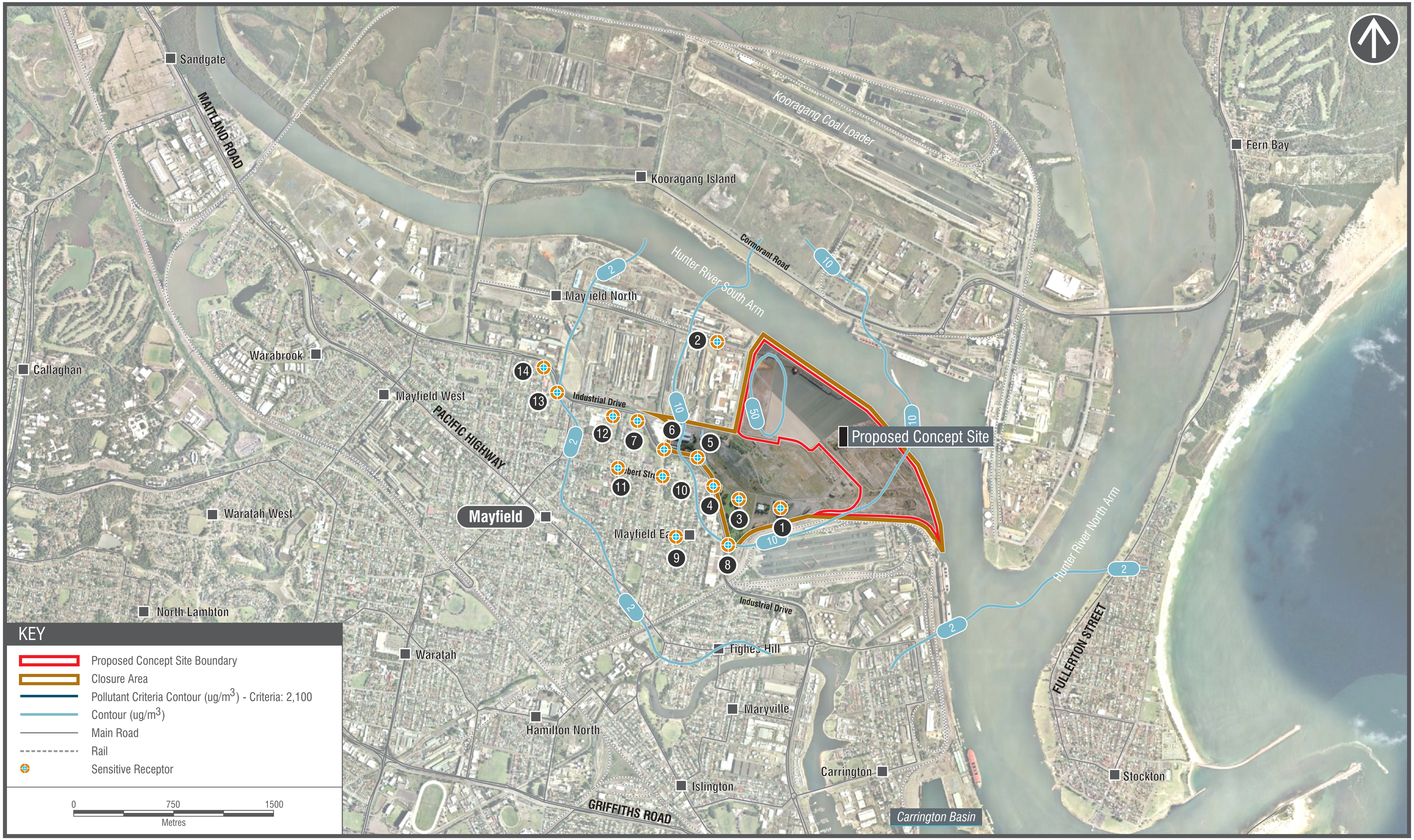


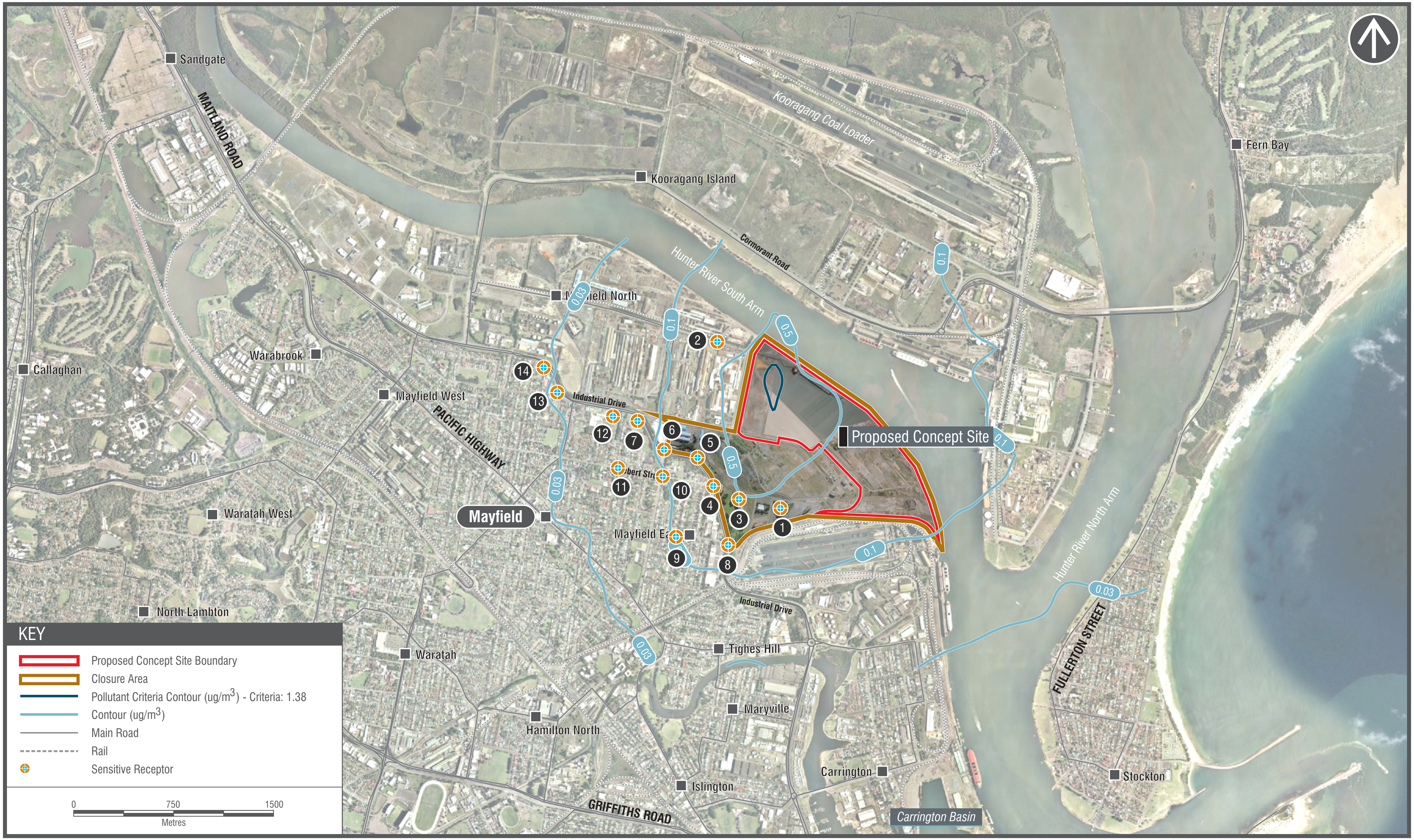
AECOM

1 HOUR ETHANOL ISOPLETHS (ISOLATED FROM BACKGROUND)

Air Quality Impact Assessment

Mayfield Site Port-Related Activities Concept Plan

Figure F14



AECOM

1 HOUR HYDROGEN SULFIDE ISOPLETHS (ISOLATED FROM BACKGROUND)

Air Quality Impact Assessment

Mayfield Site Port-Related Activities Concept Plan

Figure F15

Appendix A

