be generated by the development. A local view of the development site is provided in **Figure 1**.

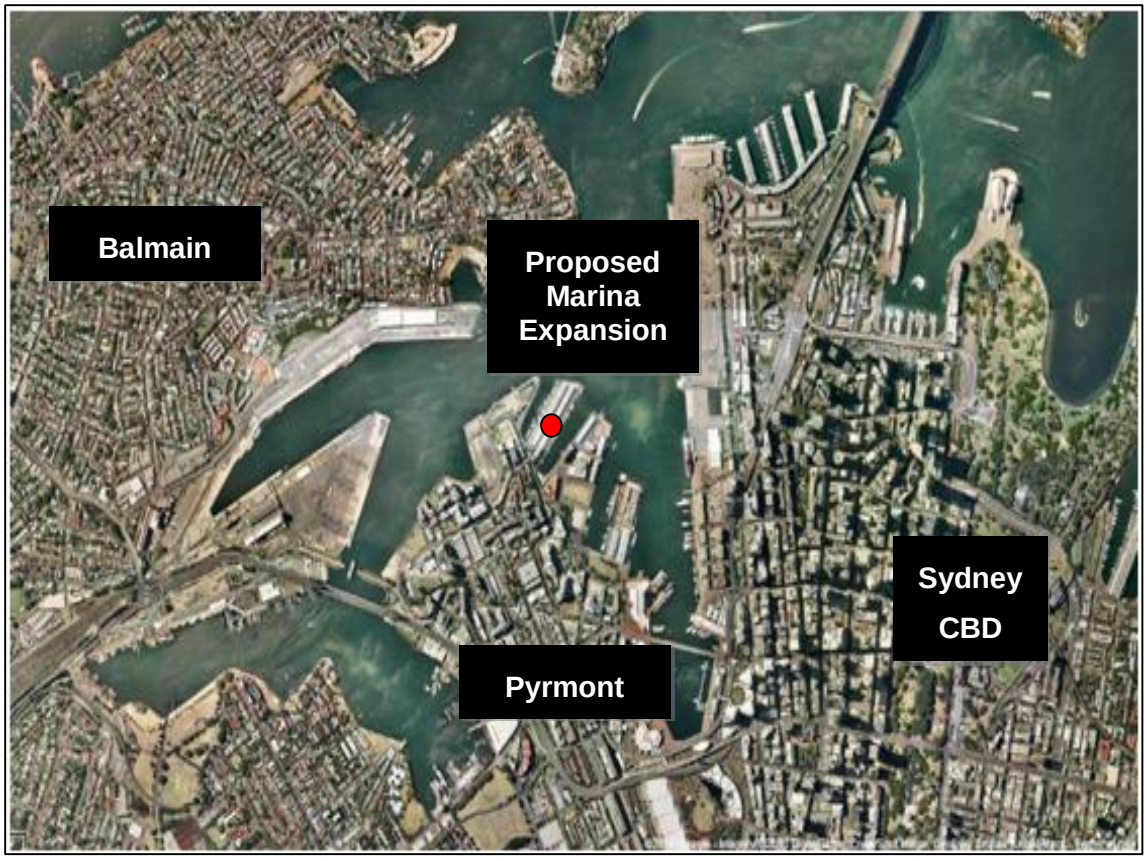

Figure 1: Location Map

1.1 Scope of Works

This AQIA focused on the potential effects of the construction and operation of the proposed development on local air quality, which were assessed qualitatively through a desktop review of:

- The proposed study area, including surrounding land use and topography;
- Potential pollutants generated by the proposed development;
- Available ambient air quality monitoring data; and
- Local meteorological data.

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2.0 Background

2.1 Assessment Area

The development is proposed to be located at Jones Bay Wharf, Pyrmont, approximately 1.5 km northeast of the Sydney CBD. The development site is located near the eastern boundary of the existing Jones Bay Wharf, with commercial premises located at the site. An existing building is located on the site, which will remain unaffected during construction to accommodate the proposed wharf upgrade.

The local terrain is flat with no major topographical features of note. A detailed discussion of meteorological conditions likely to occur at the site is provided in **Section 4.3**.

