AIR IMPACT ASSESSMENT
FOR A PROPOSED PRINTING WAREHOUSE AND DISTRIBUTION FACILITY
LENORE DRIVE, ERSKINE PARK

Prepared for: Paclib Group
Department of Planning
Penrith City Council

Prepared by: Duke Ismael, Environmental Engineer
Gusni Melington, Senior Environmental Engineer
Filbert Hidayat, Environmental Engineer
R T Benbow, Principal Consultant
BENBOW ENVIRONMENTAL

Report No: 109026_Rep
April 2009
(Released: 8 April 2009)

Benbow
ENVIRONMENTAL

Engineering a Sustainable Future for Our Environment

13 Daking Street North Parramatta NSW 2151 AUSTRALIA
Tel: 61 2 9890 5099 Fax: 61 2 9890 5399
Email: admin@benbowenviro.com.au
Visit our website at: www.benbowenviro.com.au

CONTENTS PAGE

TABLES PAGE

FIGURES PAGE

ATTACHMENTS

1. INTRODUCTION

Benbow Environmental (BE) has been commissioned by the Paclib Group to prepare an air impact assessment to support the major project development application for a proposed printing warehouse and distribution facility at Lenore Drive, Erskine Park.

The subject site will contain a warehouse and distribution facility and is proposed to operate on a 24 hour, 7 day per week basis. Two (2) warehouse buildings will be built on site and each building would be built in separate stages.

The facility would operate a maximum of 7 web offset printing presses, 5 as the main practice and 2 would be introduced in the later date. The printing process is identified as the major sources of air emissions from this air impact assessment.

1.1 SCOPE OF WORKS

This quantitative air assessment is limited to the following scope of works:

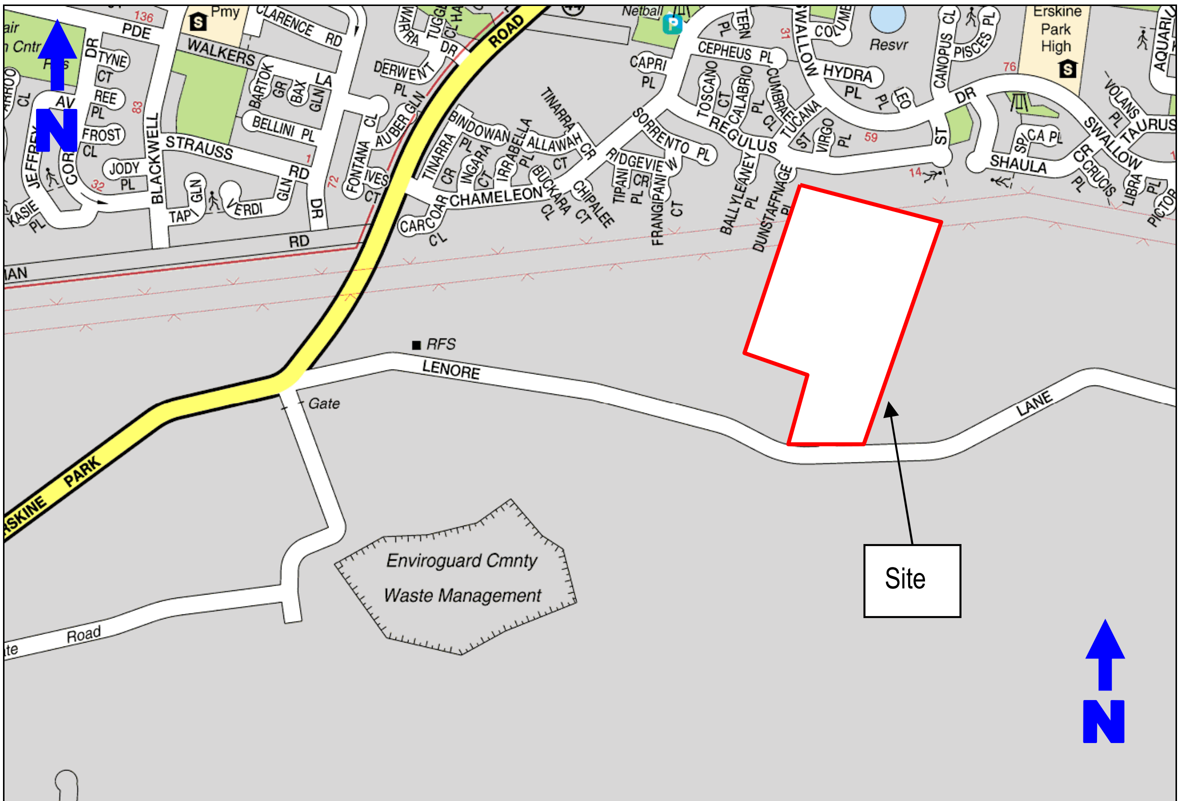
- Description of the air emission sources on site;
- Discussion of the relevant legislation documents and guidelines;
- Assessment of impacts from the identified air emission sources; and
- Recommendation of controls and procedures where necessary.

2. SITE DESCRIPTION

2.1 SITE LOCATION

The proposed site is located at Lot 62 DP 1090695 Lenore Drive, Erskine Park. The site falls under the Local Government Area of Penrith and is under the Hawkesbury-Nepean Catchment Management Area. Figure 2-1 shows the location of the subject site in a regional context.

Figure 2-1: Local Site Map



Legend:
Site Location

Source: © 2004 Universal Publishers Pty Ltd
Scale: 1:28,800

The subject site is located within an industrial zoned area at Erskine Park, part of the Erskine Park Employment Area. A large residential zoned area is located north of the site location, with the local overhead power lines shown as the significant feature located between the two zoned areas. In future, it is expected that more industrial premises will be developed and built around the subject site.

2.2 SITE OPERATIONS

The following provides the list of activities that would occur on site:

- Receipt and Despatch of Raw Materials and Products;
- Web Offset Printing;
- Product Packaging;
- Office and Administration; and
- Ancillary Processes, such as:
  - Heat integration using heat exchangers;
  - Collection and compacting of paper scraps using a Pelletiser; and
  - Waste management system.

The web offset printer contains the following operational units as a whole. There will be 7 web offset printers in total on site. It is proposed that 5 web offset printers will be used at all the time, while the 2 other smaller web offset printers will be on stand-by. Each printer contains a number of unit operations that have a specific role in achieving the required quality of the printed material. These are listed as follows:

- Paper web feed;
- Ink fountain;
- Dampening system;
- Plate and blanket cylinders;
- Dryer;
- Chilled rollers; and
- Trimmers.

Raw materials such as paper rolls and inks are delivered to the subject site. The plastic cover of the paper rolls would be disposed off, and the paper rolls would each be unwound before being fed into the web offset printers which are capable of printing materials at high speeds.

The printing operations involve producing a plate image, which is then transferred to a blanket cylinder. A rubber blanket would then transfer the image to the paper. The technology allows better image transfer compared to ordinary plate printing.

As the printing process proceeds, the printed paper is then passed through a dryer to enhance solvent evaporation, and then cooled through a chilled roller. The extraction system of the dryer would be designed in order to allow the re-circulation and destruction of VOC emissions emitted during the drying stages. This would reduce the total VOC emissions, provide a better work environment and achieve the environmental policy objectives of the component. The VOC stack concentration limits specified in Section 3.1.2.

Leftover ink would then be collected and removed to the waste disposal and recycling area.

The magazines would then be ready for folding and packaging. These magazines are then stored in the publishing areas for distribution. Paper waste from trimming and splicing is then collected and compacted with a pelletiser, and removed to the waste disposal and recycling area.

2.2.1 Further Detail

The operations of the printing facility are discussed in further detail below.

The layout of the operational areas of the site is shown in detail on Figure 2-13.

In web offset printing, the inked image is transferred from the printing plate to a rubber blanket, as the template, which transfers the image into the substrate (paper). The type of ink used is a heatset type, whereby printed images are set by applying heat followed by rapid cooling to accelerate the curing process. At the start of the printing process, a thin layer of dampening solution will be applied and this will occupy the non-image area of the plate. A silicon based solution is also used to lubricate the paper and increase the gloss of the paper for a cleaner and improved print appearance. The next step is applying the ink, which adheres to the image area of the plate, ready to be transferred to the rubber blanket, and then the image is printed onto the paper.