Meteorological Data Review

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A.1 Wind

Wind rose diagrams for the Mayfield area, from data generated by the TAPM and CALMET meteorological models (refer **Section 8.2.1**) are shown in **Figure FB1 to B5**.

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.

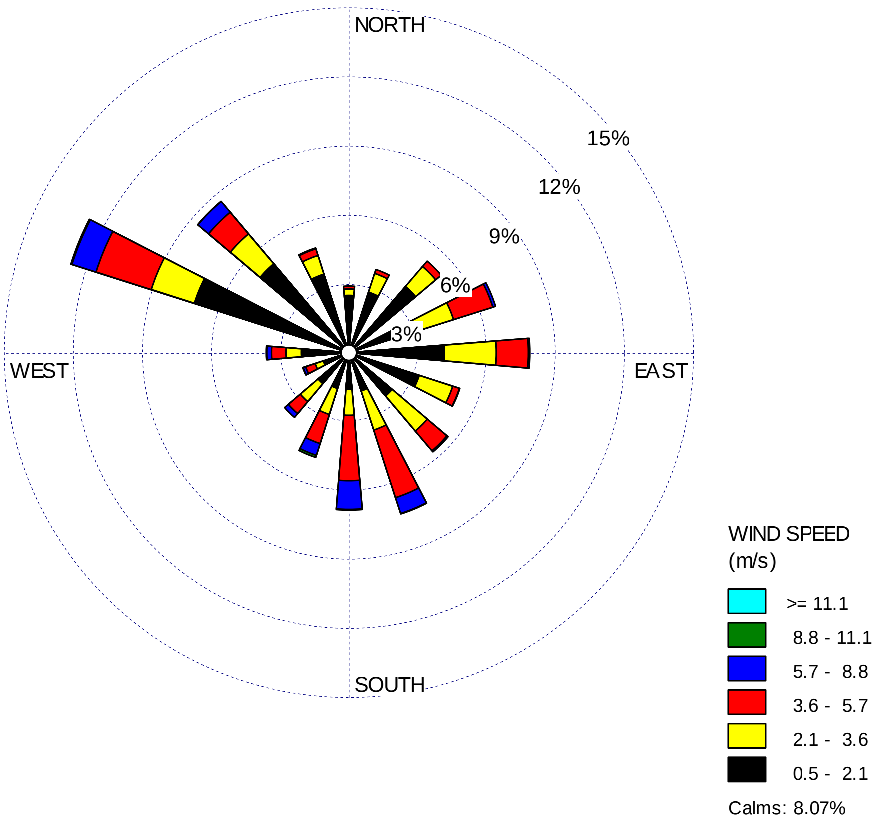

Figure FB1 Wind Rose for TAPM - CALMET Generated Meteorological Data for Mayfield