2.2 Description of Proposed Operations

Jones Bay Wharf Pty Ltd is a commercial marina facility. The proposed development is expected to expand the marina's capacity from approximately 43 to 73 vessels. The following activities are expected to occur at the proposed development site:

- A vessel wet berthing facility for commercial and private vessels providing for both long and short-term tenants;
- A centrally located sewage pump-out facility operated by trained marina staff;
- Minor repairs and general vessel cleaning and maintenance will be permitted and undertaken subject to the management controls contained within this AQIA;
- No storing of fuel or flammable materials will take place at the facility; and
- No commercial charter operations will board or discharge paying customers from the facility.

Further detail regarding the processes and their expected air emissions is provided in **Section 2.3**

2.2.1 Hours of Operation

Jones Bay Wharf will be staffed from 8.30am to 5.30pm Monday to Friday and 8.30am to 12.00pm Saturday and Sunday. Vessel movements can occur anytime up until midnight but are prohibited between the hours of midnight and 7.00am. Access to the marina outside of operating hours would require contact with the marina management which are contactable 24 hours per day, seven days per week as required.

2.3 Potential Emission Sources

Potential sources of air pollution that may occur as part of the construction stage of the development and the operational use of the site are described in the following sections.

2.3.1 General Construction

The primary pollutant expected to be generated during the construction phase of the projects is particulate matter. The construction phase will mostly consist of remodelling the existing marina site to accommodate the operational needs of the new marina. Such works may include piles driven and drilled as well as the placement of new pontoons which are to be pre-fabricated off site. The pontoons and piles will then be assembled and installed via a barge. Most works would be expected to be undertaken within the water, which is likely to result in very little dust escaping to the environment.

The effect of the construction works on local air quality will be short-term and localised to the area surrounding the site. As such, the works should not affect the long term health or amenity of the surrounding area.

2.3.2 Operational Sources

The main emissions from the marina are volatile organic compounds (VOCs) and fuel combustion that will occur from the use of auxiliary engines during idling and berthing. Emissions from the fuel combustion will include carbon monoxide (CO), oxides of nitrogen (NO_X) and particulate matter (PM10). Other emissions include fugitive emissions from a variety of other equipment and operations – these additional emissions are considered relatively minor. Associated emissions are summarised in **Table 1** and in the following sections.

Table 1: Operational Sources of Air Pollution

Operation	Unit Process	Expected Pollutants	Comments
Vessels at wet berth	Auxiliary engines	Combustion products	Cleaning and maintenance
Landside vehicle operation	Exhaust emissions from vehicles	Combustion products	Cleaning and maintenance
Odour form waste removal	Pump-out facility	Odours may be liberated to air during pumping of waste material	Cleaning and maintenance

2.3.3 Vessel at Wet Berth

The size of vessel utilising the wet berth will vary from 12 m up to 45 m. Emissions from the vessels may consist of particulates or combustion products and the impacts are dependent on the size of the vessel. Diesel fuel generates a range of pollutant emissions, such as oxides of nitrogen (NO_X), carbon monoxide (CO), volatile organic compounds (VOCs) and particulate matter (PM).

2.3.4 Land Side Vehicle Operation

Emissions may consist of particulates or combustion products. The volume is dependent on the vehicle. The by-products of a vehicle may include NO_X, CO and particulate matter

Jones Bay Wharf does not provide on-site marina specific parking. Marina users can use the adjacent public parking facility approximately 100 m from the south end of the facility. The marina facility will provide approximately 10 service or loading bays, located adjacent to each of the marina access ramps.

On-site parking will only be granted to vehicles with a specific reason for needing a vehicle on site. Other than service vehicles no common parking on the main wharf apron will be allowed. Short term loading and unloading for the servicing of vessels will be carried out from the designated service bays.

2.3.5 Odour

The activities carried out in and around the assessment area contain potential odour sources. Emissions to air from the marina operations will stem from the impact of sewage from the pump-out facility, waste collection in the marina specific garbage room and bins and diesel fuel from vessels. The marina management will maintain the right to inspect vessels on arrival into the facility to check bilges for oil or potential environmental hazards. All on board toilets must comply with Australian standards and make use of on board holding tanks. No vessel will be permitted to pump out black or grey water into the local waterway.