After being printed, the solvent in the ink would be dried using heated air in the dryers. The solvent would be lost in gaseous form from the surface of the paper. The dryers operate at a temperature of 200^{o}C. The exhaust gases would be re-circulated along with natural gas used to maintain the operating temperatures of the dryers. This is aimed to destroy most of the VOC contained in the exhaust gas, limiting the release of VOC to the environment. The printed materials are then cooled, trimmed, stitched and folded. Paper waste cut-off from the trimmer operation would be compacted, and pelletised.

After the printing process, the magazines are cut to length, folded, stapled and conveyed to a pelletiser. The logistics management aspect of the facility stores the magazine in a computerised system to achieve a high level of efficiency in the distribution of the magazine.

The proposed development would comprise warehouse to accommodate printing, storage and distribution facility.

Part of the warehouse area would be used to store rolls of the high quality paper required for magazines. The rolls are each of 2 tonnes and would be stored up to 10 m high. Forklifts fitted with reel grabs are used to undertake the unloading of the rolls from mainly "B" double trucks.

The rolls are stored vertically and forklift drivers of high skill are required to prevent edge damage to the rolls of paper. The rolls are relocated to the commencement of the web offset printing process again using these forklifts.

The rolls are placed on a conveyor that enables them to be shifted onto the unwinders at the start of the web offset printer.

Production wrapping is removed from each roll.

The printing process generates trim when the printed paper is cut to exact size. The trim is withdrawn from the printing process using fans that place a duct under vacuum. The trim is chopped to length by these fans so that the trim may be transferred along long length of ducting without blocking the ducting.

The trim is collected from several locations and is conveyed to a compaction unit located in a designated area of the plant. The trim is converted into pallets, placed into bulky bag or containers suitable for transfer to a port and be shipped overseas for reuse.

The magazine folding and stitching operation generates minor quantity of dust and then areas are subjected to daily cleaning to remove paper dust. This area is needed to be kept to a high state of cleanliness to maximise the operating efficiencies of the printing equipment.

Similarly the waste paper conversion area is needed to be readily cleaned to ensure there is low risk of fire or a dust explosion. Opportunities for a dust explosion are rare given the nature of the dust being paper particles and off cuts. As discussed in this report, however risk of fire is real and needs to be reduced to a low to negligible level.

The printing process requires 120 tonnes of ink to be stored on-site.

An ink tank farm would be established consisting of eight tanks each of 15 tonnes capacity. The tank farm would be isolated from the building housing the printing facility by either fire rated walls or separation distance in accordance with AS1940-2004 *The Storage and Handling of Flammable and Combustible Liquids.*

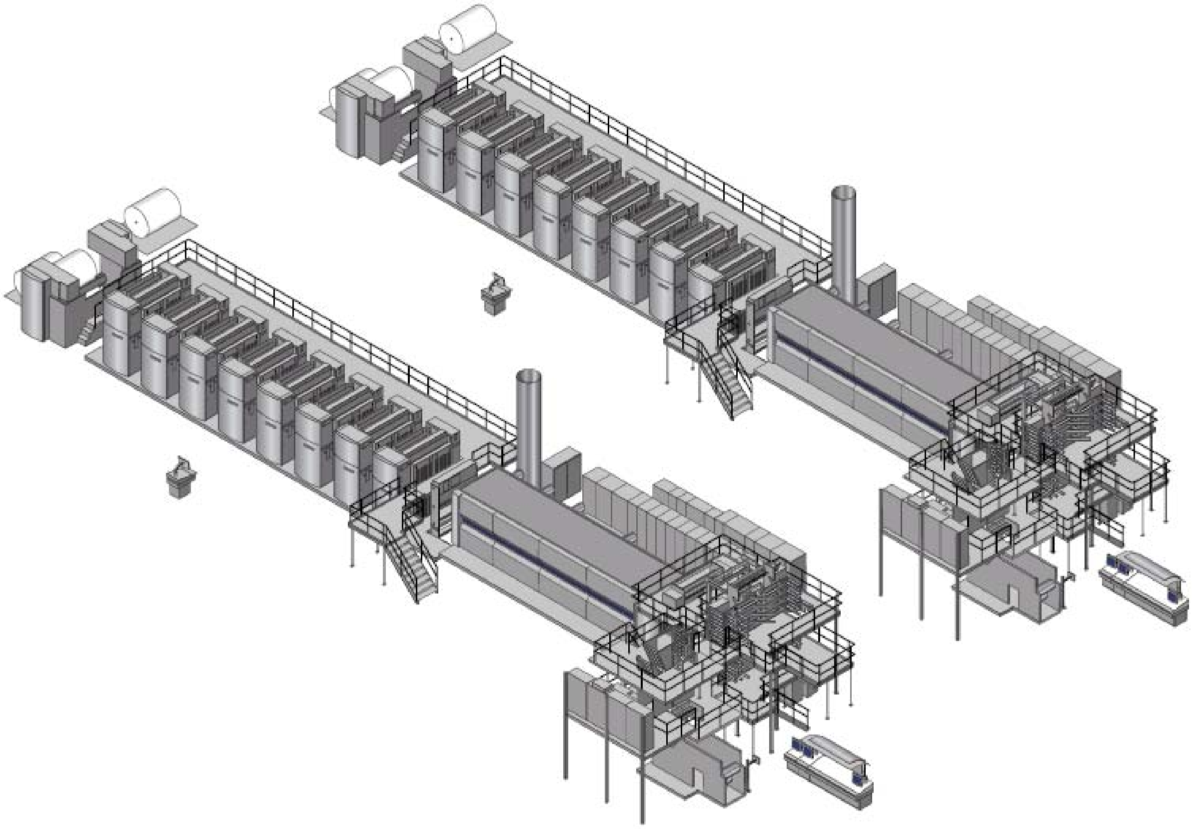
The ink would be delivered by road tanker and would be parked in an open area with drive up ramp and sump to contain 110% of the largest compartment volume of the road tanker.

The ink is transferred by pumps to the dispensing stations and application rolls on the printer. Steel welded piping would be used in the transfer of inks.

The layout of the operational areas of the site is shown in detail on Figure 2-14.

A series of photographs illustrate the typical type of equipment to be used.