All Hours 2006

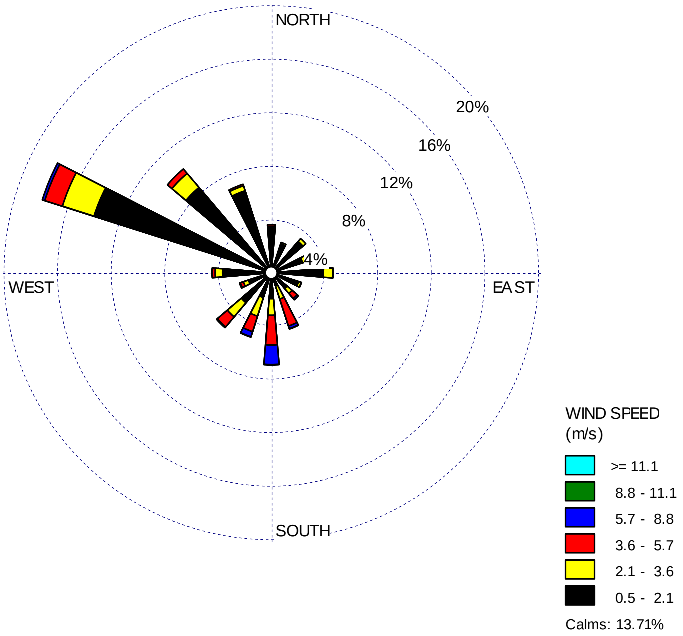

Figure FB2 Wind Rose for TAPM - CALMET Generated Meteorological Data for Mayfield

From 12 am to 6 am, 2006

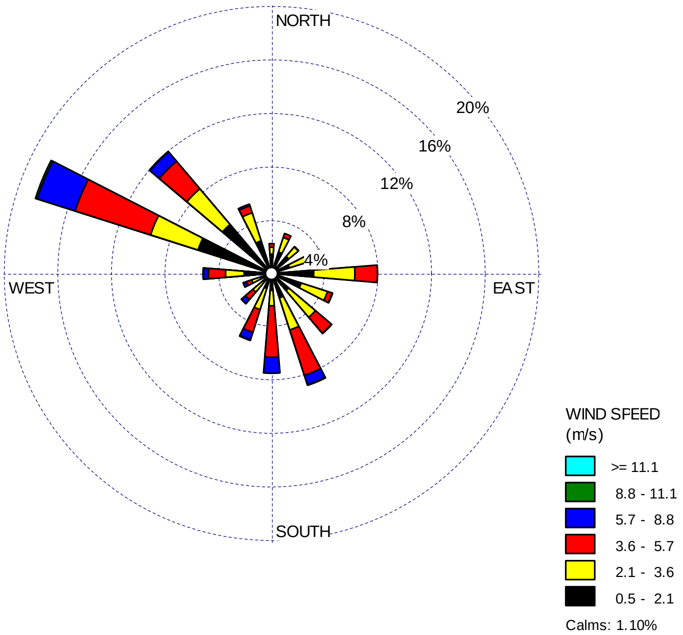

Figure FB3 Wind Rose for TAPM - CALMET Generated Meteorological Data for Mayfield

From 7 am to 12 pm, 2006

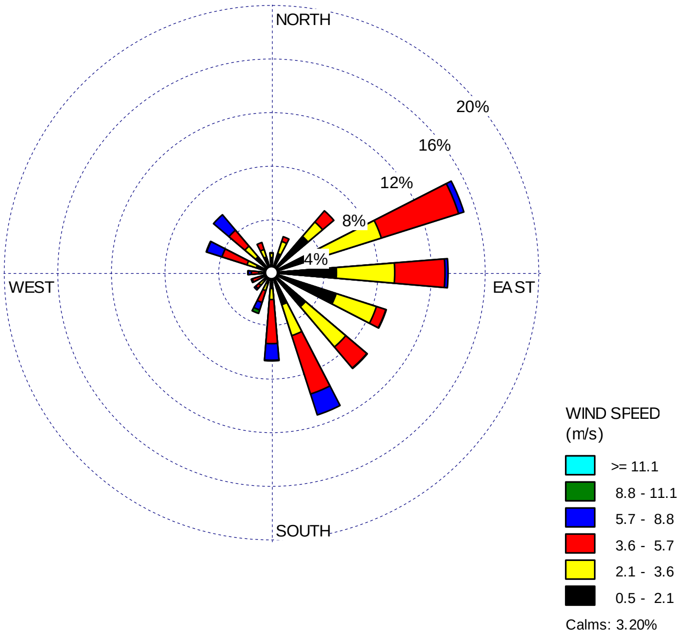

Figure FB4 Wind Rose for TAPM - CALMET Generated Meteorological Data for Mayfield