A waste oil receptacle will be located within the facilities garbage room for the safe disposal of waste oil. Licensed waste contractors will remove garbage weekly or more frequently during busy periods..

To avoid excess diesel fumes from accumulating vessel warm up procedures for motorised vessels will be limited to 10 minutes and the running of engines onboard vessels is prohibited except in preparation for departure or checking of equipment functionality and docking to the marina.

2.3.5.1 Sensitive Receptors

Sensitive receptors are typically defined as areas where people currently live or work, or may do so in the future. Land uses such as schools, hospitals, nursing homes, and recreational areas are also classified as sensitive receptors. **Figure 1** shows a local view of the development area. The closest residences are located to the southwest, approximately 105 m from the existing wharf, on Mill Street. Other residences are located to the south of the development, off Point Street.

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3.0 Air Quality Criteria

3.1 Pollutants of Concern

3.1.1 Volatile Organic Compounds

VOCs are a group of organic chemical compounds that are produced by a wide range of industrial processes, and emitted from organic fuels. These pollutants can cause a wide range of health and environmental effects. While the National Pollutant Inventory (NPI) frequently refers to VOCs collectively, there is no impact assessment criterion for collective VOCs in NSW for ambient air. VOCs will be generated primarily through the use of auxiliary engines during idling and berthing.

3.1.2 Particulate Matter

Particulate matter (or total suspended particulates - TSP), is the term for solid or liquid particles found in the air. Some particles are large or dark enough to be seen as soot or smoke, but fine particulate matter is tiny and is generally not visible to the naked eye. Particulate matter is produced by the mechanical breakup of larger solid particles. The larger or coarse fraction can include dust from roads, agricultural processes, uncovered soil or mining operations, as well as non-combustible materials released when burning fossil fuels. The smaller or fine particulates are largely formed by the oxidation of primary gases.

There are two main effects of particulates - nuisance effects and health effects. Nuisance effects are primarily due to deposited dust and the coarser fraction of TSP. Deposited dust refers to the larger fractions that fall from the air and deposit on exposed surfaces. While deposited dust generally has an aerodynamic diameter of greater than about 20 µm, there is no sharp size cut off between these particles and the smaller particles that remain suspended in the air for long periods. Larger dust particles are generally responsible for nuisance (amenity) effects. Dust can have a range of nuisance effects including vegetation damage and surface soiling. Depending on its physical or chemical characteristics, dust may also cause surface deterioration of materials due to its abrasive or corrosive properties. If the dust composition is dangerous then it is considered a hazardous air pollutant (and may contain toxic material).

Health effects are primarily due to particles in the size range less than 10 µm in diameter (PM_{10}) and particles less than 2.5 µm in diameter ($PM_{2.5}$). PM_{10} refers to the range of particulate matter that is inhalable and is able to penetrate the nose or mouth under normal breathing conditions. $PM_{2.5}$ is respirable and is able to penetrate the nasal cavity and ultimately the lungs.

Particulates generated from the development would result from construction activities, the combustion of fuel by plant/equipment used at the marina and vessels entering and exiting the marina.

3.1.3 Odour

Odour is a sensory response to the inhalation of one or more chemicals in the air we breathe. A person's perception of an odour can vary significantly depending on the sensitivity of the person, the acuteness of the person's sense of smell and the connotations that the odour bestows on that person. Odour primarily affects a person's quality of life and can have a large range of adverse effects including stress and other physical symptoms.

While odour is not monitored by state environmental agencies nor by industry, odorous emissions do need to be taken into account in any air pollution assessment, as many air pollution complaints in residential (and sometimes industrial) areas often relate to odour. Sewage from the pump-out facility, waste collection and VOCs are the main expected odour emissions from the development. The cafe at the marina also contains potential odour sources. In the absence of other information regarding likely odour emissions from the facility, the control of VOC emissions to comply with regulatory limits is expected to result in acceptable odour emissions from the site; as such, odour was not formally assessed in this report.

3.2 Other Pollutants

In addition to the pollutants of concern mentioned above, a number of other pollutants may also be emitted during operation of the proposed facility. These pollutants are carbon monoxide, nitrogen dioxide, and sulphur dioxide.

