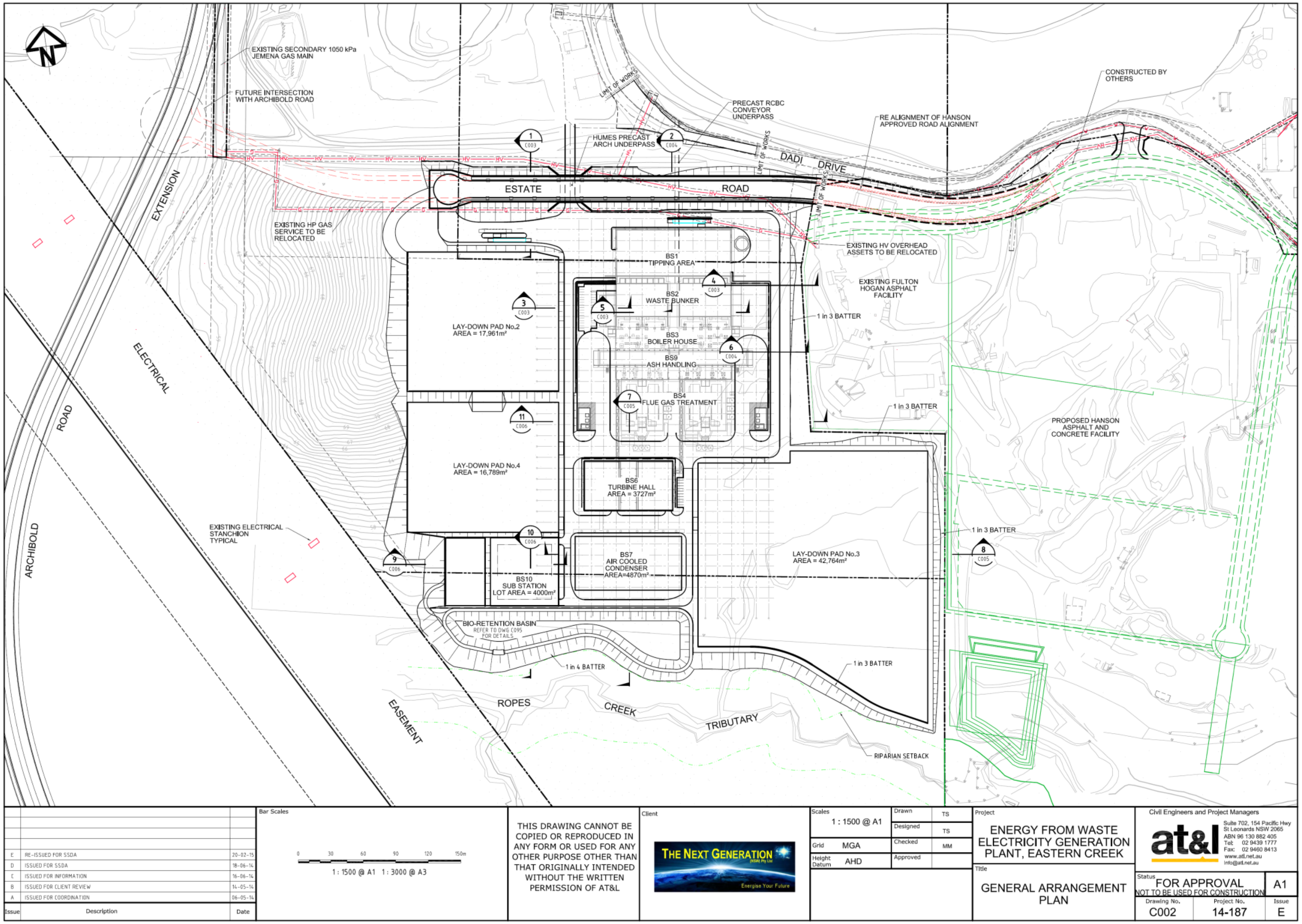

EXISTING SECONDARY 1050 kPa JEMENA GAS MAIN
FUTURE INTERSECTION WITH ARCHIBOLD ROAD
PRECAST RCBC CONVEYOR UNDERPASS
HUMES PRECAST ARCH UNDERPASS
RE ALIGNMENT OF HANSON APPROVED ROAD ALIGNMENT
CONSTRUCTED BY OTHERS
DADI DRIVE
ESTATE ROAD
EXISTING HP GAS SERVICE TO BE RELOCATED
EXISTING HV OVERHEAD ASSETS TO BE RELOCATED
EXISTING FULTON HOGAN ASPHALT FACILITY
BS1 TIPPING AREA
BS2 WASTE BUNKER
BS3 BOILER HOUSE
BS9 ASH HANDLING
BS4 FLUE GAS TREATMENT
LAY-DOWN PAD No.2 AREA = 17,961m²
LAY-DOWN PAD No.4 AREA = 16,789m²
BS6 TURBINE HALL AREA = 3727m²
BS7 AIR COOLED CONDENSER AREA=4870m²
BS10 SUB STATION LOT AREA = 4000m²
LAY-DOWN PAD No.3 AREA = 42,764m²
PROPOSED HANSON ASPHALT AND CONCRETE FACILITY
1 in 3 BATTER
1 in 4 BATTER
BIO-RETENTION BASIN
EXISTING ELECTRICAL STANCHION TYPICAL
ARCHIBOLD ROAD EXTENSION
ELECTRICAL EASEMENT
ROPES CREEK TRIBUTARY
RIPARIAN SETBACK
E RE-ISSUED FOR SSDA 20-02-15
D ISSUED FOR SSDA 18-06-14
C ISSUED FOR INFORMATION 16-06-14
B ISSUED FOR CLIENT REVIEW 14-05-14
A ISSUED FOR COORDINATION 06-05-14
1 : 1500 @ A1 1 : 3000 @ A3
THIS DRAWING CANNOT BE COPIED OR REPRODUCED IN ANY FORM OR USED FOR ANY OTHER PURPOSE OTHER THAN THAT ORIGINALLY INTENDED WITHOUT THE WRITTEN PERMISSION OF AT&L
THE NEXT GENERATION
Scales 1 : 1500 @ A1
Grid MGA
Height Datum AHD
ENERGY FROM WASTE ELECTRICITY GENERATION PLANT, EASTERN CREEK
GENERAL ARRANGEMENT PLAN
Civil Engineers and Project Managers
at&l
FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION
A1
Drawing No. C002
Project No. 14-187
Issue E

Appendix B ASSUMPTIONS

ASSUMPTIONS

General

The EfW facility will operate 24 hours a day, 7 days a week, with occasional offline periods for maintenance. Over the entire year, it is assumed that the facility would be operational for 8,000 hours as an average.

It is understood that the annual average chlorine content of the residual waste fuel will be less than 1%. This is further discussed in **Section 4.2**.

The flue gas treatment system includes:

- Selective Non-Catalytic Reduction (SNCR) for reducing emissions of oxide of nitrogen.
- Dry lime scrubbing for reducing emissions of acid gases, including hydrogen chloride (HCl) and Sulfur Dioxide (SO_2).
- Activated carbon injection for reducing emissions of dioxins and mercury.
- Fabric filters for reducing emissions of particles and metals.
- Following flue gas treatment, emissions will be dispersed via a 100m stack. Further details of the flue gas treatment are discussed in **Section 7**.

The EfW facility is designed to operate continuously, therefore start-up and shutdown are infrequent events and anticipated to be required during the plants annual maintenance programme. (**Fichtner, 2015**).

In accordance with the EU IED, such events shall under no circumstance occur for more than 4 hours uninterrupted where the emission values exceed the limits on no more than 60 hours per year.

To facilitate the safe shutdown and black start there will be two emergency diesel generators with one dedicated to each purpose. Each diesel generator (QSK78) will have a capacity of 2.4 MW that will provide sufficient power for the four waste lines. Routine maintenance and specific testing will occur for one hour, once a month.

Emissions

Air quality parameters anticipated to be released are as follows:

- Particulate matter (PM), assumed to be emitted as PM_{10} and $PM_{2.5}$.
- Hydrogen Chloride (HCl).
- Hydrogen Fluoride (HF).
- Carbon Monoxide (CO).
- Sulfur Dioxide (SO_2)
- Oxides of nitrogen (NO_x) (expressed as Nitrogen Dioxide (NO_2)).
- Heavy metals (including Mercury (Hg), Cadmium (Cd), Arsenic (As), Chromium (Cr).
- Organic substances (expressed as total organic compounds (TOC)).
- Dioxins and furans.
- Hydrogen sulfide (H_2S).
- Chlorine (Cl_2).
- Ammonia (NH_3).
- Poly-aromatic hydrocarbons (PAHs).

Dispersion modelling has referenced the higher short term EU IED limits (where available), regardless of the averaging period for assessment.

Where emission limits are not available as part of the EU IED the emission limits from the NSW Clean Air Regulation have been adopted, such as the case for H_2S.

For the emissions of NH_3 and PAHs data was based on emission from the Reference Document on the Best Available Techniques (BREF) for Waste Incineration **(European Commission, 2006)**.

Ammonia slippage from an SNCR system normally ranges between 1 to 10 mg/Nm³, with an average of 4 mg of NH_3/Nm³ **(Fichtner, 2015)**.

There are no monitoring data available from existing facilities during 'upset operations'. In the absence of monitoring data worst-case assumptions have been made based on consultation with the UK Environment Agency based on their knowledge of plausible upset emissions for key pollutants (**Fichtner, 2015**).

The ammonia concentration during upset conditions has been taken as the upper limit of the range of in-stack concentration provided by **Fichtner (2015)**.

Meteorology

The review identified 2013 as a representative year for dispersion modelling with no anomalous wind patterns compared to the other years examined and is therefore considered a representative year for dispersion modelling.

Background used for cumulative assessment

A $PM_{2.5}$:PM_{10} ratio (0.35:1) has been applied to the PM_{10} data measured at St Marys and Prospect for the $PM_{2.5}$ background. The ratio is based on PM_{10} measurements from Richmond and Liverpool between 2009 and 2013.

Pollutant	Averaging period	Units	Criteria	Maximum background
NO_2	1 hour	µg/m³	246	100
	Annual	µg/ m³	62	23
SO_2	10-minute	µg/ m³	712	107 (a)
	1 hour	µg/ m³	570	57
	24 hours	µg/ m³	228	0.7
	Annual	µg/ m³	60	3 (a)
CO	15-minute	mg/ m³	100	14
	1 hour	mg/ m³	30	7
	8 hours	mg/ m³	10	2
PM_{10}	24 hours	µg/ m³	50	49 (a)
	Annual	µg/ m³	30	19
$PM_{2.5}$	24 hours	µg/ m³	25	17 (c)
	Annual	µg/ m³	8	7 (b)

Note: (a) Excludes days already over the 50 µg/m³

(b) Calculated background. See **Section 6.2**.

Modelling

The stack temperature is taken from the technical specifications for a similar facility in the UK. A stack diameter of 2.5m is chosen to achieve an exit velocity of greater than 15 m/s, based on the provided volumetric flow rates (**Fichtner, 2014**).

A stack height of 100m has been adopted as compliance with the NSW impact assessment criteria was demonstrated at this height.