From 1 pm to 6 pm, 2006

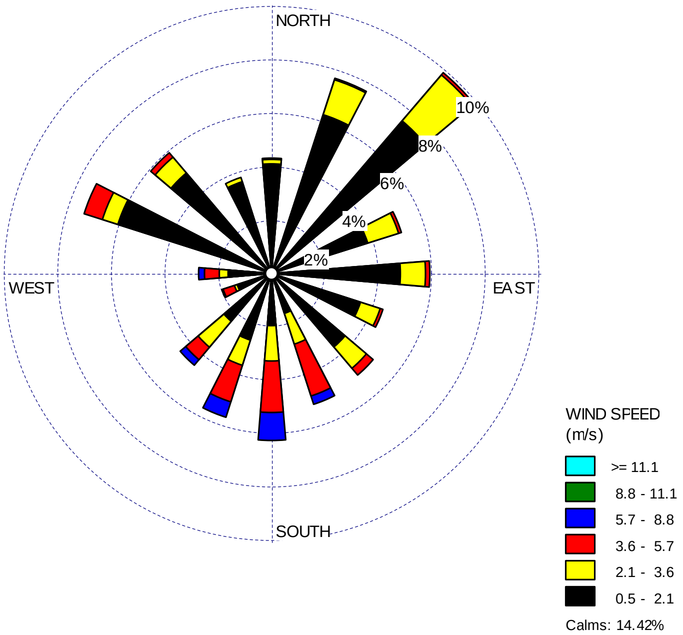

Figure FB5 Wind Rose for TAPM - CALMET Generated Meteorological Data for Mayfield

From 7 pm to 11 pm, 2006

Figure FB2 shows that in the early morning (midnight to 6.00 AM) winds are lighter than average and dominated by north westerly flows representing a land breeze generated on clear nights with light prevailing wind conditions most common in winter. Winds from the east coming from the coast in the afternoon are generally stronger than the land breeze winds. Later in the morning, winds are still predominantly lighter from the west and north west, but are stronger from the east. By afternoon (**Figure FB4**), winds are stronger and most frequently from the south east to north east, representing both common synoptic scale influences and the sea breeze effect respectively. In summary, the sea breeze-land breeze and proximity to the Bay exert strong influences on the local wind regime, and this is consistent with expectations.

The predicted morning and afternoon winds generally conform to the long-term average wind rose diagrams (**Figure FB6** and **Figure FB7**) shown by the BoM monitoring station at Williamtown. Overall, the wind roses indicate that there is a diurnal pattern in the wind directions.

Rose of Wind direction versus Wind speed in km/h (10 Sep 1942 to 31 Jan 2007)
WILLIAMTOWN RAAF
Site No: 061078 • Opened Jan 1942 • Still Open • Latitude: -32.7932° • Longitude: 151.8359° • Elevation 9m