3.2.1 Carbon Monoxide

Carbon monoxide (CO) is a colourless, odourless gas produced by the incomplete combustion of fuels containing carbon (e.g. oil, gas, coal and wood). CO is absorbed through the lungs of humans, where it reacts to reduce the blood's oxygen-carrying capacity. In urban areas, motor vehicles account for up to 90 percent of all CO emissions. Emissions of CO from the development will be associated with combustion of fuel in vessels at the marina.

3.2.2 Nitrogen Dioxide

Nitrogen dioxide (NO_2) is a brownish gas with a pungent odour. It exists in the atmosphere in equilibrium with nitric oxide. The mixture of these two gases is commonly referred to as nitrogen oxides (NO_x). Oxides of nitrogen are products of combustion processes. In urban areas, motor vehicles and industrial combustion processes are the major sources of ambient NO_x. NO_2 can cause damage to the human respiratory tract, increasing a person's susceptibility to respiratory infections and asthma. NO_2 can also cause damage to plants, especially in the presence of other pollutants such as ozone and SO_2. Nitrogen oxides are also primary ingredients in the reactions that lead to photochemical smog formation. Emissions of NO_2 from the development will be associated with combustion of fuel in vessels at the marina.

3.3 Ambient Air Quality Criteria

In order to determine the potential effects of a proposed development on air quality or to assess the general air quality in the air shed, ambient pollutant concentrations can be compared to relevant impact assessment criteria. In NSW, the criteria are specified by the Department of Environment, Climate Change and Water (DECCW)[1], and represent maximum allowable pollution levels at the boundary of the premises or at the nearest sensitive receptor. **Table 2** outlines the DECCW impact assessment criteria for the pollutants assessed for the development.

Table 2: Impact Assessment Criteria for Pollutants of Concern

Pollutant	NSW DECCW Air Quality Criteria		Averaging Period
	ppm	mg/m^3	
Carbon monoxide (CO)	87	100	15 minutes
	25	30	1 hour
	9	10	8 hour
VOCs (Benzene)	0.009	0.029	1 hour
	ppm	$\mu g/m^3$	
Nitrogen dioxide (NO_2)	12	246	1 hour
	3	62	Annual
PM_{10}	-	50	24 hour
	-	30	Annual

[1] DEC. (2005). Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales.

4.0 Existing Environment

4.1 Surrounding Sources of Potential Air Pollution

There are a variety of pollution sources in the area surrounding the proposed development. Major industrial sources include the following facilities; approximate distances of the facilities from the development are indicated in parentheses:

- Motor vehicles in the local area;
- The Sydney Fish Market and associated commercial boat activity (1 km S); and
- Concrete batching plant (1.2 km S).

A variety of pollutants are emitted from these facilities, including CO, NO_X, PM_{10}, and VOCs. As such, air quality in the area is likely to be relatively degraded.

4.2 Existing Air Quality

The pollutant concentrations recorded by the DECC's monitoring station at Prospect for 2009 is summarised in **Table 3**. All ambient pollutant concentrations are below the guideline levels.

Table 3: Ambient Air Quality, Prospect

Pollutant	Averaging Period	Year 2008 ($\mu g/m^3$)	Criteria ($\mu g/m^3$)
CO	8 hour maximum	2	10,000
NO_2	1 hour maximum	75.2	246
	Annual average	20.7	62
PM_{10}	24 hour maximum	43.1	50
	Annual average	17.4	30

From early 1996 to August 2001, the then Environmental Protection Agency (EPA, now DECCW) conducted a study to asses the presence of air toxics on a regional scale encompassing the Sydney, Newcastle and Illawarra regions[2]. The primary aim of the program was to obtain data on the concentration of a wide range of pollutants, including VOCs. The closest of the monitoring stations was located in St Mary's, Sydney, approximately 41 km northwest of the development. Recorded data are shown in **Figure 2**. All data were below the DECCW guideline concentrations.

[2] Ambient Air Quality Research Report (1996-2001); Dioxins, Organics, Polycyclic Aromatic Hydrocarbons and Heavy Metals (2002), NSW Environment Protection Authority (EPA), Sydney.