AERMOD was chosen as a suitable dispersion model due to the source type, location of nearest receiver and nature of local topography.

Terrain data was sourced from NASA's Shuttle Radar Topography Mission Data (3 arc second [~90m] resolution) and processed to create the necessary input files.

Values of surface roughness, albedo and bowen ratio were determined based on a review of aerial photography for a radius of 3 km centred on the EPA St Marys station. Default values for cultivated land and urban areas were chosen over two sectors across this area.

Building wake heights associated with the proposed on-site structures have been incorporated into the model.

For sub-hourly averaging periods, such as for CO and SO_2, predictions were based on the power-law formula from **Borgas (2000)** to estimate short-term peak values from longer-term average concentrations.

Results

GLCs for NO_2 were based on the assumption of 100% NO_x to NO_2 conversion.

Longer term averaging periods (24-hour, annual, 90 day, 30 day and 7 day) have not been included for the upset conditions modelling scenario. This is because the upset conditions would last for a period of no more than four hours.

Assuming the EfW facility emits NO_x at the EU IED limit for 8,000 hours of the year, the annual NO_x load to the Sydney air shed would be approximately 800 tonnes/year, thereby triggering further assessment. The potential for regional photochemical smog / ozone impacts are investigated in a standalone study, submitted as part of the Environmental Assessment (**Pacific Environment, 2015b**).

Greenhouse Gas Assessment

Scope 2 emissions (purchase of electricity) is not required to be quantified (the EfW facility is a net exporter of electricity) and the focus of this assessment is therefore on Scope 1 emissions. Scope 3 is optional and has been addressed in this assessment qualitatively as the Scope 3 emissions would be minor.

The maximum volume of material that will be combusted during any one year is assumed to be 1,350,000 tonnes.

The facility is assumed to operate for 8,000 hours per year.

The facility requires 7.5 MW of electricity to operate.

The carbon content of the residual waste fuel is based on the information provided for the design fuel mix (**Fichtner, 2014**).

DOC fraction for wood 'garden and green' (0.2) provides a conservatively low estimate of GHG emissions from landfilling. This results in a conservatively low estimate of GHG emissions diverted from landfill.

Fichtner (2015)

MEMORANDUM

To:	Damon Roddis	**Organisation:**	Pacific Environment
cc:	Skye Playfair Redman	**Organisation:**	Urbis
From:	Rosalind Flavell	**Our Ref:**	S1624-0010-0163RSF
Date:	29 January 2015	**No. of Pages:**	5
Subject:	Advice To Address EPA Comments		

Damon,

Please find enclosed a detailed description of how we would propose to assess the impact of the facility operating during periods of upset, start up and shut down. In addition we have provided some advice on likely emissions of ammonia.

1 Periods of Upset Operating Conditions

1.1 Definition

Article 46(6) of the Industrial Emissions Directive (IED) (Directive 2010/75/EU) states that:

> *"… the waste incineration plant … shall under no circumstances continue to incinerate waste for a period of more than 4 hours uninterrupted where emission limit values are exceeded.*
>
> *The cumulative duration or operation in such conditions over 1 year shall not exceed 60 hours."*

Article 47 continues with:

> *"In the case of a breakdown, the operator shall reduce or close down operations as soon as practicable until normal operations can be restored."*

In addition Annex VI, Part 3, 2 states the emission limit values applicable in the circumstances described in Article 46(6) and Article 47:

> *"The total dust concentration in the emissions into the air of a waste incineration plant shall under no circumstances exceed 150 mg/Nm3 expressed as a half-hourly average. The air emission limit values for TOC and CO set out in points 1.2 and 1.5(b) shall not be exceeded."*

The conditions detailed in Article 46(6) are considered to be "Upset Operating Conditions".

1.2 Reasons for occurrence

Upset operating conditions such as those defined may occur as a result of the following:

- reduced efficiency of the Selective Non-Catalytic Reduction (SNCR) system as a result of blockages or failure of the reagent injection system, leading to elevated oxides of nitrogen emissions;
- reduced efficiency of particulate filtration system due to bag failure and inadequate isolation, leading to elevated particulate emissions and metals in the particulate phase;
- reduced efficiency of lime injection system such as through blockages or failure of fans leading to elevated acid gas emissions;

- complete failure of the lime injection system leading to unabated emissions of hydrogen chloride. (Note: this would require the plant to have complete failure of the bag filter system. As a plant of modern design, the plant would have shut down before reaching these operating conditions); or
- complete failure of the activated carbon injection system and loss of temperature control leading to elevated concentrations of metals and dioxin reformation and their unabated release.

1.3 Likely emission concentrations

There is no monitoring data available from existing facilities during 'upset operations'. In the absence of monitoring data plausible worst-case assumptions are used based on consultation with the UK Environment Agency based on their knowledge of plausible upset emissions. It will be worth consulting with HZI to ensure that they agree with the predicted NOx emissions under upset operating conditions.

No data on flow characteristics (flow rate, temperature etc) during these upset operating conditions is available and there is no reason to expect these parameters to change, so for the purposes of any assessment the design flow characteristics are applied.

Table 1: Emission Concentrations

Pollutant	Permitted Emission (mg/Nm³ unless stated)		Plausible Upset Emission (mg/Nm³ unless stated)	% Above Max Permitted Emission
	Daily Average	½ hourly max		
Oxides of nitrogen	200	400	550 (1)	38
Particulate matter (PM_{10}s)	10	30	150 (2)	400
Sulphur dioxide	50	200	450	125
Hydrogen chloride	10	60	900 (3)	1,400
Hydrogen fluoride	1	4	90 (4)	2,150
TOC (VOCs)	10	20	20 (2)	0
CO	50	100	100 (2)	0
Dioxins	0.1 ng/Nm^3		10 ng/Nm^3 (4)	9,900
Group 1 Metals - Mercury	0.05		0.75	1400
Group 2 Metals - Cadmium etc	0.05		0.75	1400

Reference conditions for all emissions dry, 11% oxygen, 283K.
(1) To be confirmed with HZI.
(2) Taken from the Annex VI Part 3 of the IED.
(3) Based on information presented in an Environment Agency document.
(4) As requested by the Environment Agency.

It is assumed that all metals are in the particulate phase, therefore metal emissions during predicted upset operation will increase in proportion to the increase in particulate emissions. Reference monitoring methods for metals require periodic monitoring with emission concentrations expressed as an average over a sampling period of up to 8 hours. For the purpose of any assessment the ratio applied to the daily limit for particulates should be applied to the metals emissions. As such the predicted plausible upset emissions for each group of metals (Groups 1 and 2) should be calculated as 15 times the predicted emission concentration.

1.3.1 Plausible upset emissions of group 3 metals

For the purposes of assessing upset operating conditions a number of assumptions are usually made with regard to the plausible upset emissions of the group 3 metals.

(1) The group 3 metals which have a short or long term EAL are considered (antimony, arsenic, chromium, copper, lead, manganese, nickel, vanadium).

(2) The permitted emission concentrations for each group 3 metal is taken as the maximum monitored from "Environment Agency Guidance to Applicants on Metals Impact Assessment for Stack Emissions (September 2012, Version 3)".

(3) The permitted emission concentration of chromium (VI) is based on the ratio of the effective chromium (VI) emission concentration to total metal emissions, as presented in the "Environment Agency Guidance to Applicants on Metals Impact Assessment for Stack Emissions (September 2012, Version 3)".

(4) It is assumed that metals are in the particulate phase, therefore metal emissions during predicted upset operation will increase in proportion to the increase in particulate emissions. Reference monitoring methods for metals require periodic monitoring with emission concentrations expressed as an average over a sampling period of up to 8 hours. For the purpose of any assessment the ratio applied to the daily limit for particulates is applied to the group 3 metals. As such the predicted plausible upset emission for each group 3 metal is calculated as 15 times the predicted emission concentration.

The plausible upset emissions concentrations are presented in Table 2 for group 3 metals.

Table 2: Predicted Group 3 Metal Emission Concentrations

Pollutant	Permitted Emission based on Max Monitored Emission Concentrations (µg/Nm³)	Predicted Plausible Upset Emission (µg/Nm³)	% Above Max Permitted Emission
Antimony	11.5	172.5	1,400
Arsenic	3	45	1,400
Chromium	52.1	781.5	1,400
Chromium (VI)	0.01355	0.20319	1,400
Copper	16.3	244.5	1,400
Lead	36.8	552	1,400
Manganese	36.5	547.5	1,400
Nickel	136.2	2,043	1,400
Vanadium	1	15	1,400

Reference conditions for all emissions dry, 11% oxygen, 283K

1.4 How assessed

In the UK we assess the impact of the plant operating at the upset operating conditions against the relevant short term EALs. For instance an assessment is not made of the plant continually operating at the upset operating conditions for a continuous period of more than 4 hours.

To determine the impact for comparison with the long term objectives it is assumed that the plant operates at the plausible upset operating conditions for 60 hours and the remaining 8,700 hours at the daily limit. The impact is then assessed against the relevant long term EALs.

2 PLANT START-UP AND SHUTDOWN

Start-up of the facility from cold will be conducted with clean support fuel (low sulphur light fuel oil). During start-up waste will not be introduced onto the grate unless the temperature within the oxidation zone is above the 850ºC as required by Article 50, paragraph 4(a) of the IED. During start-up, the flue gas treatment plant will be operational as will be the combustion control systems and emissions monitoring equipment.

The same is true during plant shutdown where waste will cease to be introduced to the grate. The waste remaining on the grate will be combusted, the temperature not being permitted to drop below 850ºC through the combustion of clean support auxiliary fuel. During this period the flue gas treatment equipment is fully operational, as will be the control systems and monitoring equipment. After complete combustion of the waste, the auxiliary burners will be turned off and the plant will be allowed to cool.

Start-up and shutdown are infrequent events. The facility is designed to operate continuously, and ideally only shutdown for its annual maintenance programme.

In relation to the magnitude of dioxin emissions during plant start-up and shutdown, research has been undertaken by AEA Technology on behalf of the Environment Agency. Whilst elevated emissions of dioxins (within one order of magnitude) were found during shutdown and start-up phases where the waste was not fully established in the combustion chamber, the report concluded that:

"The mass of dioxin emitted during start-up and shutdown for a 4-5 day planned outage was similar to the emission which would have occurred during normal operation in the same period. The emission during the shutdown and restart is equivalent to less than 1 % of the estimated annual emission (if operating normally all year)."

There is therefore no reason why such start-up and shutdown operations will affect the long term impact of the facility.

3 AMMONIA SLIP

We have assumed that the facility will use Selective Non-Catalytic Reduction (SNCR) rather than Selective Catalytic Reduction (SCR). The IED NOx limit is easily achieved using SNCR. SCR can achieve much lower NOx levels but at a significant cost to the project.

The BREF states that ammonia slippage from a SNCR system normally range from 1 to 10 mg/Nm^3, with an average of 4 mg of NH3/Nm^3. For the purpose of the permit and planning application in the UK we would normally assume the upper end of the range (i.e. 10 mg/Nm^3) to allow for some flexibility. However, if local sites are highly sensitive to ammonia or nitrogen deposition a more stringent limit may be requested. It will be worth requesting the guarantee from HZI.