Figure 2-2: Three Dimensional Layout of Sunday 4000 Printers



Source Goss International, 2008

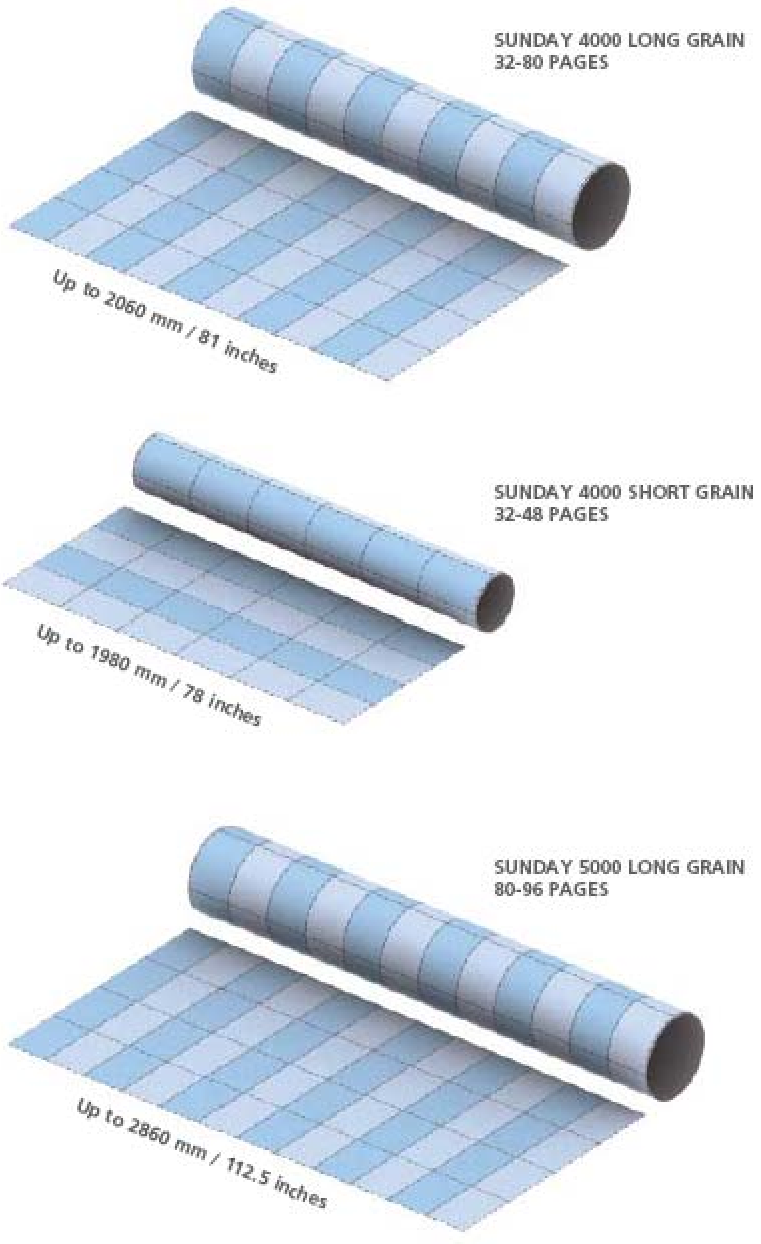
A three-dimensional layout of the Sunday Goss printing systems is provided in Figure 2-2. This printing system can be easily customised to integrate with third-party supplier components such as closed-loop control and auxiliary systems.

Figure 2-3: Zero-speed Splicers and Flying Pasters

Source: Goss International, 2008

Figure 2-3 shows the Splicing system of the Sunday 4000 printer, also known as CS Splicer. The paper rolls used are known as webs, hence the name web offset printing.

Figure 2-4: Printing Size Capabilities of Sunday 4000 Printer



Source: Goss International, 2008

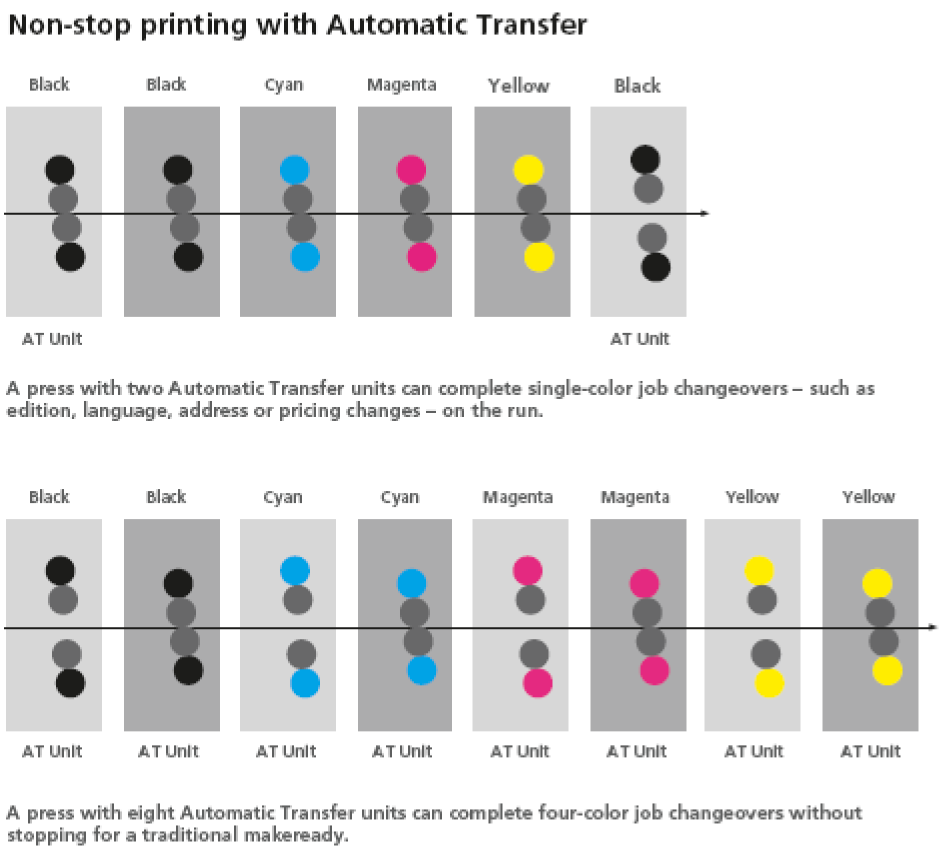
Figure 2-4 shows the various paper sizes that Sunday printers are capable of printing, ranging from a short grain size of 32-48 pages up to long grain size of 80-96 pages.

Figure 2-5: Automatic Transfer Units of Sunday 4000 Printer

Source: Goss International, 2008

Figure 2-5 shows the Automatic Transfer Units of the Sunday printer, where the actual inking process occurs.

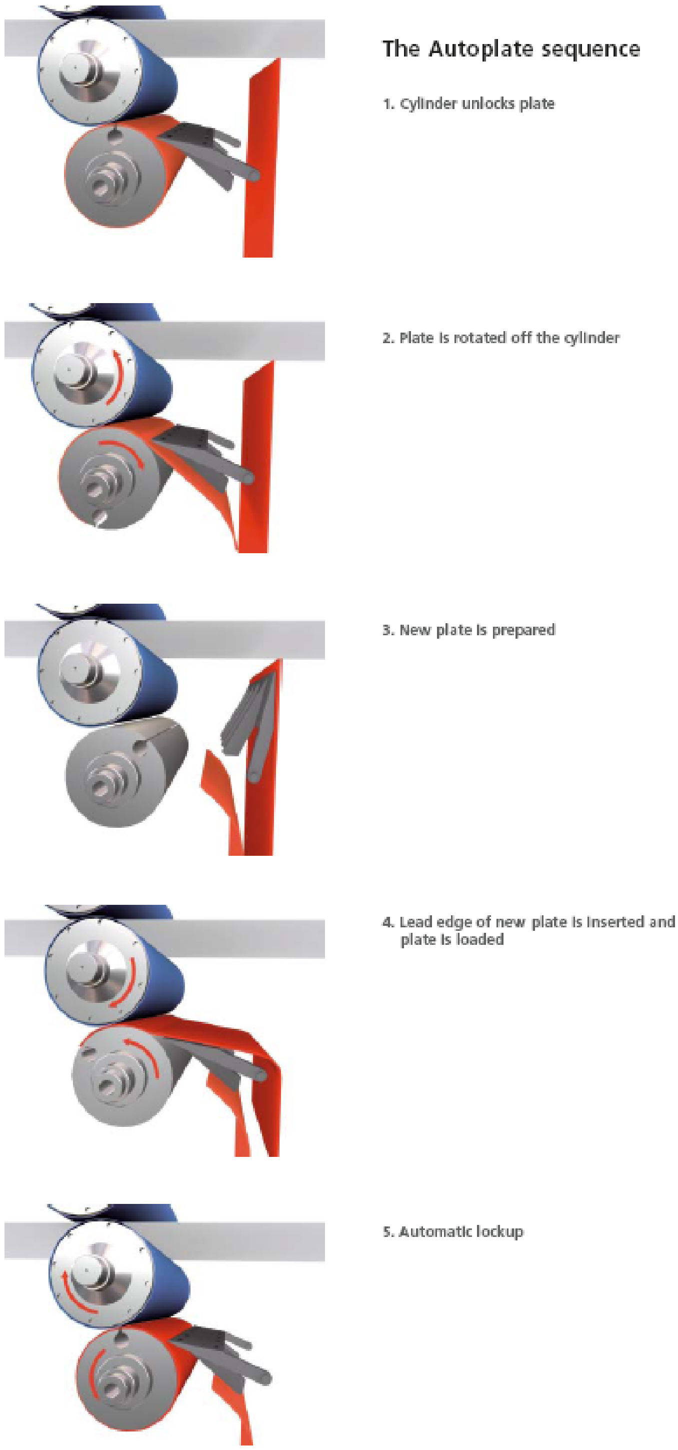
Figure 2-6: Makeready Transfer Units Configuration for Sunday 4000 Printer



Source: Goss International, 2008

Figure 2-6 provides the 2 arrangements of "Makeready" transfer units for the Sunday printer: (a) a 2 Automatic Transfer unit system capable of completing single-colour job changeovers, and (b) an eight automatic transfer unit system capable of establishing 4-colour job changeovers.