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

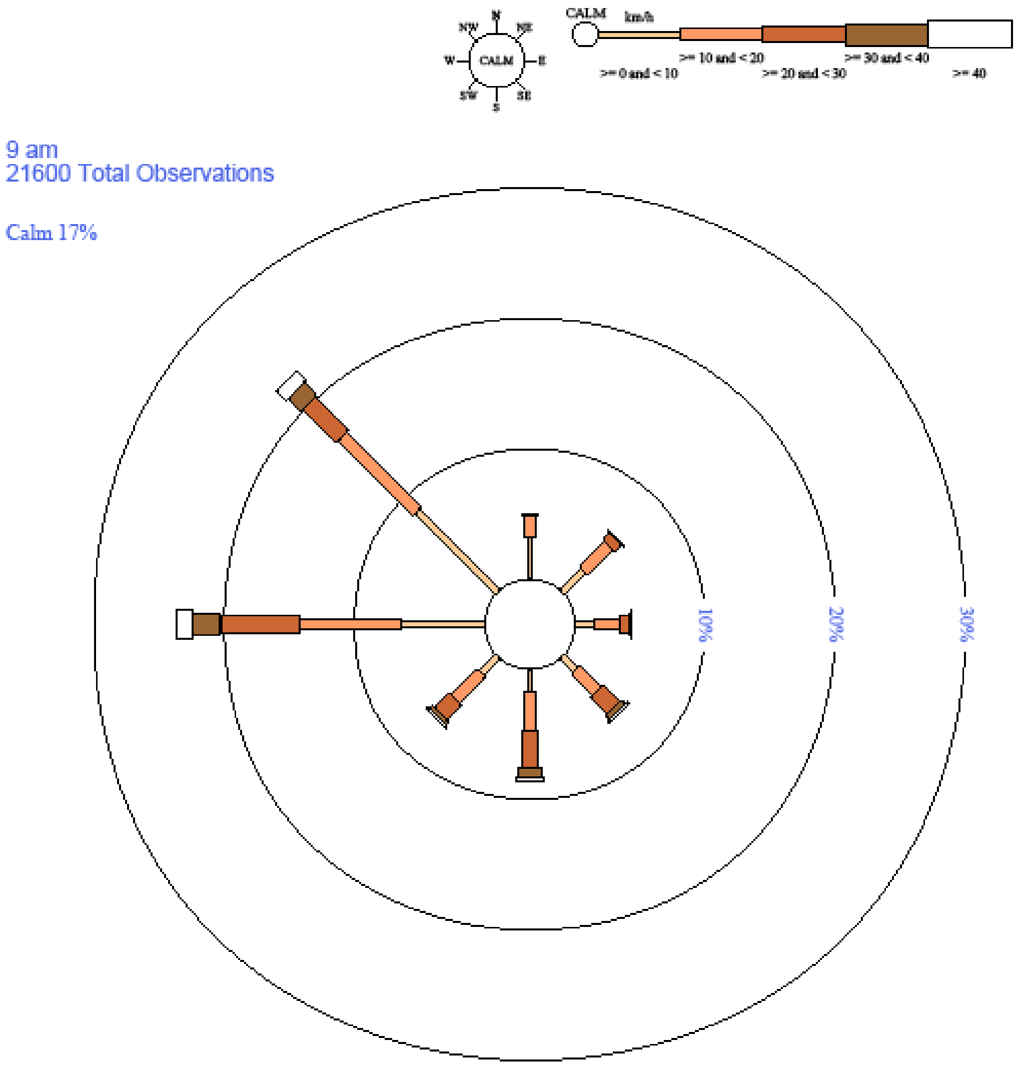

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Figure FB6 Wind Rose for BoM Data Measured at Williamtown at 9 am, 2006

Rose of Wind direction versus Wind speed in km/h (10 Sep 1942 to 31 Jan 2007)
WILLIAMTOWN RAAF
Site No: 061078 • Opened Jan 1942 • Still Open • Latitude: -32.7932° • Longitude: 151.8359° • Elevation 9m

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

3 pm
21586 Total Observations

Calm 5%

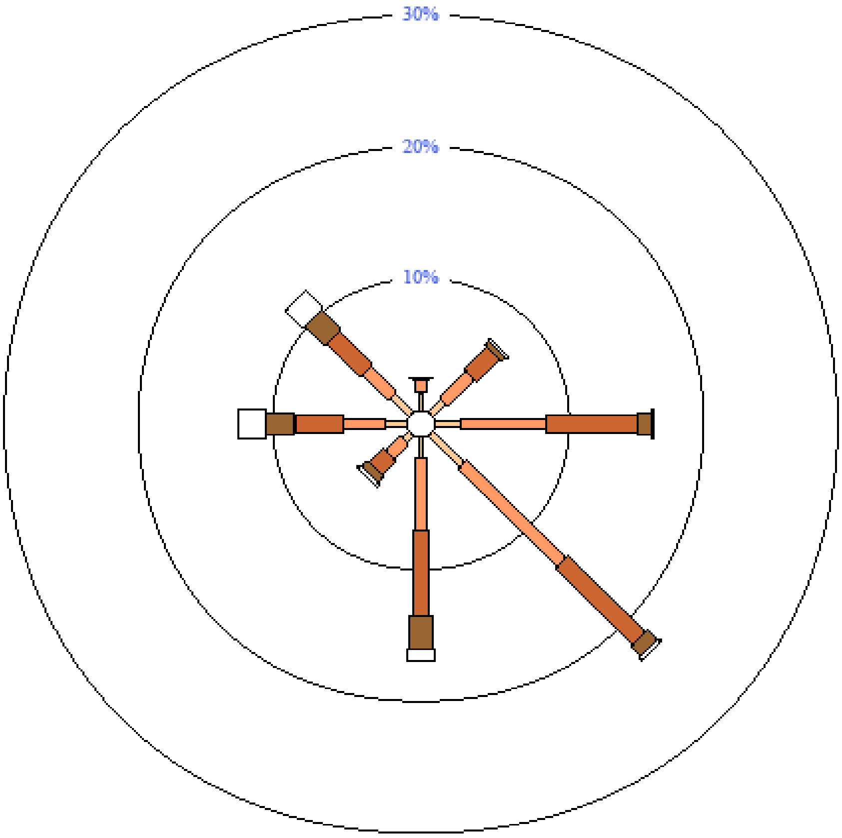

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Figure FB7 Wind Rose for BoM Data Measured at Williamtown at 3 pm, 2006

The estimated mean windspeed for the year at the site is 2.5 metres per second, which is slightly lower than the range of average wind speeds measured at 9 AM and 3 PM for Williamtown (3.7 to 5.6 metres per second) reported by BoM. The frequency distribution of hourly averaged windspeed values is shown in **Figure FB8**. Windspeeds up to 6 metres per second are relatively common with medium to strong winds (> 4 metres per second) occurring approximately 35 percent of the time.