If you have any questions please feel free to contact us.

Yours sincerely
FICHTNER Consulting Engineers Limited

Rosalind Flavell
Environmental Consultant

Stephen Othen
Technical Director

Appendix C SENSITIVE RECEPTORS

Sensitive receptor locations

Sensitive Receptor	Easting (m)	Northing (m)
James Erskine Primary School	296,748	6,257,187
Eskrine Park High School	296,709	6,256,992
Clairgate Public School	296,299	6,258,187
Minchinbury Public School	299,287	6,259,084
Pinegrove Memorial Park Lawn Cemetery	300,567	6,258,692
Sunny Patch Preparation School & Long Day Care Centre	297,153	6,258,266
Eastern Creek Public School	301,201	6,259,319
St Agnes Catholic High School	300,761	6,259,894
All Areas Family Day Care Pty	299,581	6,258,986
Maria Hawey Child Care Centre	299,370	6,259,272
Jiminey Cricket Long Day Care	298,562	6,259,310
White Bunny Child Care Centre	299,792	6,259,530
LITTLESMARTIES	296,419	6,258,212
Kidz Fun Factory	298,128	6,259,445
Industrial facility	297,743	6,259,085
Industrial facility	298,017	6,259,102
Industrial facility	298,262	6,259,157
Industrial facility	298,362	6,259,444
Industrial facility	298,106	6,259,473
Industrial facility	297,650	6,259,598
Industrial facility	297,391	6,259,845
Industrial facility	297,425	6,259,607
Industrial facility	297,528	6,259,706
Industrial facility	297,827	6,259,711
Industrial facility	297,923	6,259,624
Industrial facility	298,057	6,259,589
Industrial facility	298,165	6,259,576
Industrial facility	298,169	6,259,723
Industrial facility	297,988	6,259,754
Industrial facility	297,855	6,259,871
Industrial facility	298,473	6,259,809
Industrial facility	298,254	6,259,912
Industrial facility	297,964	6,259,979
Industrial facility	297,807	6,260,039
Industrial facility	299,645	6,258,440
Industrial facility	299,645	6,258,037
Industrial facility	299,709	6,257,886
Industrial facility	299,541	6,257,851
Industrial facility	299,441	6,258,055
Industrial facility	299,490	6,257,405
Industrial facility	299,906	6,257,425
Industrial facility	300,157	6,257,390
Industrial facility	300,263	6,257,339
Industrial facility	300,447	6,257,583

Industrial facility	300,228	6,257,651
Industrial facility	300,560	6,257,928
Industrial facility	300,633	6,257,735
Industrial facility	300,948	6,257,833
Industrial facility	300,802	6,257,591
Industrial facility	300,633	6,257,403
Industrial facility	300,755	6,257,374
Industrial facility	301,037	6,257,567
Industrial facility	301,057	6,257,410
Industrial facility	301,003	6,257,186
Industrial facility	300,950	6,257,066
Industrial facility	300,910	6,256,975
Industrial facility	300,682	6,257,126
Industrial facility	300,691	6,257,026
Industrial facility	300,830	6,257,241
Industrial facility	300,436	6,257,299
Industrial facility	299,601	6,257,064
Industrial facility	299,490	6,256,891
Industrial facility	299,689	6,256,705
Industrial facility	299,501	6,256,224
Industrial facility	300,008	6,256,426
Industrial facility	300,219	6,256,526
Industrial facility	300,529	6,256,577
Industrial facility	300,899	6,256,202
Industrial facility	300,786	6,255,839
Industrial facility	301,006	6,255,854
Industrial facility	298,652	6,255,402
Industrial facility	298,508	6,255,389
Industrial facility	298,584	6,255,037
Industrial facility	296,204	6,256,521
Industrial facility	296,614	6,256,526
Industrial facility	296,388	6,256,355
Industrial facility	296,643	6,256,280
Industrial facility	296,700	6,256,087
Industrial facility	296,946	6,256,040
Industrial facility	296,598	6,255,723
Industrial facility	296,410	6,255,743
Industrial facility	296,055	6,255,881

Appendix D FIVE YEAR ANALYSIS OF METEOROLOGY

As specified in the EPA's *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* five years of data are required to be reviewed so that a representative year of meteorological conditions can be selected.

Annual and seasonal wind roses for Horsley Park Equestrian Centre have been prepared for 2009 through 2013 and are shown below. All five years of data collected at Horsley Park Equestrian Centre show a similar pattern both annually and seasonally. There are some minor differences which are discussed below.

On an annual basis the prevailing wind directions originate from all directions of the compass, with fewer winds experienced from the northeast and north-northeast.

During summer the prevailing winds are dominated by flows originating from the eastern and south-eastern quadrants.

Conversely, the months of winter are dominated by wind from the south-western and north-western quadrants. Almost no winds are experienced from the north-eastern and north-northeastern directions across all years of data examined.

The wind distribution patterns for autumn and spring are less consistent and present a transition of summer to winter and vice versa across all years.

The percentage of calms is fairly consistent across all years and ranged between 14.2 % for 2009 and 24.5% for 2013.

Further analysis was conducted for the five years of data. The long term trend of monthly average temperature and monthly average wind speed is also shown below.

A strong seasonal trend in monthly average temperatures is evidenced with the highest temperatures experienced during the summer months of December, January and February and the lowest temperatures during the winter months of June, July and August. 2009 and 2013 are shown to experience higher monthly average temperatures across most months. Generally speaking, the monthly average temperatures at Horsley Park Equestrian Centre do not vary significantly from year to year.

There is no strong relationship between the time of year and the monthly average wind speed. Generally speaking, the monthly average wind speeds are less during the months of autumn. Both 2009 and 2010 measured the highest winds speed across the five years investigated. The lowest wind speed was recorded in 2013.

From this analysis, in addition to the consistent wind distribution patterns experienced discussed above it is considered that 2013 is a typical year and is therefore deemed a representative year for dispersion modelling.

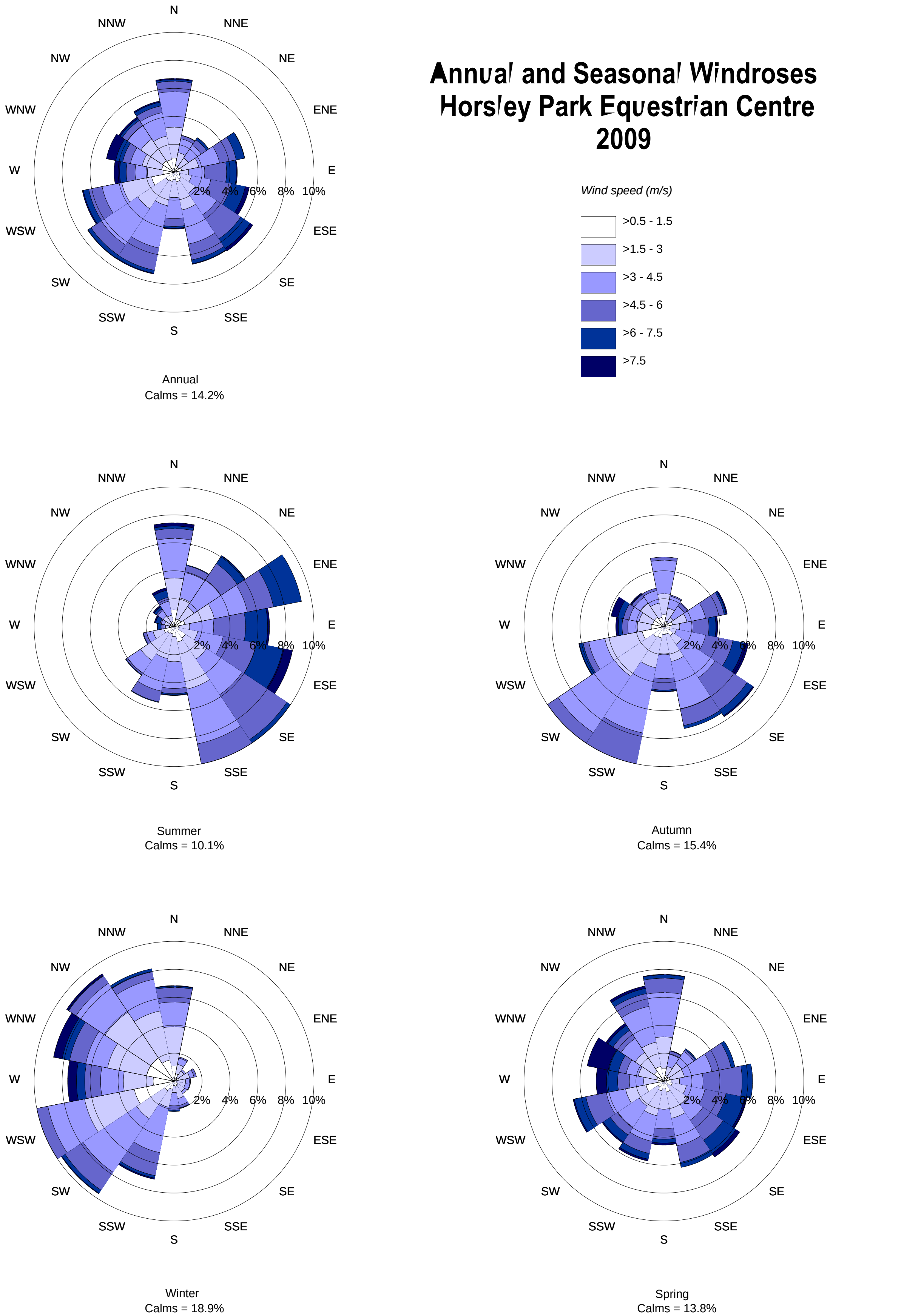


Figure C 1: Annual and seasonal wind roses for Horsley Park Equestrian Centre (2009)