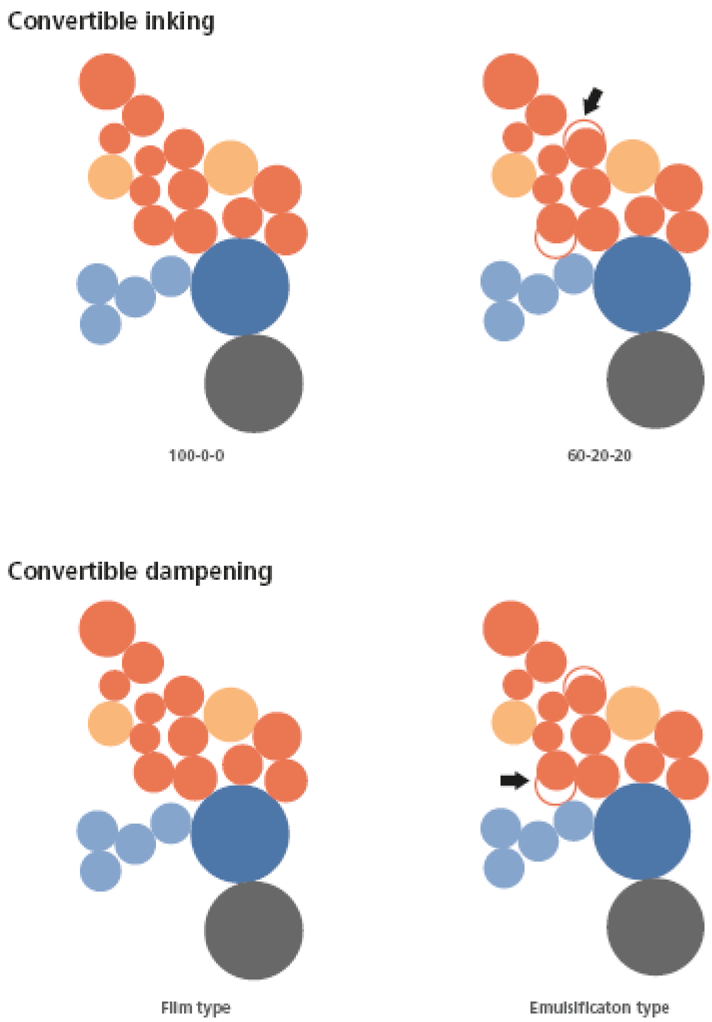
Figure 2-7: Autoplate Sequence of Sunday 4000 Printer



Source: Goss International, 2008

Figure 2-7 shows the autoplate sequence within of the Sunday 4000 printer automatic transfer units. This sequence is only unique to Sunday 4000 Printer series.

Figure 2-8: Hi-Tech Inking and Dampening Techniques of Sunday 4000 Printer



Source: Goss International, 2008

Figure 2-8 provides an illustration of the different high-tech inking and dampening techniques established by the Sunday printers. Convertible inking and dampening are two of the techniques that can be established by the Sunday printer, which are to provide flexibility and adjustment of ink coverage to meet most of the lithographic challenges faced by the printing industry.

Figure 2-9: Replacing Gapless Blankets for Sunday 4000 Printer

Source: Goss International, 2008

Figure 2-9 shows the replacement of the gapless blankets in Sunday printers. This technology has been revolutionised in 1993 and have become a new standard for print quality, establishing minimal to no gaps and taking advantage of the paper surface area.

Figure 2-10: Ecocool Dryer

Source: Goss International, 2008

Once the printing process is done, the printed paper would go through the Ecocool dryer (as shown in Figure 2-10). The evaporated solvents from the heatset inks are recycled to partially fuel the burners, and maximise efficiency. This leads to reduction of energy consumption by up to 30% by comparison to conventional dryer.

Ecocool is the first dryer to fully integrate the chill roll section. The chill rollers immediately positioned after the dryer, preventing condensation occurring on the rollers. Significant reduction of the individual chill rollers diameter improves the print quality, providing sharper angles and tighter contact.

Figure 2-11: Web Offset Prints from Sunday 4000 Printer

Source: Goss International, 2008

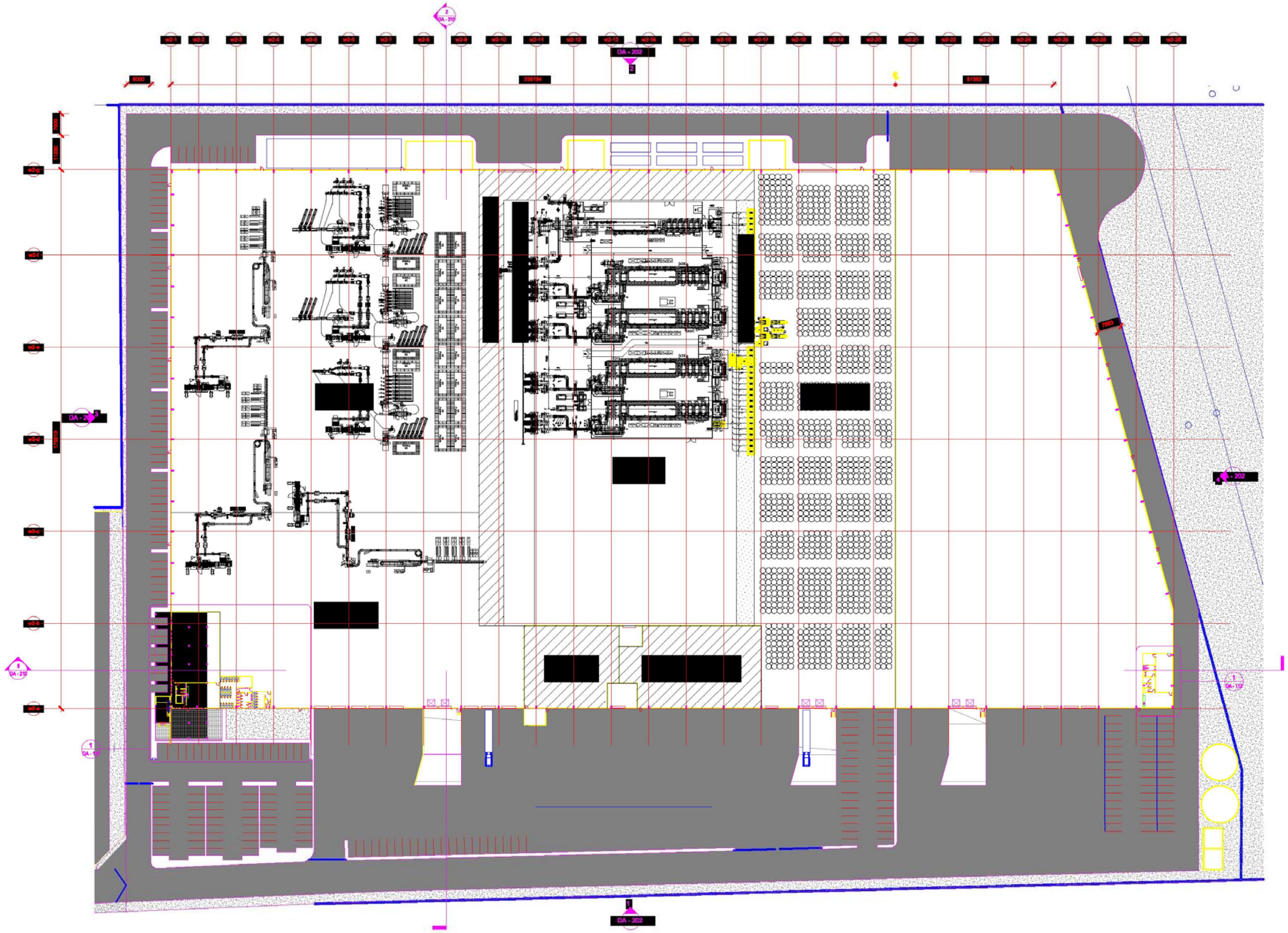
Figure 2-11 shows the web offset prints after the drying stage of the printing process. The prints are then transferred to the pinless folder for packaging.