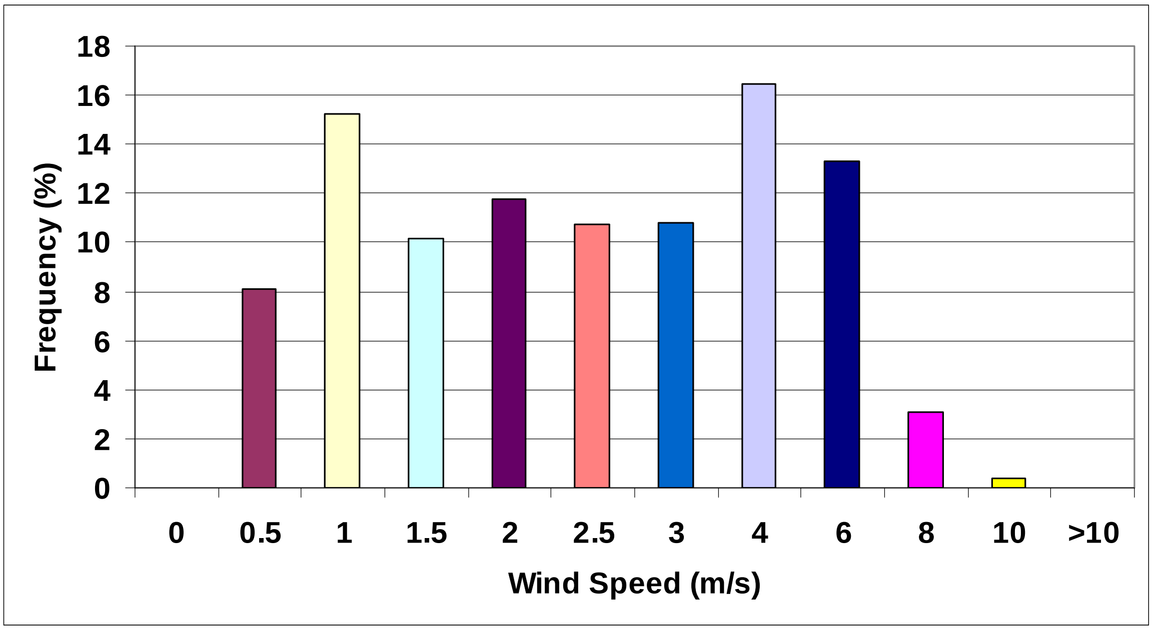

Figure FB8 Frequency Distribution of Wind Speed

A.2 Stability Class

An important aspect of plume dispersion is the atmospheric turbulence level in the region of the plume, near the ground in this case. Turbulence acts to increase the cross-sectional area of the plume due to random motions, thus diluting or diffusing a plume. For traditional dispersion modelling using Gaussian plume models, categories of atmospheric stability are used in conjunction with other meteorological data to describe atmospheric conditions and thus dispersion.

The most well-known stability classification is the Pasquill-Gifford scheme, which denotes stability Classes from A to F. Class A is described as highly unstable and occurs in association with strong surface heating and light winds, leading to intense convective turbulence and much enhanced plume dilution. At the other extreme, Class F denotes very stable conditions associated with strong temperature inversions and light winds, which commonly occur under clear skies at night and in the early morning. Under these conditions plumes can remain relatively undiluted for considerable distances downwind. Intermediate stability classes grade from moderately unstable (B), through neutral (D) to slightly stable (E). Whilst Classes A and F are strongly associated with clear skies, class D is linked to windy and/or cloudy weather, and short periods around sunset and sunrise when surface heating or cooling is small.

As a general rule, unstable (or convective) conditions dominate during the daytime and stable flows are dominant at night. This diurnal pattern is most pronounced when there is relatively little cloud cover and light to moderate winds. The frequency distribution of estimated stability classes in the meteorological file is shown in **Figure FB9**. The data show a total of 44 percent of hours with either E or F Class. This is consistent with the expected occurrence of slightly stable conditions at such a location, given the coastal location.