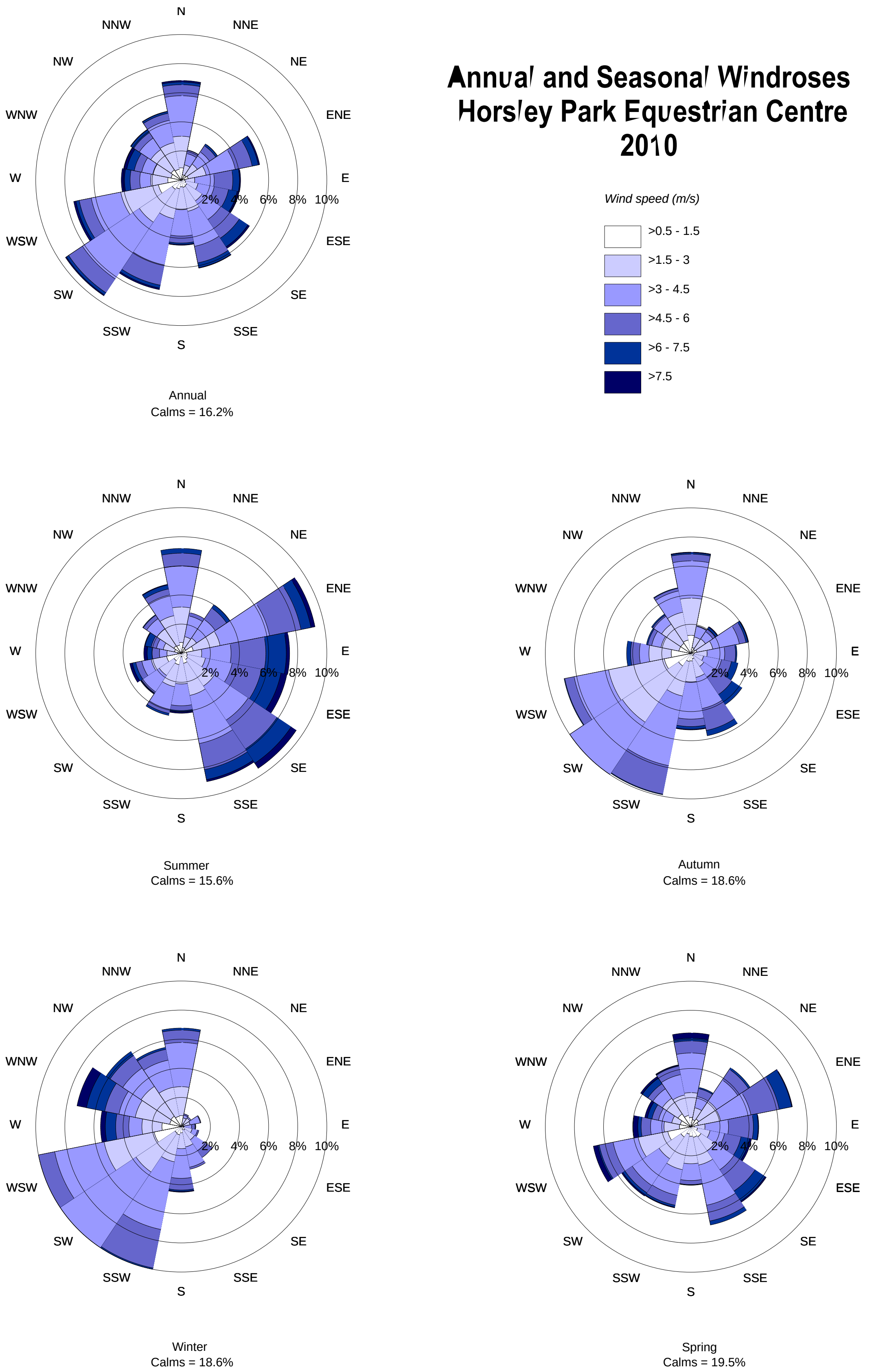


Figure C 2: Annual and seasonal wind roses for Horsley Park Equestrian Centre (2010)

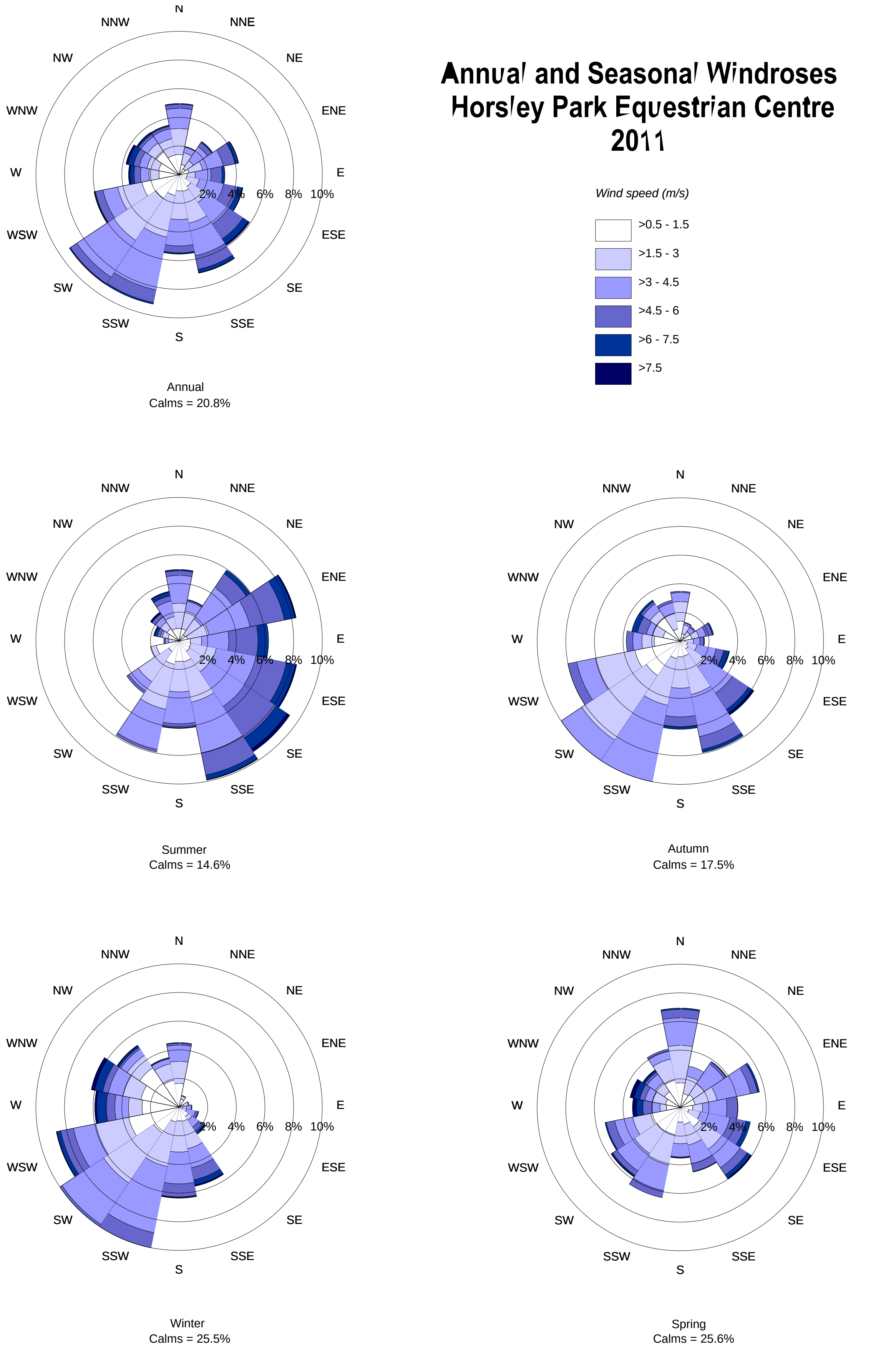


Figure C 3: Annual and seasonal wind roses for Horsley Park Equestrian Centre (2011)

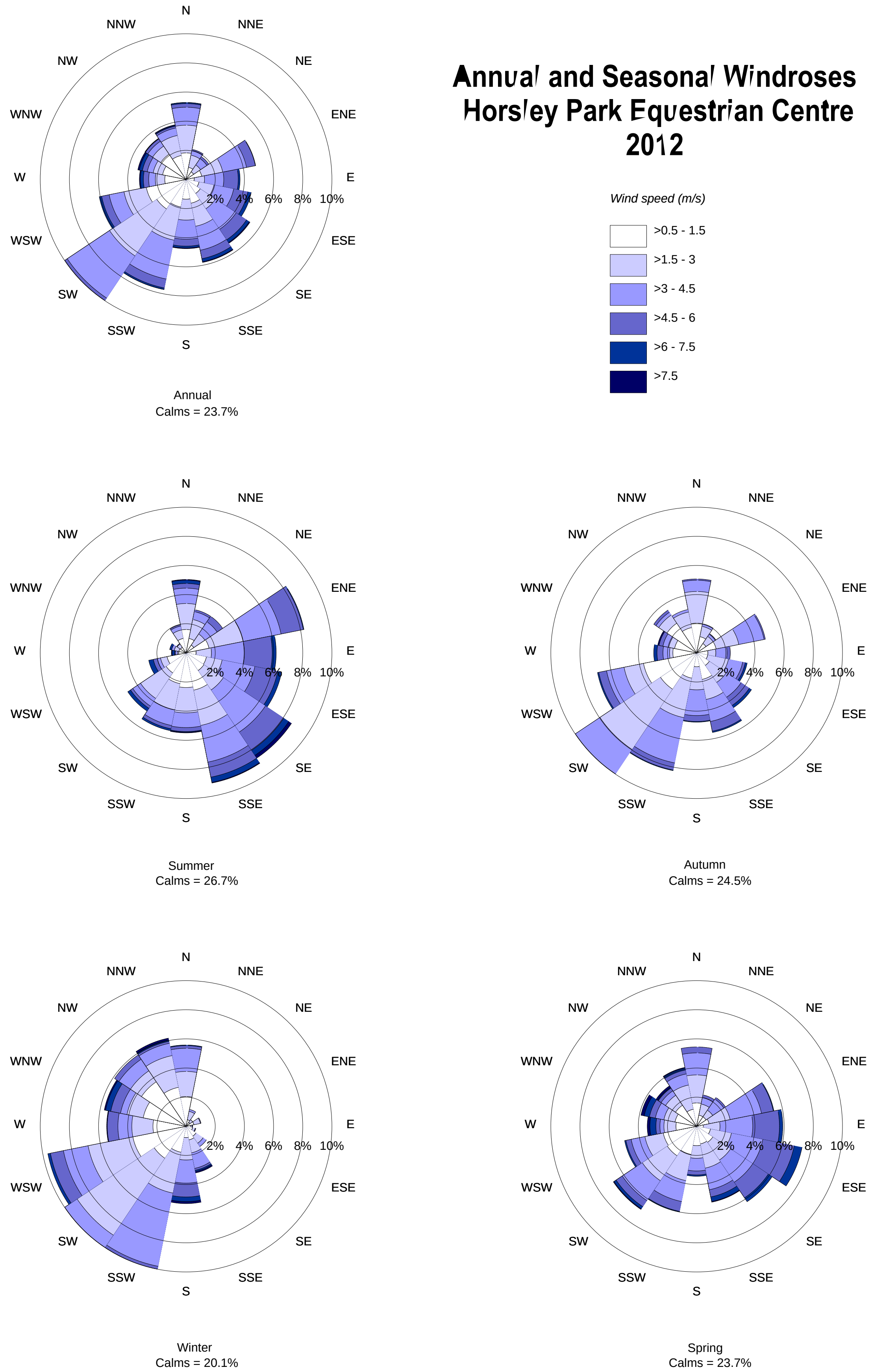


Figure C 4: Annual and seasonal wind roses for Horsley Park Equestrian Centre (2012)