Figure 2-12: Pinless Folders Integrated within the Sunday 4000 Printer

Source: Goss International, 2008

Once the prints are produced, it is folded by the Pinless Folder integrated with the Sunday 4000 printer (as shown in Figure 2-12). The operation enhances the paper savings by eliminating pin trim requirements and delivers maximum speed, versatility and reliability.

Figure 2-13: Layout of Site Operational Areas



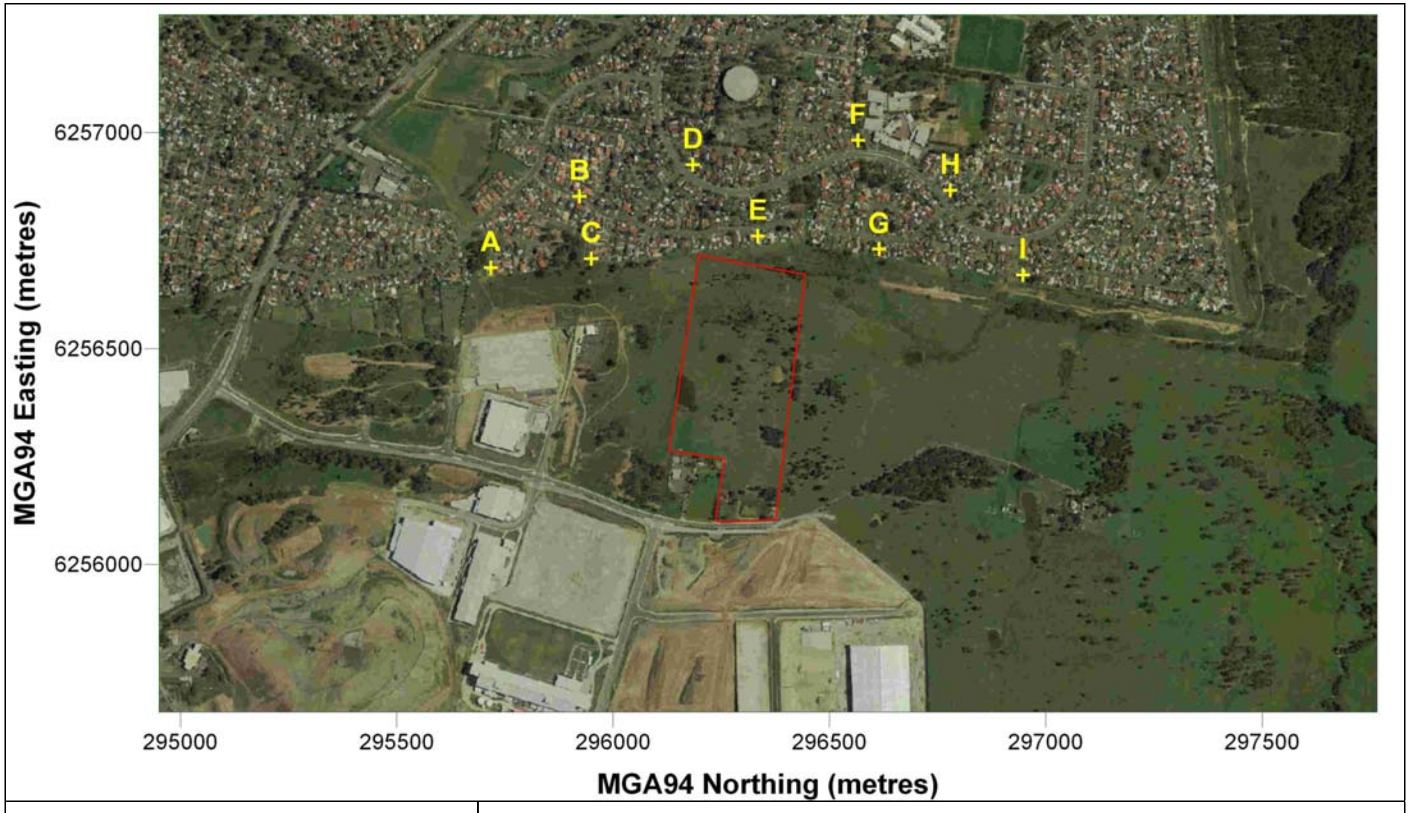
2.3 SITE SURROUNDS

As briefly mentioned previously, the site is located at the edge of an industrial zone area and is predominantly surrounded by residential premises north of the subject site. The following residences were considered as the nearest receptors for the assessment:

- Receptor A – 5 Tipani Place, Erskine Park, 2759;
- Receptor B – 4 Toscano Court, Erskine Park, 2759;
- Receptor C – 6 Ballyleaney Place, Erskine Park, 2759;
- Receptor D – 38 Swallow Drive, Erskine Park, 2759;
- Receptor E – 16 Regulus Street, Erskine Park, 2759;
- Receptor F – 76 Swallow Drive, Erskine Park, 2759;
- Receptor G – 18 Shaula Crescent, Erskine Park, 2759;
- Receptor H – 96 Swallow Drive, Erskine Park, 2759; and
- Receptor I – 8 Pictor Street, Erskine Park, 2759.

Figure 2-14 provides an aerial photograph of the site location and shows the nature of the existing land use within proximity of the site.

Figure 2-14: Site Location



Legend:	Source: © Department of Lands
Site Location (red)	
Receptors (yellow)	

3. RELEVANT LEGISLATION AND GUIDELINES

3.1 LEGISLATION

3.1.1 Protection of the Environment Operations Act, 1997

The Protection of the Environment Operations Act, 1997 (POEO Act) applies the following definitions relating to air pollution:

> ***"Air pollution"*** *means the emission into the air of any air impurity.*
>
> *While "air impurity" includes smoke, dust (including fly ash), cinders, solid particles of any kind, gases, fumes, mists odours, and radioactive substances*

The following clauses of this Act have most relevance to the site:

- *Clause 124 (Operation of Plan)*

  The occupier of any premises who operates any plant in or on those premises in such a manner as to cause air pollution from those premises is guilty of an offence if the air pollution so caused, or any part of the air pollution so caused, is caused by the occupier's failure:

  (a) to maintain the plant in an efficient condition, or

  (b) to operate the plant in a proper and efficient manner,

- *Clause 126 (Dealing with Materials)*

  (1) The occupier of any premises who deals with materials in or on those premises in such a manner as to cause air pollution from those premises is guilty of an offence if the air pollution so caused, or any part of the air pollution so caused, is caused by the occupiers failure to deal with those materials in a proper and efficient manner.

  (2) In this section:

  deal *with materials means process, handle, move, store or dispose of the materials.*

  Materials *includes raw materials, materials in the process of manufacture, manufactured materials, by-products or waste materials*

- *Clause 127 Proof of causing pollution*

  To prove that air pollution was caused from premises within the meaning of Sections 124 – 126, it is sufficient to prove that air pollution was caused on the premises, unless the defendant satisfies the court that the air pollution did not cause air pollution outside the premises.

- *Clause 128 Standards of air impurities not to be exceeded*

  (1) The occupier of any premises must not carry on any activitiy, or operate any plant, in or on the premises in such a manner as to cause or permit the emission at any point specified in or determined in accordance with the regulations of air impurities in excess of:

  (a) The standard of concentration and the rate, or

  (b) The standard of concentration or the rate.