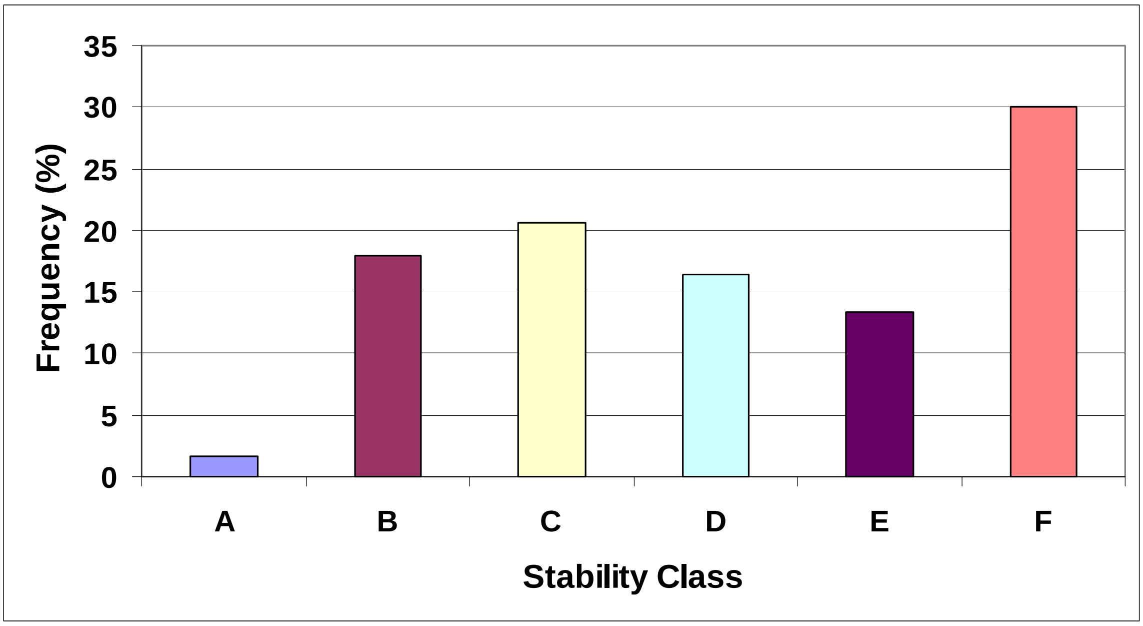

Figure FB9 Frequency Distribution of Stability Class

A.3 Mixing Height

Mixing height is the depth of the atmospheric surface layer beneath an elevated temperature inversion. It is an important parameter within air pollution meteorology. Vertical diffusion or mixing of a plume is generally considered to be limited by the mixing height, as the air above this layer tends to be stable, with restricted vertical motions.

CALMET is used to calculate mixing heights at Mayfield. The diurnal variation of mixing height is summarised in **Figure FB10**. Mixing heights are marginally lower during the night and early morning hours (< 800 metres), increasing after sunrise to a maximum of 1400 metres by mid-afternoon. This pattern of a small diurnal cycle is consistent with the coastal site.