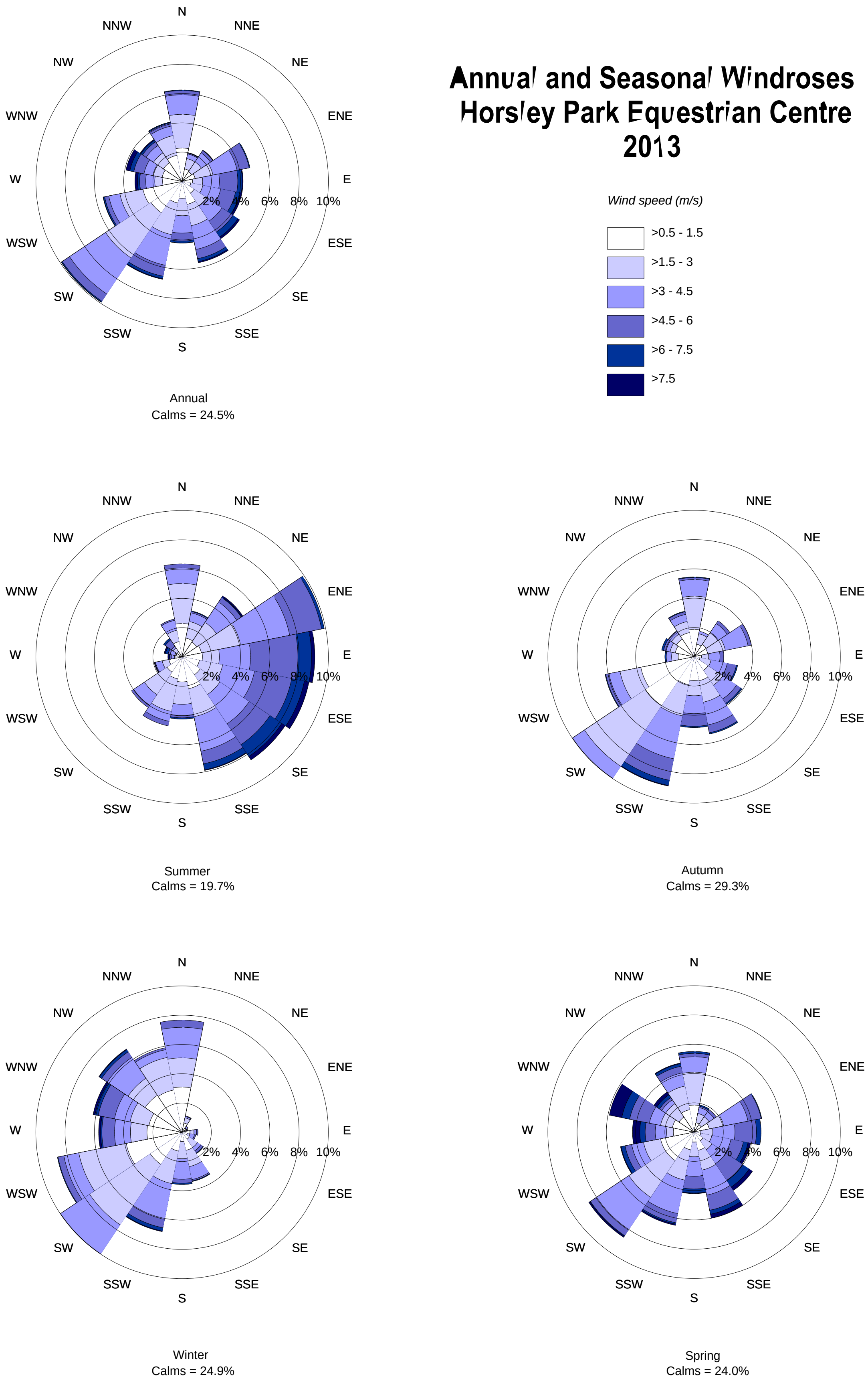


Figure C 5: Annual and seasonal wind roses for Horsley Park Equestrian Centre (2013)

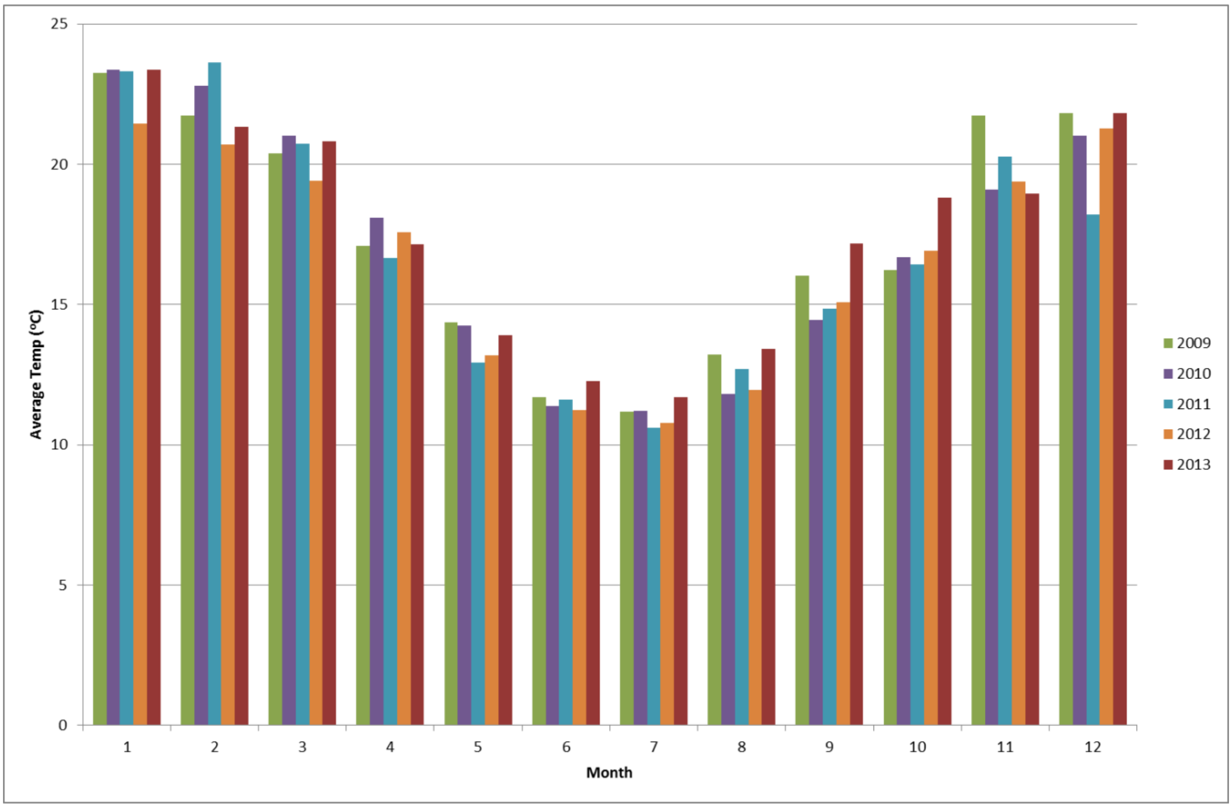


Figure C 6: Monthly average temperature at Horsley Park Equestrian Centre (2009 – 2013)

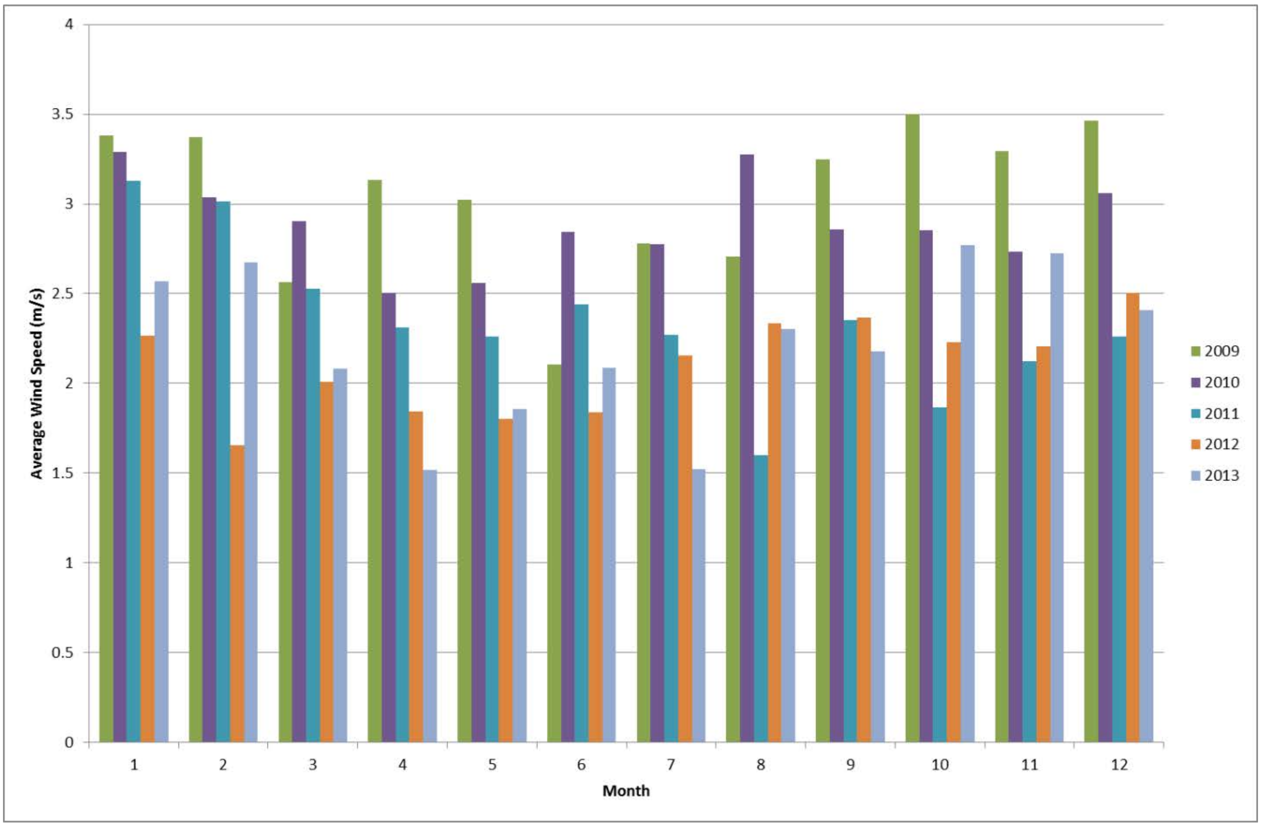


Figure C 7: Monthly average wind speed at Horsley Park Equestrian Centre (2009 – 2013)

