



Appendix G

Construction Odour Assessment



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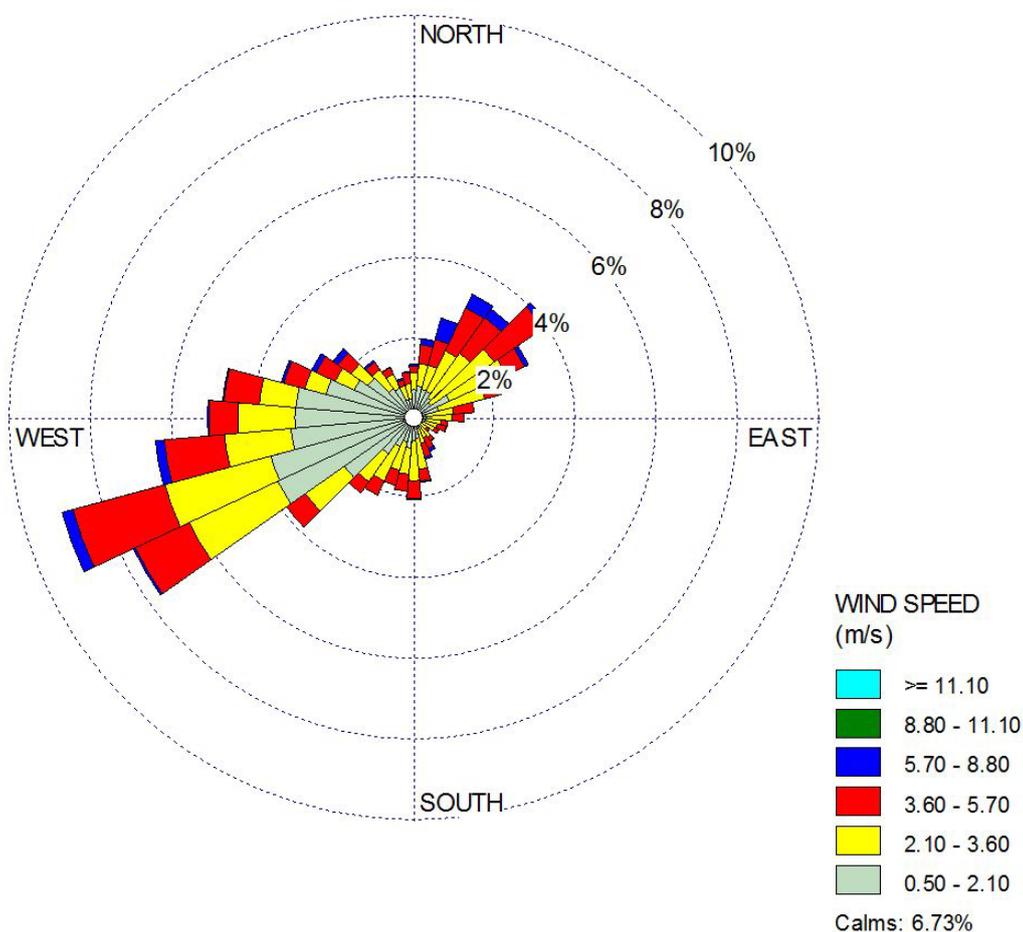
1 Odour

1.1 Local Meteorological Conditions

The North Shore, Albany weather station located at Rosedale Waste Water Treatment Plant (WWTP) has been used to assess local weather conditions. The weather station is located approximately 1.5km to the south-west of the Landfill, and due to the close proximity of the weather station it should provide representative data for wind speed and direction at the site.

The wind speed and direction data for this weather station have been downloaded for the period 1 January 2013 to 31 December 2015 and are shown in wind roses presented in **Figures 1 to 3**. The wind roses indicate that the predominant wind direction for the Landfill is from the west-south-west. This indicates the primary downwind receptors will be located to the north and north-east of the site.