  Prescribed by the regulations in respect of any such activity or any such plant.

  (2) Where neither such a standard nor rate has been so prescribed, the occupier of any premises must carry on any activity, or operate any plant, in or on the premises by such practicable means as may be necessary to prevent or minimise air pollution

The proposed development would be required to meet the above stated requirements.

3.1.2 Protection of Environment Operations (Clean Air) Regulation 2002

Table 3-1 and Table 3-2 provide the Protection of Environment Operations (Clean Air) Regulation limits that would be applicable to the stack emission sources on the subject site.

Table 3-1: Excerpt from Protection of the Environment Operations (Clean Air) Regulation 2002, Schedule 4 – *Standards of concentration for scheduled premises: general activities and plant*

Air Impurity	Activity or Plant	Group	Standard of Concentration
Solid Particles	Any activity or plant (except as listed)	Group 6	50 mg/m^3
Nitrogen dioxide (NO_2) or Nitric oxide (NO) or both, as NO_2 equivalent	Any activity or plant (except boilers, gas turbines and stationary reciprocating internal combustion engines as listed)	Group 6	350 mg/m^3
Volatile organic compounds (VOCs) as n-propane	Any activity or plant involving combustion (except as listed)	Group 6	40 mg/m^3 VOCs or 125 mg/m^3 CO

Table 3-2: Excerpt from Protection of the Environment Operations (Clean Air) Regulation 2002, Schedule 6 – *Standards of concentration for non-scheduled premises*

Air Impurity	Activity or Plant	Group	Standard of Concentration
Solid Particles	Any activity or plant (except as listed)	Group C	100 mg/m^3
		Group C	Ringelmann 1 or 20% opacity

3.2 APPROVED METHODS FOR MODELLING AND ASSESSMENT OF AIR POLLUTANTS IN NEW SOUTH WALES, 2005

The NSW DECC document of "Approved Methods for Modelling and Assessment of Air Pollutants in NSW" (NSW DECC 2005) provides a methodology in assessing air impacts using specific modelling techniques and guidelines. This document also provides concentration limits that receptors are allowed to experience based on modelling outcomes. These limits are provided in Table 3-3.

Table 3-3. Air Impact Assessment Criteria Based on the NSW DECC Approved Methods Guidelines		
Pollutant	**Averaging Period**	**Concentration (µg/m³)**
Sulfur Dioxide (SO_2)	10 minutes	712
	1 hour	570
	24 hours	228
	Annual	60
Nitrogen Dioxide (NO_2)	1 hour	246
	Annual	62
PM_{10}	24 hours	50
	Annual	30
Total Suspended Particulates (TSP)	Annual	90
Deposited Dust	Annual	4 g/m²/month
Carbon Monoxide (CO)	15 minutes	100 mg/m³
	1 hour	30 mg/m³
	8 hours	10 mg/m³

For air pollutants that did not have limits stipulated by NSW DECC Approved methods, the limit on "Good Practice Guide for Assessing Discharges to Air from Industry" published by the Ministry of Environment, New Zealand (MOE NZ 2008) is adopted for best practice. The limit is shown in Table 3-4.

Table 3-4. Additional Air Impact Assessment Criteria Based on the New Zealand Good Practice Guidelines		
Pollutant	**Averaging Period**	**Concentration (µg/m³)**
Aliphatic Hydrocarbons	3 minutes	36.0
Pentane	3 minutes	35.3
Hexane	3 minutes	35.2

4. DISPERSION METEOROLOGY AND LOCAL AIR QUALITY

4.1 DISPERSION METEOROLOGY – SITE REPRESENTATIVE DATA

Data from weather station in Horsley Park Equestrian Centre (Station No. 67119) has been deemed the most appropriate one to be used in this case, as it is found to be the nearest monitoring station to the subject site. Meteorological input figures, such as wind speed, wind direction, temperature and wind standard deviation from the Horsley Park monitoring station were compiled to be used in this assessment.

4.1.1 Introduction to Wind Rose Plots

Wind rose plots show the direction from which the wind is coming from with triangles known as "petals". The petals of the plots in the figure summarise wind direction data into 8 compass directions i.e. north, north-east, east, south-east, etc. The length of the triangles, or "petals", indicates the frequency that the wind blows from the direction presented. Longer petals for a given direction indicate a higher frequency of wind from that direction. Each petal is divided into segments, with each segment representing one of the six wind speed classes. Thus, the segments of a petal show what proportion of wind for a given direction falls into each class. The proportion of time, for which wind speed is less than speeds in the first class (i.e. 0.5 $m.s^{-1}$), when speed is negligible, is referred to as calm hours or "calms". Calms are not shown on a wind rose as they have no direction, but the proportion of time that made up for the period under consideration is noted under each wind rose.

The concentric circles in each wind rose are the axis, which denote frequencies. In comparing the plots it should be noted that the axis varies between wind roses, although all wind roses are the similar in size. The frequencies denoted on the axes of the wind rose are indicated beneath each wind rose.

4.1.2 Wind Observations and Validation

In order to validate the meteorological model used in the dispersion modelling phase of the impact assessment, seasonal wind rose plots from the Horsley Park Equestrian Meteorological Station for the year 2007 were compared against data obtained for 6 years (2002-2007) from the same monitoring site.

Inspection of the two tables show that wind rose plots for 2007 are similar to those for the longer BoM data time period, thus demonstrating that weather patterns in 2007 were not unusual.

It can be seen in Figure 5-1 and Figure 5-2 ("All Seasons" wind rose plot) that both the year 2007 and the longer term Horsley Park Equestrian data exhibit similar wind trends and intensities for autumn and winter. Winds from east and south-east dominate the summer period, while south-east, south and south-west winds are dominant during spring. Overall, the south-west winds occur for more than 20% in both wind rose plots. The average wind speed for all seasons was estimated to be 3.09 m/s.

In summer, the year 2007 and 2002-2007 Horsley Park data shows dominance of moderate winds originating from the south-east and east; both occurring at a frequency of approximately 22 % and 17% respectively.

For wind patterns in autumn at Horsley Park, wind frequency and direction is more focused on south-west winds. Both the long term and short term data showed the same pattern of lower wind speed and higher calms frequency compared to the rest of the period.

The year 2007 winter at Horsley Park experiences the lowest frequency of calms than the 2002-2007 average. Nonetheless, south-west winds dominated on both the 2007 and the longer term BoM data.

Wind patterns in the spring period show that the 2007 Horsley Park data has moderate winds originating from the south, south-east, and south-west. Longer-term BoM data from Horsley Park illustrates a similar wind pattern.

Average seasonal wind patterns for Horsley Park were noted to be similar throughout the year. Longer term data contains wind speeds ranging from 2.76 m/s (autumn) to 3.45 m/s (summer) while the 2007 data wind speeds ranging from 2.47 m/s (autumn) to 3.27 m/s (summer).

Despite the minor differences discussed, which are to be expected, the similarities observed between the two Horsley Park Equestrian datasets indicate that the 2007 meteorological data for Horsley Park is valid for use in the air dispersion modelling.