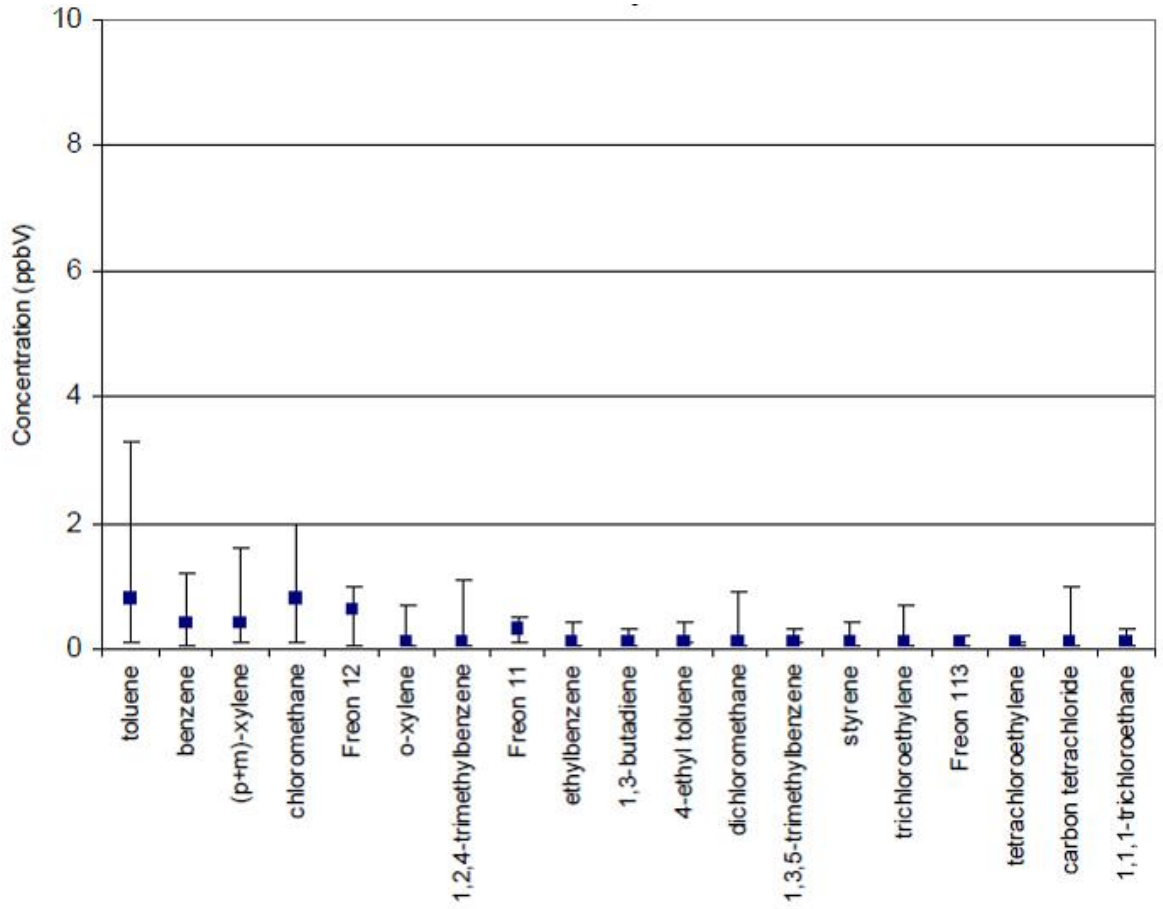


Figure 2: Average, Maximum and Minimum Ambient VOC Concentrations, St Mary's (Jan 1996 – Aug 2001)

4.3 Meteorology

The DECCW operates a series of air quality/meteorological monitoring stations throughout the Sydney metropolitan region. The closest operational station to the development is located in the grounds of Rozelle Hospital, off Balmain Road, Rozelle, approximately 3 km SW of the development, which was commissioned in 1978.. The Bureau of Meteorology additionally monitors meteorological parameters at Observatory Hill, approximately 1.2 km NE of the development. As there are no significant topographical features located between these stations and the development site, data from these sources were analysed to determine air quality conditions likely to occur at the development site. These data are summarised in the following sections.