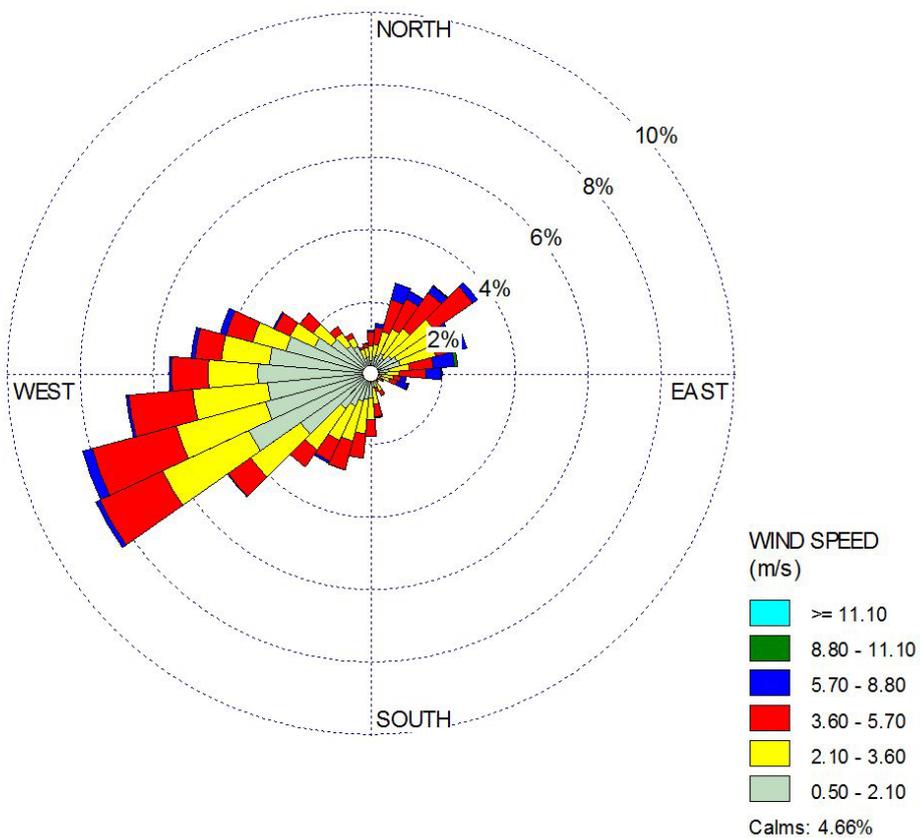
Figure 1 Windrose from Rosedale EWS for 1 January 2013 to 31 December 2013



Source: PDP



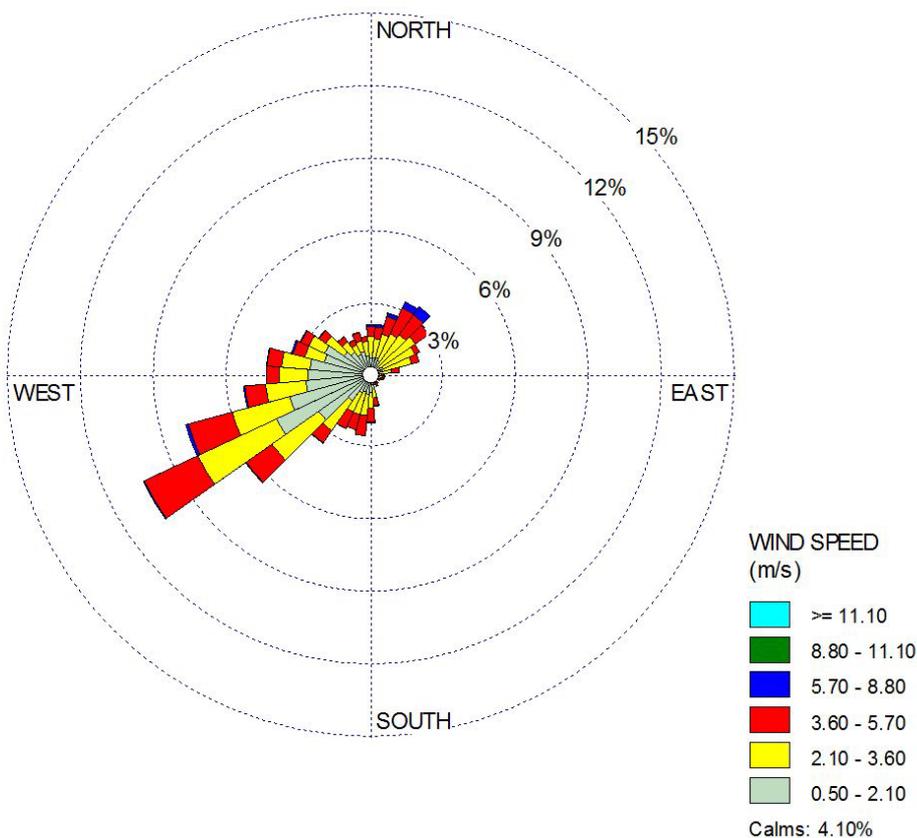
Figure 2 Windrose from Rosedale EWS for 1 January 2014 to 31 December 2014