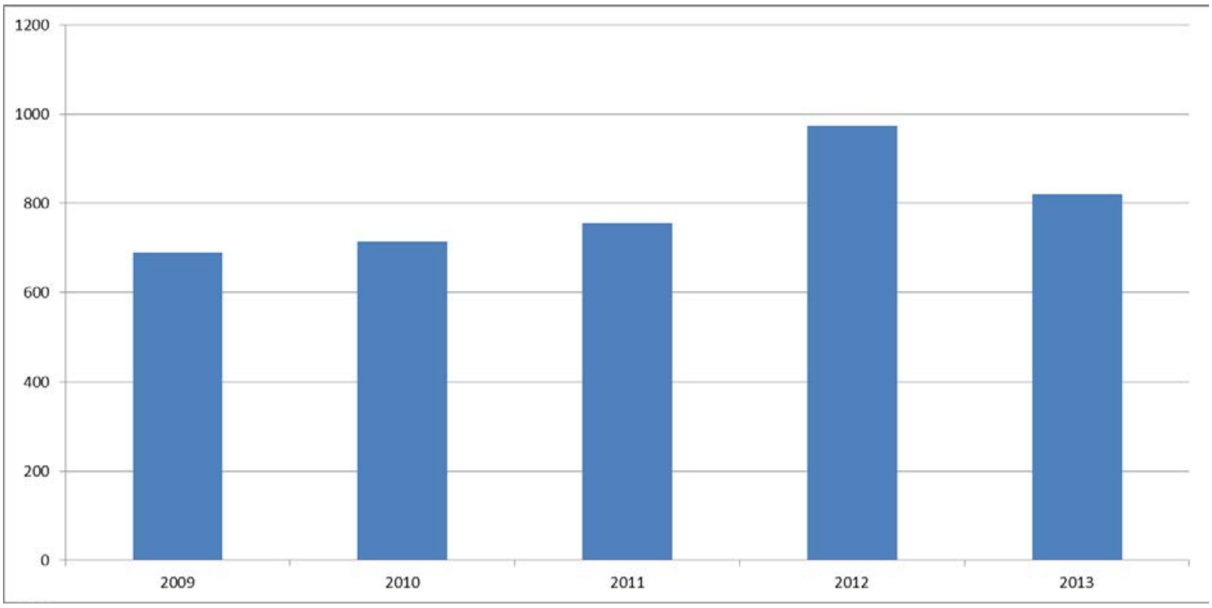
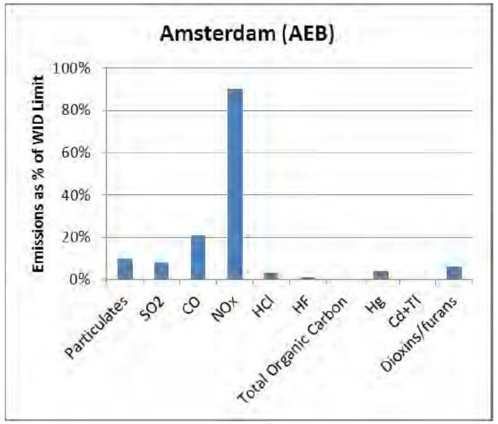


Figure C 8: Annual rainfall at Horsley Park Equestrian Centre (2009 – 2013)

Appendix E SUMMARY OF EMISSIONS PERFORMANCE

E.1 SUMMARY OF EMISSIONS PERFORMANCE REPORTED IN WSP (2000)

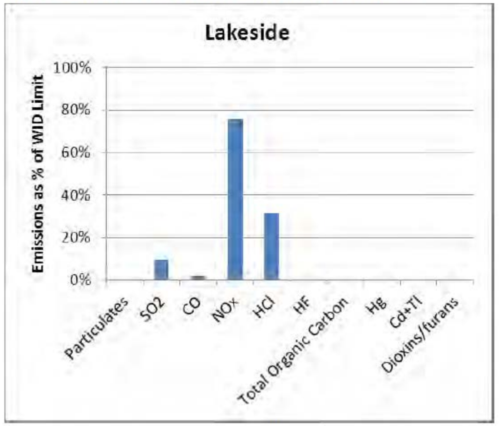
Figure 2-1-7: Emission performance at Amsterdam



Source: interpreted from AEB data (circa Feb 2011)

AEB Amsterdam

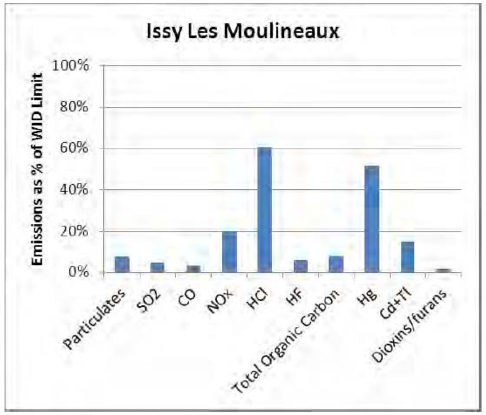
Figure 2-2-4: Emissions data for the Lakeside WtE plant



Source: WSP analysis of data from 1st to 25th November 2012

Lakeside, UK

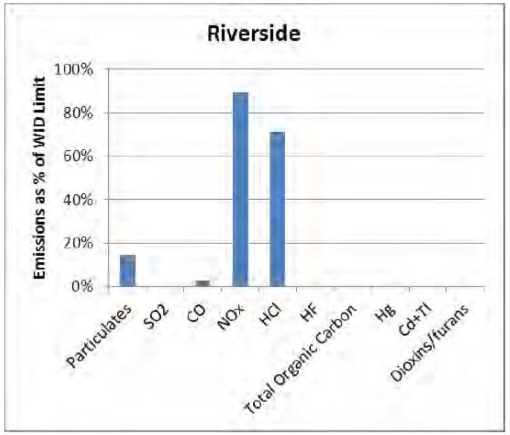
Figure 2-5-3: Emission limits for the ISSEANE plant in Paris for 2011



Source: WSP analysis of plant data

Issy

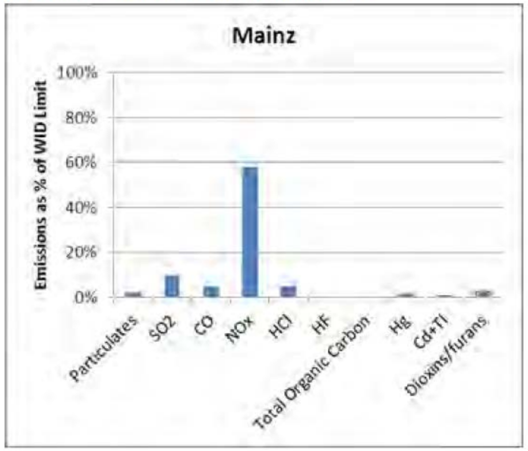
Figure 2-10-9: Emissions data for August to October 2012



Source: WSP analysis of plant data

Riverside, UK

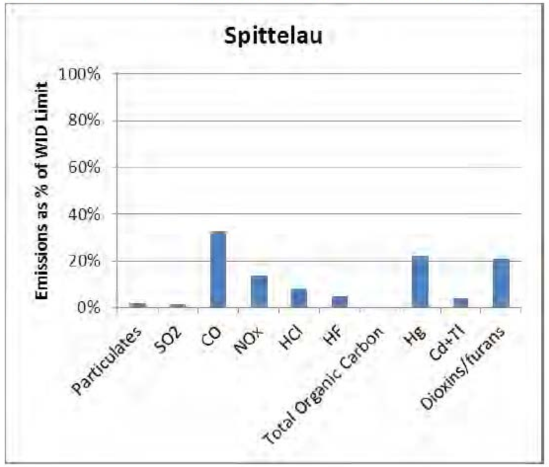
Figure 2-11-6: Emissions from the Mainz plant



Source: WSP analysis of plant data

Mainz, Germany

Figure 2-3-5: Emission values in the stack gas (2006) at Spittelau



Spittelau, Austria

E.2 CADMIUM AND METALS EMISSIONS PERFORMANCE IN HZI PLANTS

Heavy metal emissions HZI plants with semi-dry FGT in UK

all data in mg/m^3 at STP and referred to 11% O_2 dry

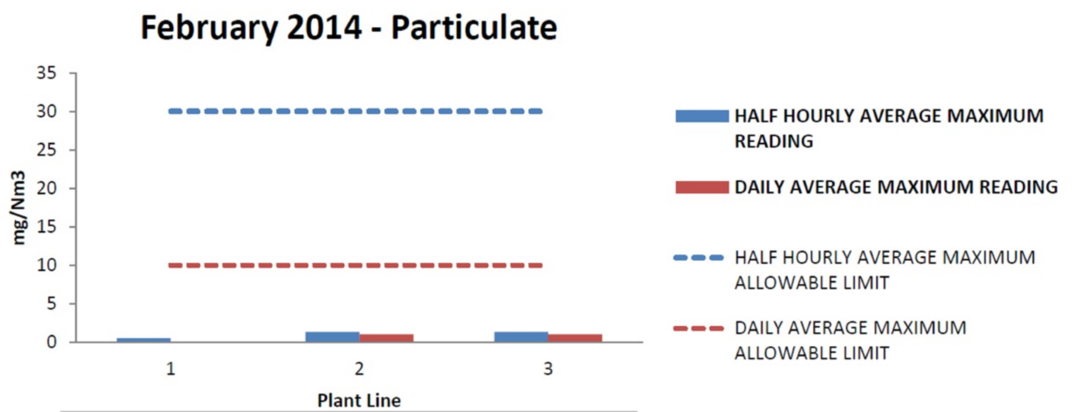
		Plant A			Plant B		Plant C	Average	EU
Metal	**Symbol**	**Line 1**	**Line 2**	**Line 3**	**Line 1**	**Line 2**	**Line 3**		WID
Mercury	**Hg**	**0.0015**	**0.0004**	**0.0002**	**0.004**	**0.003**	**0.0017**	**0.002**	**< 0.05**
Cadmium	Cd	0.00270	0.00085	0.00111	0.009	0.001	0.004		
Thallium	Tl	0.00005	0.00003	0.00002	0.000	0.000	0.0009		
Sum Cd+Tl	**Cd + Tl**	**0.00275**	**0.00087**	**0.00113**	**0.009**	**0.001**	**0.0049**	**0.003**	**< 0.05**
Arsenic	**As**	0.0006	0.0003	0.0004	0.003	0.000	0.0013		
Antimony	**Sb**	0.0148	0.0047	0.0047	0.007	0.001	0.0026		
Chromium	**Cr**	0.0179	0.0115	0.0399	0.014	0.002	0.0467		
Cobalt	**Co**	0.0003	0.0002	0.0001	0.003	0.000	0.0006		
Copper	**Cu**	0.0085	0.0085	0.0263	0.051	0.001	0.0049		
Lead	**Pb**	0.0452	0.0137	0.0170	0.172	0.002	0.0094		
Manganese	**Mn**	0.0084	0.0041	0.0037	0.095	0.005	0.0051		
Nickel	**Ni**	0.0118	0.0058	0.0041	0.006	0.002	0.0208		
Vanadium	**V**	0.0003	0.0002	0.0004	0.003	0.000	0.0004		
Sum heavy metal	**As-V**	**0.11**	**0.049**	**0.097**	**0.35**	**0.015**	**0.092**	**0.12**	**< 0.5**

28.4.2014 / HZI / Fy

E.3 SAMPLE CEMS REPORT FROM RIVERSIDE

Riverside Resource Recovery emission report – February 2014

The following charts summarise the emission data for the Riverside Resource Recovery facility. The charts show the **MAXIMUM** readings taken during the month.