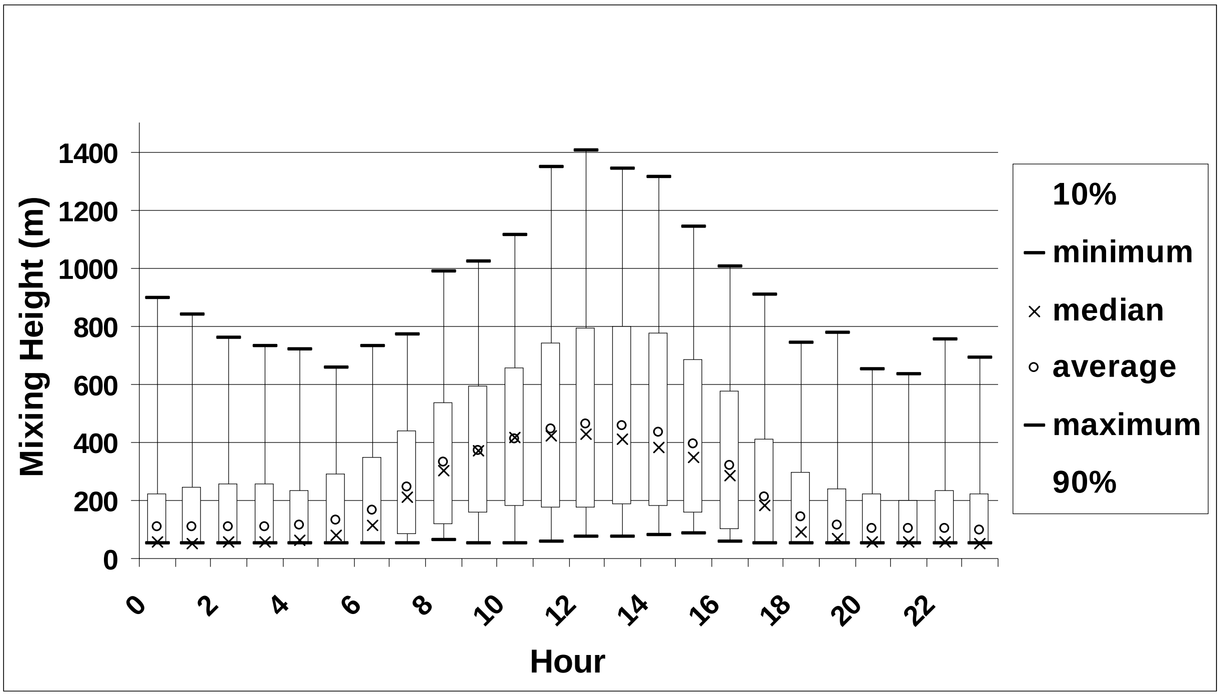

Figure FB10 Hourly Mixing Height

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Appendix B

Review of Potential Impacts of Proposed Local Developments

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Development	**Year Approved**	**Completed**	**PM10 Max 24hr Avg**	**PM10 Max Annual Avg**	**TSP Max Annual Avg**	**SO2 Max 1hr Avg**	**SO2 Max 24hr Avg**	**SO2 Max Annual Avg**	**NO2 Max 1hr Avg**	**NO2 Max Annual Avg**	**VOC Max 99.9th %ile 1hr Avg**	**VOC Max 100th %ile 1hr Avg**	**References**	
Units			**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**mg/m3**	**µg/m3**	**Document**	**Ref**
Orica Ammonium Nitrate Upgrade	2009	n	5.9	0.6	2.4				42.7	2.4			ENSR 2009. Air Quality Impact Assessment Kooragang Island NSW	Table 13 (page 26), receptor 28
PWCS Kooragang Coal Loader Expansion Stage 4	2009	n	Insignificant	Insignificant	Insignificant								PAE Holmes 2009. Air Quality Impact Assessment: Kooragang Coal Terminal Stage 4 Project Fourth Dump Station and Fourth Shiploader	Page 19
Manildra Park Bulk Liquids Facility - Kooragang Island	2008	n	<0.02	<0.002		<1	<0.2	<0.02	2	<0.05	<0.05		Holmes Air Sciences 2007. Air Quality Assessment Manildra Park Fuel Distribution and Biodiesel Facility Kooragang Island	Figures 12-19
PWCS Kooragang Coal Loader Expansion	2007	n	1.3	0.2	0.2								PAE Holmes 2006. Air Quality Impact Assessment: PWCS Kooragang Coal Terminal Proposed Throughput Increase	Table 8 (page 20), Figures 14 and 15
Marstel Bulk Liquids Facility - Kooragang Island	2007	n										100	ENSR 2008. Air Quality Impact Assessment, Proposed Bulk Liquid Fuel Storage, Air Quality Impact Assessment Proposed Bulk Liquid Fuel Storage Facility Mayfield NSW	Table 8 (page 21), receptor 2
NCIG Koorangang Coal Loader	2006	n	2.36	0.2	0.5								Holmes Air Sciences 2006. Air Quality Impact Assessment: Newcastle Coal Export Terminal	Pages 19, 20 and 22
Cargill Oilseed Processing Plant	2006	y				0.1	0.001	0.001					HLA 2005. Air Quality Impact Assessment Cargill Oilseed Processing Plant Kooragang Island	Figures 11-13
GrainCorp Operations Ltd and P&O Ports Agri-Products Storage Facility and Associated Export Facility	2001	y	<10		<2								SKM 2001. GrainCorp Operations Ltd and P&O Ports Agri-Products Storage Facility and Associated Export Facility Air Quality and Noise Assessment	Figures 4-3 and 4-5
Total Uncompleted Developments		n	10	1.0	3.1	<1	<0.2	<0.02	44.7	2.45	<0.05	100		
Total Completed Developments		y	<10		<2	0.1	0.001	0.001						

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Appendix C

Train Activity Schedule and Throttle Levels

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Hour	Train 1	Throttle Setting	Train 2	Throttle Setting	Train 3	Train 4	Throttle Setting
0:00:00						Load Cont...	T0
0:15:00						Check Train	Idle
0:30:00							Idle
0:45:00						Reform and Leave	Idle
1:00:00							T3
1:15:00							
1:30:00							
1:45:00							
2:00:00							
2:15:00							
2:30:00							
2:45:00							
3:00:00							
3:15:00							
3:30:00							
3:45:00							
4:00:00							
4:15:00							
4:30:00	Train Break and Enter	T3					
4:45:00		Idle					
5:00:00	Unload	T0					
5:15:00		T0					
5:30:00		T0					
5:45:00		T0					
6:00:00		T0					
6:15:00		T0					
6:30:00		T0					
6:45:00		T0					
7:00:00	Load	T0					
7:15:00		T0					
7:30:00		T0					
7:45:00		T0					
8:00:00		T0					
8:15:00	Waits for Curfew	T0					
8:30:00		T0					
8:45:00		T0					
9:00:00		T0					
9:15:00		T0					
9:30:00	Check Train	Idle					
9:45:00		Idle					
10:00:00	Reform and Leave	Idle	Waits to Enter	Idle			
10:15:00		T3		Idle			
10:30:00			Train Break and Enter	T3			
10:45:00				Idle			
11:00:00			Unload	T0			
11:15:00				T0			
11:30:00				T0			
11:45:00				T0			
12:00:00				T0			
12:15:00				T0			
12:30:00				T0			
12:45:00				T0			
13:00:00			Load	T0			
13:15:00				T0			
13:30:00				T0			
13:45:00				T0			
14:00:00				T0			
14:15:00			Check Train	Idle			
14:30:00				Idle			
14:45:00			Reform and Leave	Idle			
15:00:00				T3			

Train Activity Schedule and Throttle Levels from 0000hrs to 1515hrs

Hour	Train 1	Train 2	Train 3	Throttle Setting	Train 4	Throttle Setting
15:15:00			Train Break and Enter	T3		
15:30:00				Idle		
15:45:00			Unload	T0		
16:00:00				T0		
16:15:00				T0		
16:30:00				T0		
16:45:00				T0		
17:00:00				T0		
17:15:00				T0		
17:30:00				T0		
17:45:00			Load	T0		
18:00:00				T0		
18:15:00				T0		
18:30:00				T0		
18:45:00				T0		
19:00:00			Waits for Curfew	T0		
19:15:00				T0		
19:30:00			Check Train	Idle		
19:45:00				Idle		
20:00:00			Reform and Leave	Idle	Waits to Enter	Idle
20:15:00				T3		Idle
20:30:00					Train Break and Enter	T3
20:45:00						Idle
21:00:00					Unload	T0
21:15:00						T0
21:30:00						T0
21:45:00						T0
22:00:00						T0
22:15:00						T0
22:30:00						T0
22:45:00						T0
23:00:00					Load Cont. above...	T0
23:15:00						T0
23:30:00						T0
23:45:00						T0

Train Activity Schedule and Throttle Levels from 1515hrs to 2345hrs