Source: PDP



Figure 3 Windrose from Rosedale EWS for 1 January 2015 to 31 December 2015



Source: PDP

1.2 Determination of the Potential Impacts of Odours from the Landfill

When determining the impact of any odour emissions it is important to consider the combination of five interrelated factors which are known as the FIDOL factors (MfE, 2003). These FIDOL factors are:

- Frequency
- Intensity
- Duration
- Offensiveness
- Location

1.2.1 Frequency

Release of odour from the Project will potentially occur when earthworks associated with the construction of the Busway/SUP are being carried out in refuse. This is a one-off relatively short duration event.



1.2.2 Intensity

It is difficult to predict the intensity of the odour as it will be proportional to the age of the refuse, type of refuse uncovered and the area of exposed refuse. There is very little published data available in relation to specific odour emission rates from landfill sites anywhere in the world and what information there is appears to relate mainly to freshly deposited refuse. Work undertaken in relation to Italian landfill sites indicates that the “average” odour emission factor is 5.5 ± 3.4 OU/m²/s. However, these measurements were taken from an operational landfill rather than from old refuse which would be exposed during the Project works.

1.2.3 Duration

The duration of potential odour impact is the refuse excavation period and the time that a receptor is downwind of the odour source. Refer to the summary of potential effects below for additional detail.

1.2.4 Offensiveness

The decomposition of waste material results in the production of landfill gas. Landfill gas comprises mainly of methane and carbon dioxide, which are both odourless gases. However, landfill gas also contains over 100 different gases and some of these gaseous compounds, particularly reduced sulphide compounds, aldehydes, ammonia compounds, ketones and volatile fatty acids give rise to the characteristic landfill gas odour (Fang et al, 2012; Kim et al, 2005). Landfill gas odours are generally perceived to be unpleasant by most members of the public.

The character and chemical composition of landfill odours vary due to a number of factors. The character and composition of the landfill odour are affected by the nature of the waste received at that particular location in the landfill. As the waste decomposes the chemical composition of the landfill gas changes significantly, which results in significant changes in the odour character and hedonic tone (scale of how pleasant or unpleasant an odour is) of the odour. Also, as the waste material in the landfill gets older it generates less landfill gas and therefore the intensity of the odour becomes less.

In the sniffer report, 12 trace gases were identified which contributed significantly to landfill gas odour from capped areas of the landfill. These were:

- Hydrogen sulphide
- Methanethiol (methyl mercaptan)
- Butyric acid
- Ethanol
- Carbon disulphide
- Ethyl butyrate
- 1-propanethiol
- Dimethyl sulphide
- Ethanethiol
- 1-butenthliol
- 1-pentene
- Dimethyl sulphide



Current estimates indicate that between 7,000m³ and 10,000m³ of refuse may need to be removed as part of the construction of the Busway/SUP. Given the age of the refuse (approximately 35 years old), it is highly likely to have a low gas and odour generation rate. However, it is possible that if there is a significant quantity of reduced sulphides within the refuse; these could be partially oxidised when they are exposed to air, releasing odorous H₂S and other volatile sulphur compounds.