4.3.1 Wind Direction

The long term wind rose diagrams for the Observatory Hill monitoring station for the period January 1955 to June 1992 are shown in **Figures 3 and 4**. The wind roses show the frequency of occurrence of winds by direction and strength. The bar at the top of each wind rose diagram represents winds blowing from the north (i.e., northerly winds), and so on. The length of the bar represents the frequency of occurrence of winds from that direction, and the widths of the bar sections correspond to wind speed categories, the narrowest representing the lightest winds.

The wind roses indicate that annual wind patterns are dominated by winds from the southwest in the morning and from the southwest and southeast in the afternoon.

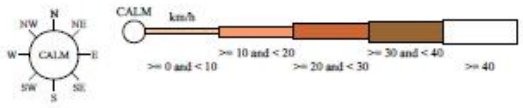
Rose of Wind direction versus Wind speed in km/h (01 Jan 1955 to 01 May 1992)

Custom times selected, refer to attached note for details

SYDNEY (OBSERVATORY HILL)

Site No: 066062 • Opened Jan 1858 • Still Open • Latitude: -33.8607° • Longitude: 151.205° • Elevation 39m

An asterisk (*) indicates that calm is less than 0.5%.
Other important info about this analysis is available in the accompanying notes.



9 am
13502 Total Observations

Calm 13%

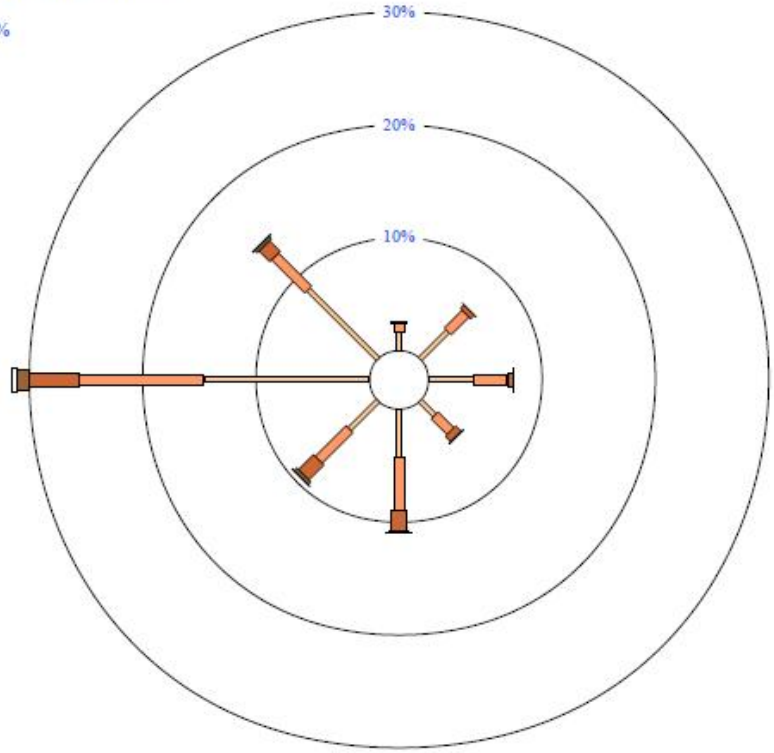


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Figure 3: Observatory Hill Wind Roses - 9 am (1955 – 1992)

Rose of Wind direction versus Wind speed in km/h (01 Jan 1955 to 01 May 1992)

Custom times selected, refer to attached note for details

SYDNEY (OBSERVATORY HILL)

Site No: 066062 • Opened Jan 1858 • Still Open • Latitude: -33.8607° • Longitude: 151.205° • Elevation 39m