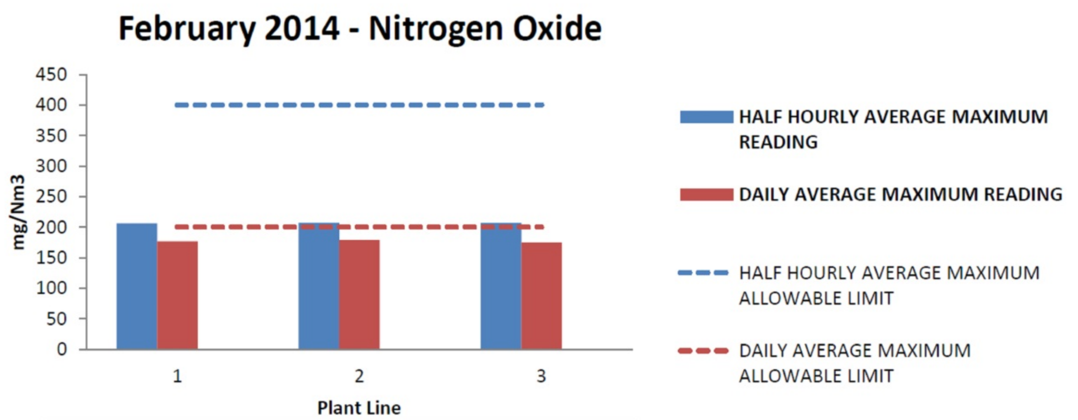


MONTHLY MEAN OF THE HALF HOURLY AVERAGE

Line 1 = 0.3 mg/Nm3
Line 2 = 0.6 mg/Nm3
Line 3 = 0.9 mg/Nm3

Why do we control and monitor Particulates (dust)?

Particulates is the term used to describe tiny particles in the air, made up of a complex mixture of soot, organic and inorganic materials having a particle size less than or equal to 10 microns diameter (10 microns is equal to one hundredth part of a millimetre). Particulates is one of the eight substances for which the government has established an air quality standard as part of

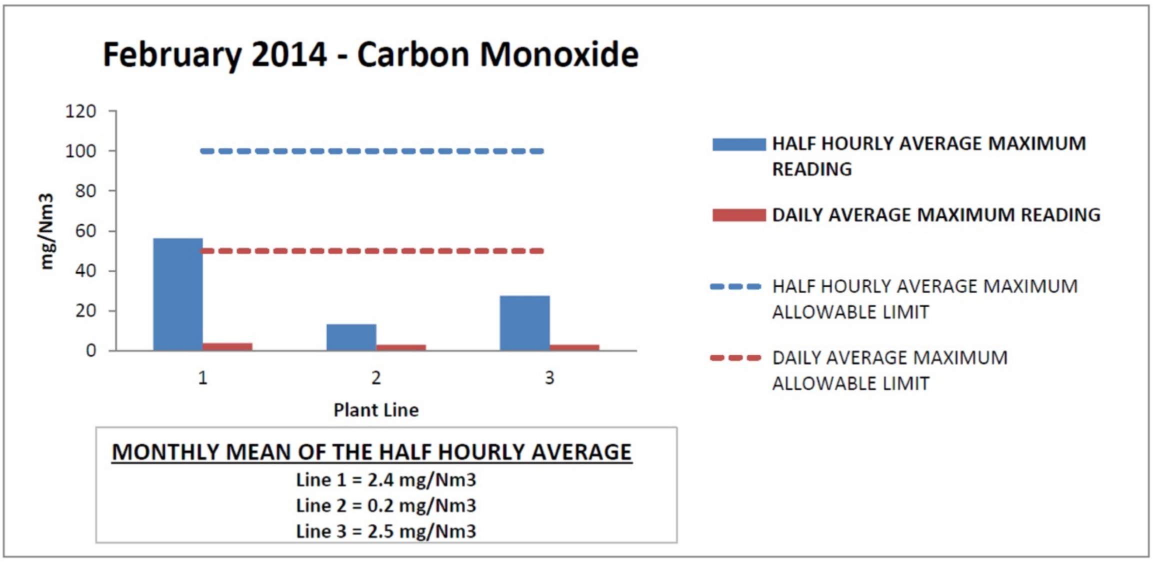


MONTHLY MEAN OF THE HALF HOURLY AVERAGE

Line 1 = 166.3 mg/Nm3
Line 2 = 168.3 mg/Nm3
Line 3 = 167.4 mg/Nm3

Why do we control and monitor Oxides of Nitrogen (NOx)?

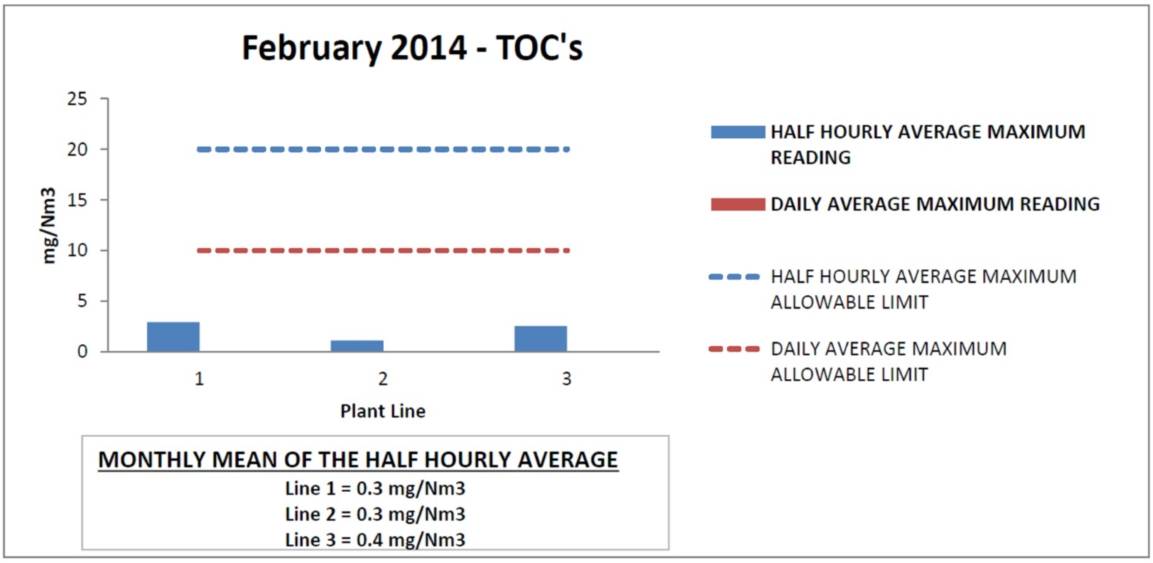
NOx includes various compounds, but is usually used to group two gases; nitrogen dioxide (NO_2) and nitric oxide (NO). These can be formed naturally, but are also formed from man-made processes like fuel combustion or biomass burning. There are a number of health and environmental issues attributed to NOx, including smog, acid rain, and possibly global warming.



Why do we control and monitor Carbon Monoxide?

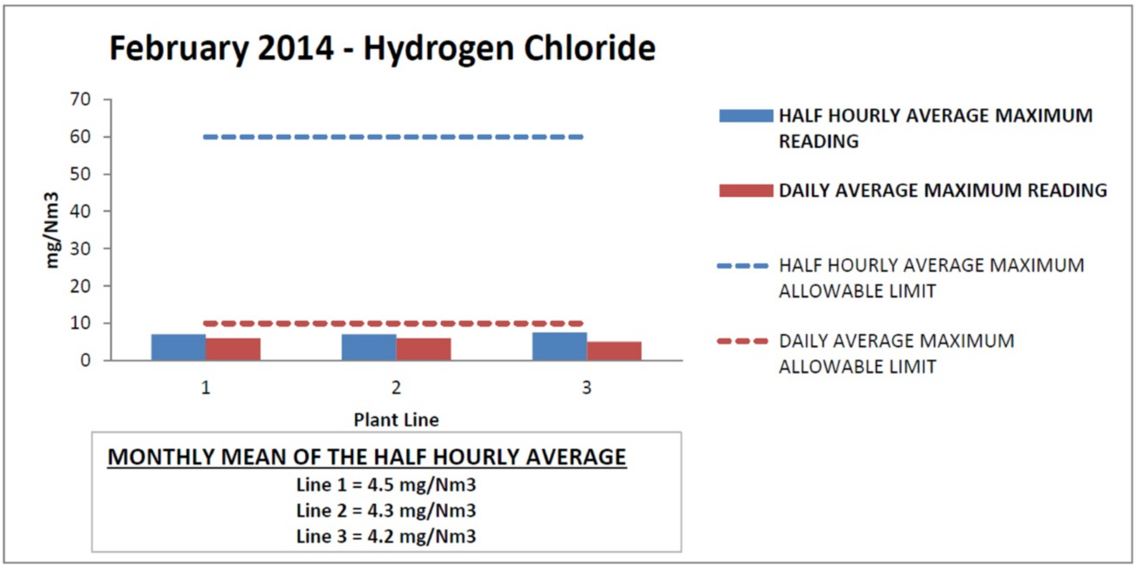
Carbon monoxide is both a common naturally occurring chemical and is manufactured by man. It is a colourless, odourless poisonous gas. Carbon monoxide is one of the eight substances for which the government has established an air quality standard as part of its national Air Quality Strategy.

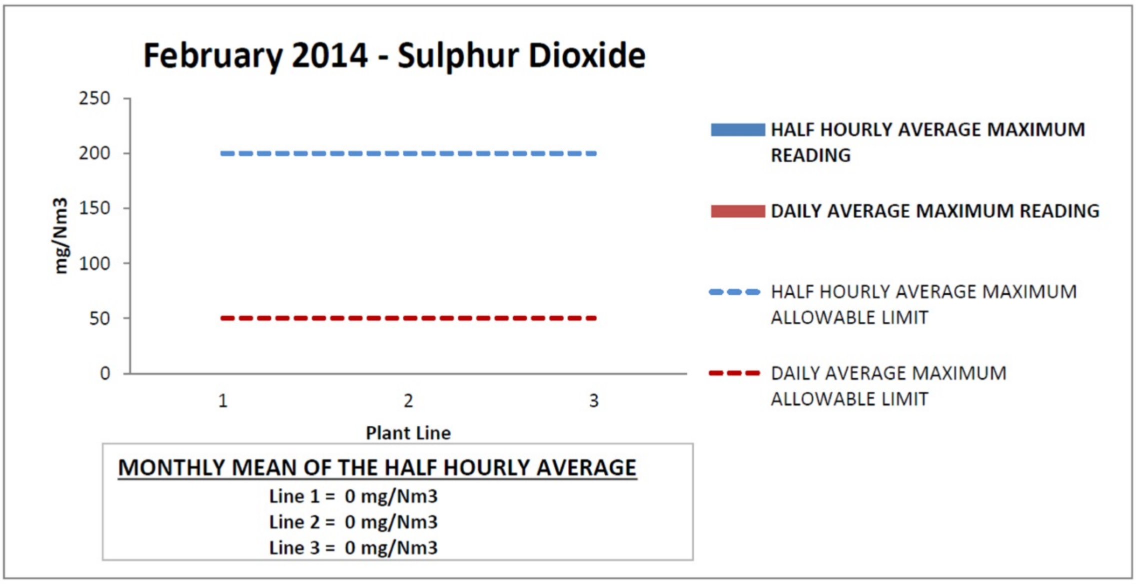
Carbon monoxide can cause harmful health effects by reducing oxygen delivery to the body's organs and tissues.



Why do we control and monitor Total Organic Carbon (TOC)?