Figure 4-1 : Wind Rose Plots for the Referenced Meteorological Station - Bureau of Meteorology Horsley Park Equestrian Centre AWS (2007)

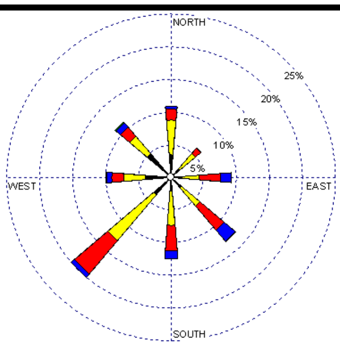
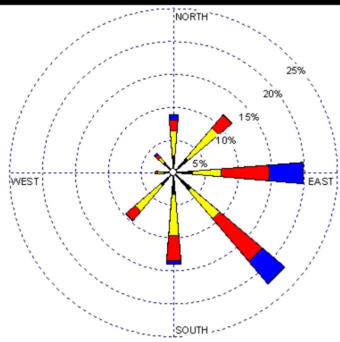
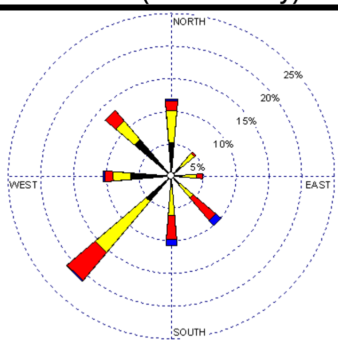
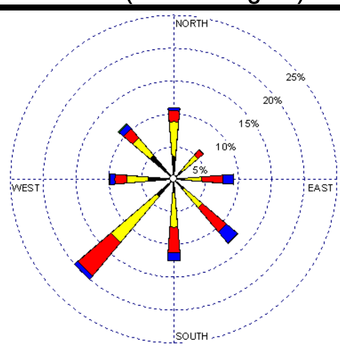
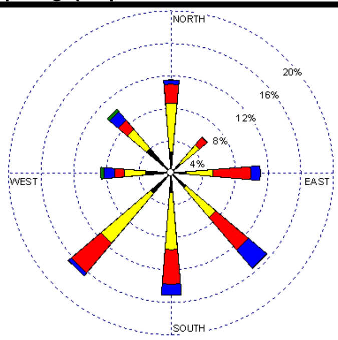
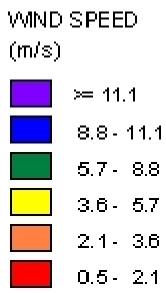
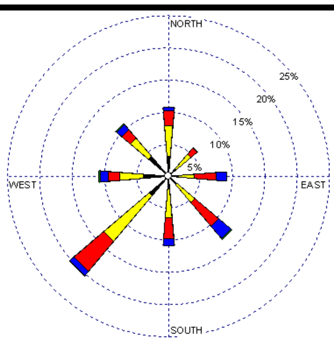
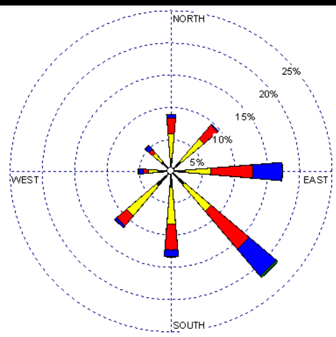
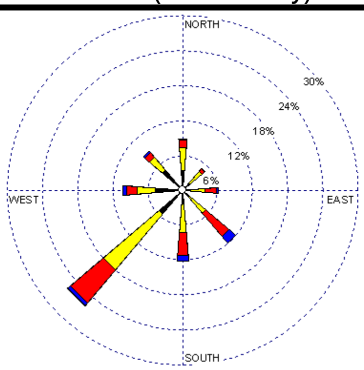
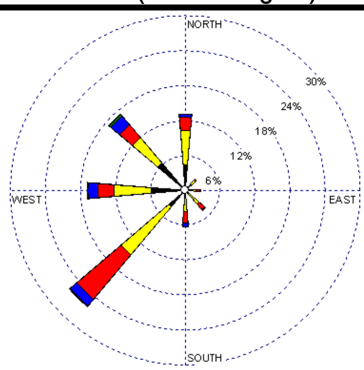
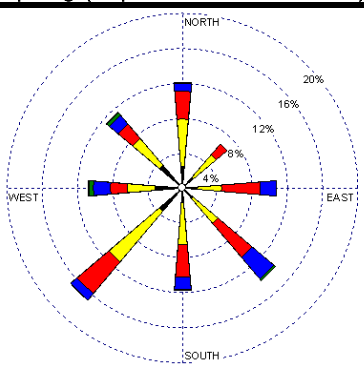
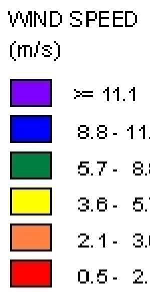
All Seasons	Summer (December – February)
 Average Wind Speed: 3.05 m/s Calms Frequency: 7.49% Axis Frequencies: 5%, 10%, 15%, 20%, 25%	 Average Wind Speed: 3.27 m/s Calms Frequency: 7.00% Axis Frequencies: 5%, 10%, 15%, 20%, 25%
Autumn (March – May)	**Winter (June – August)**
 Average Wind Speed: 2.47 m/s Calms Frequency: 12.69% Axis Frequencies: 5%, 10%, 15%, 20%, 25%	 Average Wind Speed: 3.24 m/s Calms Frequency: 4.85% Axis Frequencies: 5%, 10%, 15%, 20%, 25%
Spring (September – November)	**Legend**
 Average Wind Speed: 3.24 m/s Calms Frequency: 5.40% Axis Frequencies: 4%, 8%, 12%, 16%, 20%	

Figure 4-2 : Wind Rose Plots for the Referenced Meteorological Station - Bureau of Meteorology Horsley Park Equestrian Centre AWS (2002-2007)

All Seasons	Summer (December – February)
	
Average Wind Speed: 3.12 m/s Calms Frequency: 8.60% Axis Frequencies: 5%, 10%, 15%, 20%, 25%	Average Wind Speed: 3.45 m/s Calms Frequency: 6.93% Axis Frequencies: 5%, 10%, 15%, 20%, 25%
Autumn (March – May)	**Winter (June – August)**
	
Average Wind Speed: 2.76 m/s Calms Frequency: 10.67% Axis Frequencies: 6%, 12%, 18%, 24%, 30%	Average Wind Speed: 2.88 m/s Calms Frequency: 10.54% Axis Frequencies: 6%, 12%, 18%, 24%, 30%
Spring (September – November)	**Legend**
	
Average Wind Speed: 3.44 m/s Calms Frequency: 6.10% Axis Frequencies: 4%, 8%, 12%, 16%, 20%	

4.2 Local Site Air Quality

Table 4-1 shows the relevant background concentration data referenced from the NSW DECC Quarterly monitoring reports. These results are considered in assessing the cumulative impacts of the site against the nearest receptors.

The closest background monitoring station to the subject site is found to be the St Marys monitoring station at Mamre Road. Where contaminants were not measured at the St Marys monitoring station, data from alternate stations were provided.

Table 4-1: Existing Background Air Quality Data (2007)

Averaging Time	Value Recorded Within Each Month												
	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sept	Oct	Nov	Dec	Av.
PM_{10} [a] ($\mu g/m^3$)													
24 Hr Max.	45	27	29	39	40	20	12	13	16	26	15	16	24.8
Monthly Av	25	19	17	19	18	10	29	27	31	48	37	21	25.1
CO [b] ($\mu g/m^3$)													
1Hr Max	-	-	1718	1375	2749	2177	2635	2062	1260	1604	1031	802	1741
8 Hr Max.	-	-	1489	916	2291	1833	1833	1604	802	687	458	458	1237
NOx [a] ($\mu g/m^3$)													
1 Hr Max.	85	117	194	192	228	310	384	395	226	201	98	55	207
Monthly Av	17	19	21	19	38	26	40	24	17	15	13	11	21.6
SOx as SO_2 [c] ($\mu g/m^3$)													
1 Hr Max.	18.3	28.8	23.6	13.1	23.6	26.2	44.5	10.5	10.5	15.7	15.7	13.1	20.3
24 Hr Max.	5.2	5.2	2.6	3	3	5	8	3	3	3	5.2	5.2	4.1
Monthly Av	2.6	2.6	2.6	0	0	0	0	0	0	0	2.6	2.6	1.1

Note: [a] St Marys Monitoring Station, Mamre Road
[b] Prospect Monitoring Station, William Lawson Park Myrtle Street
[c] Bringelly Monitoring Station, Ramsay Road

The averages provided in Table 4-1 were used as background concentration data for PM_{10}, NOx and SOx. It is to be noted that these are maximum values observed and would be conservative when used as substitute background concentration data.