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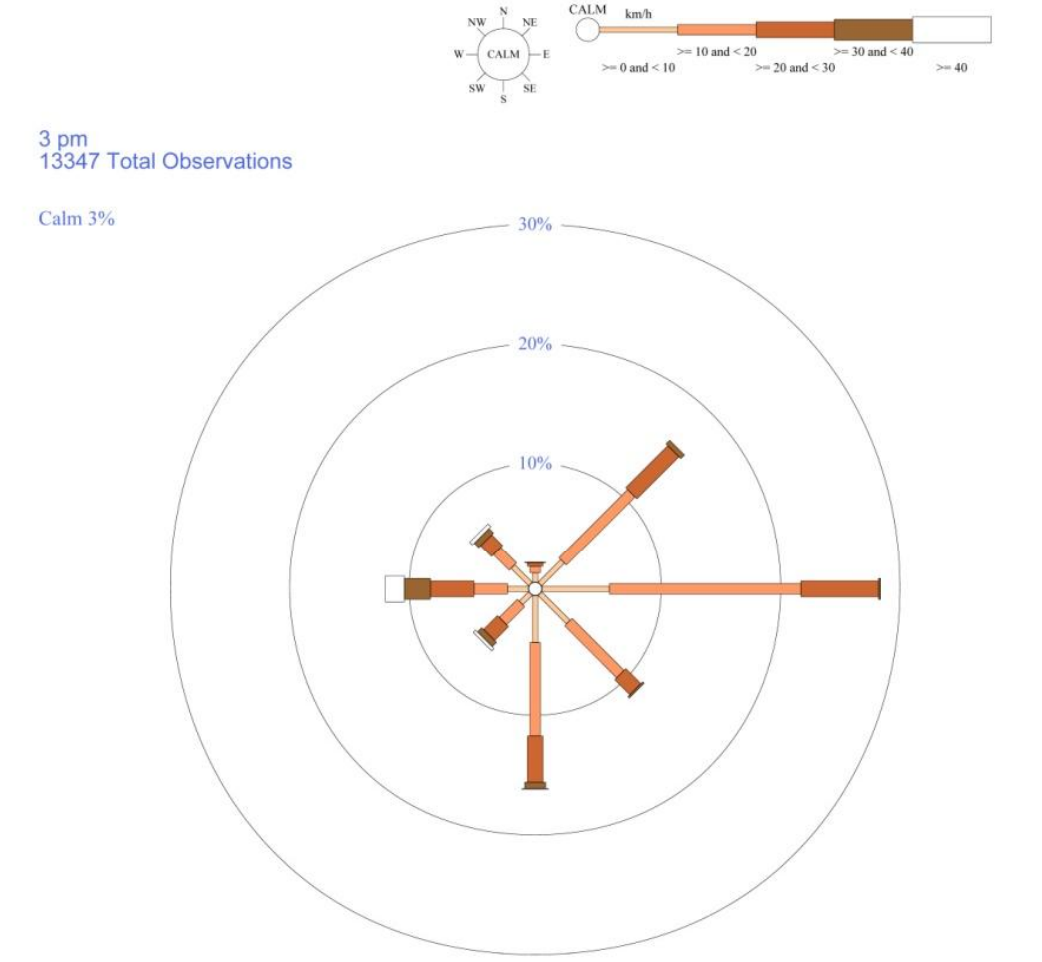

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Figure 4: Observatory Hill Wind Roses – 3 pm (1955 – 1992)

5.0 Impact Assessment and Conclusion

The following conclusions are drawn from the data and assessment presented in this document:

- Emissions to atmosphere from the marina upgrade are expected to comply with DECCW emission limits;
- Gaseous and particulate emissions from the marina will be controlled by the measures implemented in the Jones Bay Wharf Operational Management Plan and the installation of the waste removal systems for both general waste and sewage. Emissions will be dependent on the implementation of the policies and procedures outlined in the Operational Management Plan;
- VOC emissions from the marina will be controlled by
  - No revving of engines and when engines are running warm up procedures for motorised vessels will be limited to 10 minutes.
  - No generator use or running of engines onboard vessels except in preparation for departure or checking of equipment functionality will be allowed.
  - Limited landside vehicle operations inside the marina.
- Odour emissions at the marina will be management under the sites Waste Management Plan and as such are not expected to result in adverse impacts from the facility; and
- Particulate emissions from the marina will be controlled via a comprehensive weekly, monthly, bi-monthly and yearly cleaning schedule. Cleaning will range from washing of pile caps, gates, bollards, pontoons, signs and gangways to maintaining the sites garbage room and bins.
- Ambient air quality data from 2009 show no exceedances of relevant ambient air quality guidelines. It is the responsibility of the Proponent to minimise or prevent dust and other pollutants emissions from the site as much as possible and, therefore, minimise the effect of the development on the local air shed dust levels. The development includes substantial pollution reduction equipment that, if maintained and operated according, should substantially mitigate any pollutant emissions from the facility.

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