1.2.5 Location of Sensitive Receptors

Table E12 outlines the distance to receptors towards the south, east, west and north of the likely refuse excavation area for the Project.

Table E12 Distance and Direction to Receptors

Receptor	Direction	Distance	Receptor Type
Rosedale Road	SE	270 m	Commercial
Rosedale Road	SE	260 m	Commercial
Rosedale Road	ESE	320 m	Commercial
Rosedale Road	ESE	290 m	Commercial
Rosedale Road	ESE	320 m	Commercial
Rosedale Road	E	380 m	Commercial
Rosedale Road	E	460- 700 m	Residential
Hugh Green Drive	E	700-800 m	Residential
Greville Road	N-NE	350-400 m	Unknown
Greville Road	NE-ENE	400-450 m	Residential
Miro Place	W	120-160 m	Commercial
Tawa Drive	SW	230 m	Commercial

A number of commercial buildings located in Miro Place are the closest receptors, which are located across the motorway approximately 120 m to 160 m west of the Project area. The nearest residential receptors are located over 400 m from the Project area.

During construction, motorists on the Northern Motorway and the Greville Road on-ramps may be downwind of the construction works and may also be able to detect odours during their commute. Motorists on the Northern Motorway are only likely to be affected by odour emission from the construction activity when they are downwind of the source area. Exposure to odours will depend on the duration and frequency that motorists are downwind of the construction activity when refuse is exposed. It is likely that for most motorway users exposure to odours during peak travel times will be less than 30 minutes per day and for non-peak travel time exposure will be less than a few minutes each day.

1.3 Summary of the Potential Effects

Approximately 7,000 to 10,000 m³ of landfill refuse between chainage 2230 and 2450 may be disturbed as a result of the construction of the Busway/SUP. The potential for off-site odour impacts associated with this excavation will depend on the age, composition and the amount of refuse disturbed.



The closest receptors along Greville Road are approximately 350 to 450 m from the Project area and are potentially downwind of any odours emitted (from exposed refuse) between 5 to 15% of the time. Under calm and low wind speed conditions the physical bulk of the landfill will divert winds away from the sensitive receptors along Greville Road.

Residential properties located along Hugh Green Drive are more than 700 m east of the Busway/SUP excavation area. These receptors are unlikely to be significantly impacted by odour emissions even though they are downwind of the works between 15 to 25% of the time. It is expected, due to the distance from the works area to the receptors, that topography and the likely low odour generation rates of the material would result in odour concentrations of less than 5 OU/m³.

Commercial properties located along Rosedale Road east to ESE of the works area are likely to be downwind of the works area approximately 15 to 40% of the time. Some of these commercial properties may experience moderate to strong odours under calm to low wind speed conditions if odorous refuse is exposed during the excavation of the refuse.

The closest receptors to the works area are a series of commercial properties located in Miro Place approximately 120 to 160 m west from the works area across the motorway. These buildings are downwind from the works area less than 5% of the time. However, under calm conditions odours may migrate towards these receptors and potentially be detected if odorous refuse is exposed during the excavation.

1.4 Mitigation Considerations

To minimise the impacts from any odours discharged from the works, the contractor will prepare an air quality management plan. Measures such as using odour fences, prompt removal of excavated refuse (e.g. no stockpiling and direct loading onto trucks) and the use of daily cover will minimise the potential for off-site impacts.

The air quality management plan will detail specific mitigation measures to ensure that odour will not result in offensive or objectionable impacts beyond the boundary of the site. The air quality management plan will detail the location and frequency of monitoring that will be undertaken to ensure that the mitigation measures are effective. The air quality management plan will also detail procedures to record and investigate any odour complaints received by the contractor and report them to Council. The air quality management plan will be submitted to Council for approval prior to any site works being undertaken.

Once excavation of the refuse is completed and reinstatement implemented it is highly unlikely that odorous compounds will be detected by any off-site receptors.