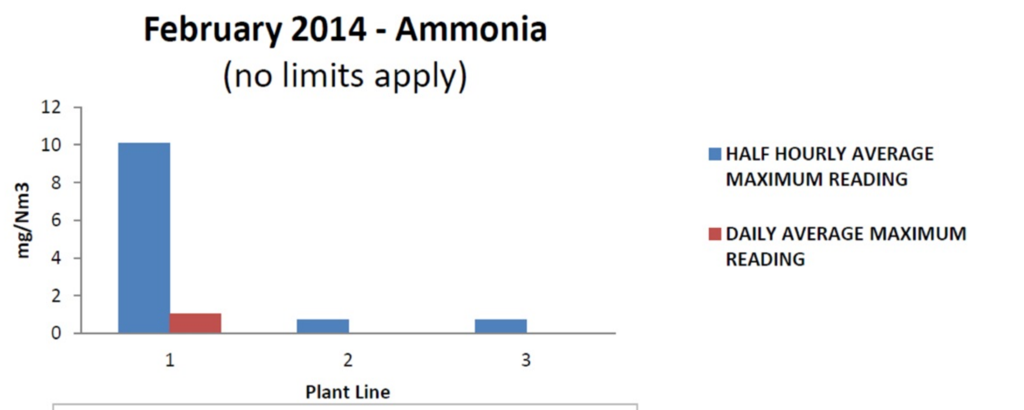
Total Organic Carbon (TOC) consists of a wide range of organic compounds including Volatile Organic Compounds (VOCs). VOCs are numerous, varied and found everywhere. VOCs are of general concern because of their ability to react with other pollutants (such as nitrogen oxides) in the lower atmosphere to form ozone. High concentrations of ozone at ground level can harm human health, damage crops and affect materials such as rubber. Some VOCs may be directly harmful to human health, contribute to global warming or destroy stratospheric ozone needed to shield the earth's surface from harmful ultra violet radiation.





Why do we control and monitor Sulphur Dioxide and Hydrogen Chloride?

Both gases dissolve in water to form strong acids and thus can contribute to the formation of acid rain. Acid rain is environmentally damaging to crops, soils and waters.



MONTHLY MEAN OF THE HALF HOURLY AVERAGE

Line 1 = 0.4 mg/Nm3
Line 2 = 0.2 mg/Nm3
Line 3 = 0.3 mg/Nm3

Why do we control and monitor Ammonia?

Although in wide-use in several industries, ammonia is both caustic and hazardous. It is a colourless gas with a characteristic pungent odour.

Ammonia, unlike the other species monitored, is not a product from the incineration of waste but is actually introduced into the furnace. Under the right conditions, ammonia is able to reduce oxides of nitrogen found in the flue gas by the chemical process Selective Non-Catalytic Reduction (SNCR) to nitrogen and water vapour which are both non-hazardous.

Appendix F DETAILED MODELLING PREDICTIONS

To inform a Human Health Risk Assessment, modelling predictions are presented in **Table B12-1** for the discrete receptors described in **Appendix C**(particularly sensitive receptors such as schools and childcare centres).

There are too many residential receptors in the suburbs of Minchinbury and Erskine Park to provide individual modelling predictions for each, however modelling predictions for the closest residential receptors are shown **Table B12-1** at the discrete locations shown in **Figure B12-1**.

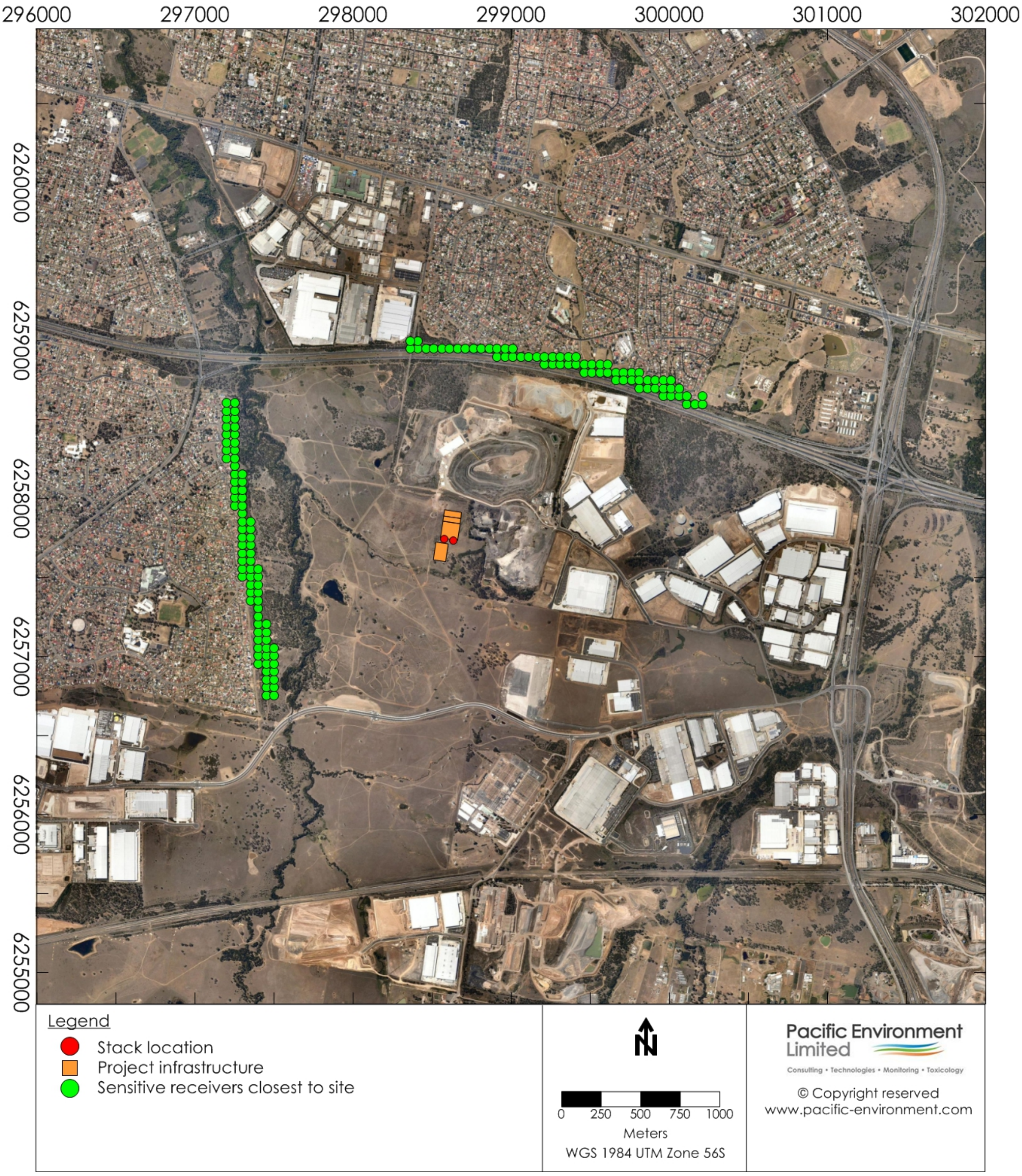


Figure B12-1: Additional receptor locations presented

Table B12-1: Predicted ground level concentrations at particularly sensitive receptors – short term averaging periods

Sensitive Receptor	Easting (m)	Northing (m)	15-minute	10-minute	1 hour	1 hour	1 hour	1 hour	1 hour	1 hour	1 hour	1 hour	1 hour	1 hour	1 hour	1 hour
			CO	SO2	NO2	SO2	PM	H2S	CO	HCl	Cd	Hg	Dioxins	TOC	NH3	PAH (as benzo(a)pyrene)
			mg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3
James Erskine Primary School	296748	6257187	1.2E-02	2.9E+01	3.1E+01	1.5E+01	2.3E+00	3.1E-01	7.6E-03	4.0E-03	3.3E-06	3.3E-06	6.7E-12	1.3E-03	2.4E-04	6.7E-08
Eskrine Park High School	296709	6256992	1.1E-02	2.6E+01	2.8E+01	1.4E+01	2.1E+00	3.0E-01	6.9E-03	3.8E-03	3.2E-06	3.2E-06	6.4E-12	1.3E-03	2.3E-04	6.4E-08
Clairgate Public School	296299	6258187	1.5E-02	3.6E+01	3.8E+01	1.9E+01	2.9E+00	2.6E-01	9.5E-03	3.3E-03	2.8E-06	2.8E-06	5.6E-12	1.1E-03	2.0E-04	5.6E-08
Minchinbury Public School	299287	6259084	2.9E-02	6.7E+01	7.2E+01	3.6E+01	5.4E+00	4.5E-01	1.8E-02	9.1E-03	7.5E-06	7.5E-06	1.5E-11	3.0E-03	5.4E-04	1.5E-07
Pinegrove Memorial Park Lawn Cemetery	300567	6258692	2.4E-02	5.6E+01	6.0E+01	3.0E+01	4.5E+00	2.9E-01	1.5E-02	6.3E-03	5.3E-06	5.3E-06	1.1E-11	2.1E-03	3.8E-04	1.1E-07
Sunny Patch Preparation School & Long Day Care Centre	297153	6258266	2.0E-02	4.6E+01	5.0E+01	2.5E+01	3.7E+00	3.8E-01	1.2E-02	5.2E-03	4.3E-06	4.3E-06	8.6E-12	1.7E-03	3.1E-04	8.6E-08
Eastern Creek Public School	301201	6259319	2.4E-02	5.6E+01	6.0E+01	3.0E+01	4.5E+00	2.1E-01	1.5E-02	5.8E-03	4.9E-06	4.9E-06	9.7E-12	1.9E-03	3.5E-04	9.7E-08
St Agnes Catholic High School	300761	6259894	2.3E-02	5.3E+01	5.6E+01	2.8E+01	4.2E+00	2.2E-01	1.4E-02	7.1E-03	5.9E-06	5.9E-06	1.2E-11	2.4E-03	4.2E-04	1.2E-07
All Areas Family Day Care Pty	299581	6258986	2.9E-02	6.8E+01	7.2E+01	3.6E+01	5.4E+00	4.0E-01	1.8E-02	8.8E-03	7.4E-06	7.4E-06	1.5E-11	2.9E-03	5.2E-04	1.5E-07
Maria Hawey Child Care Centre	299370	6259272	2.8E-02	6.6E+01	7.0E+01	3.5E+01	5.3E+00	4.1E-01	1.8E-02	9.0E-03	7.5E-06	7.5E-06	1.5E-11	3.0E-03	5.3E-04	1.5E-07
Jiminey Cricket Long Day Care	298562	6259310	3.0E-02	6.9E+01	7.4E+01	3.7E+01	5.5E+00	4.0E-01	1.8E-02	9.0E-03	7.5E-06	7.5E-06	1.5E-11	3.0E-03	5.3E-04	1.5E-07
White Bunny Child Care	299792	6259530	2.7E-02	6.3E+01	6.7E+01	3.3E+01	5.0E+00	3.4E-01	1.7E-02	8.5E-03	7.1E-06	7.1E-06	1.4E-11	2.8E-03	5.1E-04	1.4E-07