Total suspended particulates (TSP) background data were found to be unavailable for this region. Hence, the background average of PM_{10} data was used as substitutes for TSP criteria in order to take into account the finer fraction of the TSP in the air. On the other hand, for dust deposition impact criteria, a conservative background concentration value of 2 g/m^2/month would be added to account for its cumulative impact.

5. AIR DISPERSION MODELLING

5.1 AIR EMISSION SOURCES

The list of site operations provided in Section 2.2 was examined for the potential sources of air emissions. Table 5-1 shows a summary of this analysis as follows.

Table 5-1: Analysis of Air Emission Sources Based on List of Proposed Operations

Activity / Equipment	Potential for Air Emissions
Receipt and Despatch of Raw Materials and Products.	Negligible
Office and Administration.	Negligible.
Web Offset Printing Process: • Paper web feed; • Ink fountain; • Dampening system; • Plate and blanket cylinders; • Dryer; • Chilled rollers; and • Trimmers.	 Potential dust emissions. Potential VOC emissions. Potential VOC emissions. Potential VOC emissions. Potential combustion and VOC emissions. Negligible emissions. Potential dust emissions.
Ancillary Processes: • Heat exchangers; and • Collection and compacting of paper scraps using Pelletiser.	 Negligible emissions. Potential dust emissions.

Operations and activities found to contribute towards air emissions were then further assessed through quantification based on available literature and research data. These are discussed in the Section 5.2.

5.2 PRELIMINARY QUANTIFICATION OF EMISSIONS

5.2.1 Web Offset Printing Process

The following sections discuss the emissions expected from each individual web offset printer on site. As stated in Section 2.2, five (5) web offset printers will be operating at one time with 2 other printers to be introduced in the future. The development proposed 24 hours, 7 days a week operation. Thus, the emission can be expected to be constant at any time fraction.

5.2.1.1 Paper Web Feed

The paper web feed is the section of the printer where paper rolls called "webs" are placed into the feeding point of the printer. Trimming may occasionally be needed in order to achieve the correct width of the web required in order to achieve the right size and quality of the printed material.

The document "Health Effects of Working in Pulp and Paper Mills: Exposure, Obstructive Airways Diseases, Hypersensitivity Reactions, and Cardiovascular Diseases" by Kjell et al (Kjell et al 1995) provides results of dust exposures from various paper mills. In summary, it has been estimated that approximately up to 9.8 mg/m^3 of total dust levels are observed in old paper mills whilst the average was found to be below 3 mg/m^3 for newer operations. The exposure level is minimal when compared to the Australian Safety and Compensation Committee inhalable dust criteria of 10 mg/m^3 for standard 8 hours shift.

In another perspective, the technology and size of paper handling involved are much better and smaller (respectively) compared to what is involved in a normal paper mills.

With reasons that occupational compliance is achieved in terms of dust exposure at paper mills and the fact that the proposed operations would have a better technology in performing trimming and dust collection, it can be confidently stated that dust emissions from this activity can be considered minimal in terms of environmental impacts.

This is also evident from the printing processes studied over the past 20 years by Benbow Environmental at two plants in Western Sydney and a similar large magazine printing facility in South West Sydney.

5.2.1.2 Dampening System

Examination of the Material Safety Data Sheets (MSDS) of the dampening solution to be used, "Varn Webspeed AC", provides the composition breakdown as shown in Table 5-2.

Table 5-2: Composition of Dampening Solution

Components	CAS RN	%
Glycerol	56-81-5	10-30
Glycol	-	10-30
Water	7732-18-5	10-30

No emissions would be expected based on the components of the dampening solution. Hence, the emissions from the dampening system can be considered negligible and have been excluded from the assessment.

5.2.1.3 Plate and Blanket Cylinders

Platemaking Process

Examination of the MSDS' of the platemaking solutions to be used, "182 Developer" and "850S Plate Finisher", provides the composition breakdown as shown in Table 5-3.

Table 5-3: Composition of Platemaking Solutions

Components	CAS RN	%
182 Developer		
Ethylene glycol	107-21-1	5-10
Sodium silicate	1344-09-8	5-10
Glycerol	56-81-5	5-10
Trisodium phosphate	7601-54-9	1-5
850S Plate Finisher		
Boric acid	10043-35-3	1-5
Sodium 2-biphenylate	132-27-4	0.1-<1
Benzenesulfonic acid, hexadecyl (sulfophenoxy)-, disodium salt	65143-89-7	0.1-<1

No emissions would be expected to be emitted from this area due to the nature of the components and the extremely low concentrations of the potential source of emissions. Hence, emissions from this area have been considered negligible and have been excluded from the assessment.

Wash Operations

The document "VOC Emission Calculation Methodology for Lithographic Printing Operations" published by the South Coast Air Quality Management District of California USA (SCAQMD 2001) provides a methodology for estimating emissions from the ink fountain based on the following equation:

Equation 5-1: $$E_{wash} = QxOCx(1 - 0.4C_{overall})$$

Where,

E_{wash} = Total VOC emissions from the wash solution
Q = Quantity of ink used in kg
OC = Organic compound content in wt/wt%
$C_{overall}$ = Control system overall efficiency (Equation 5-4)

Examination of the MSDS of the washing solution, "Varn Natural Wash", and "Varn A230 Wash", provides the composition breakdown as shown in Table 5-4.

Table 5-4: Composition of Washing Solution		
Components	CAS RN	%
Varn Natural Wash		
Isoparaffins petroleum hydrotreated HFP	64742-47-8	30-60
Low volatility solvent		30-60
Petroleum distillates	64742-48-9	<10
Naptha petroleum, heavy, hydrotreated	64742-48-9	<10
Emulsifiers and wetters		<10
Varn A230 Wash		
White spirit	8052-41-3	>60
Aromatic hydrocarbon solvent	64742-95-6	<10
Sorbitan monooleate	1338-43-8	<10

An average of 60% organic compound content has been used in the calculation.

5.2.1.4 Dryer

Ink Drying Emissions

The document "VOC Emission Calculation Methodology for Lithographic Printing Operations" published by the South Coast Air Quality Management District of California USA (SCAQMD 2001) provides a methodology for estimating emissions from the main printing process in which emissions are assumed to be retained and be carried over to the dryer based on the following equation:

Equation 5-2: $$E_{print} = Qx[OCx(1-RF)]x(1-C_{overall})$$

Where,

- E_{print} = Total VOC emissions from the printing process carried over to the dryer
- Q = Quantity of ink applied in kg
- OC = Organic compound content in ink in wt/wt%
- RF = Retention factor for OC in inks, in decimal
- $C_{overall}$ = Control system overall efficiency in decimal, which can be calculated according to the following equation:

Equation 5-3: $$C_{overall} = C_{cap}xC_{des}$$

Where,

- C_{cap} = Control system capture efficiency in decimal
- C_{des} = Control equipment destruction efficiency in decimal

The composition breakdown of the ink used is provided in Table 5-5, which shows that the organic compound content would be up to 30%.

Examination of the MSDS of the ink stored in the fountain has provided the composition breakdown as shown in Table 5-5.

Table 5-5: Composition of Heatset Offset Printing Ink

Components	CAS RN	%
Diarylide yellow anilide pigment	Proprietary	10-20
Carbon black pigment	Proprietary	12-20
C.I. pigment red 57:1	Proprietary	10-20
Copper phthalocyanine (blue) pigment	147-14-8	10-20
Phenolic modified resin	28470-78-2	10-30
Petroleum resin	Mixture	1-10
Linseed oil	67700-51-0	1-10
Aliphatic petroleum distillates	64742-47-8	10-30
Aliphatic petroleum distillates	64742-46-7	0-15
Wax dispersion	Mixture	1-10
Miscellaneous additives	Mixture	<5

<u>Combustion Emissions from the Dryer using Natural Gas as Fuel</u>

The documents "Emission Estimation Technique Manual (EETM) for Combustion in Boilers" published by the National Pollutant Inventory (NPI DEH 1999) and "Chapter 1: External Combustion Sources – Natural Gas Combustion" published by the U.S. Environmental Protection Agency (USEPA 1998) were used to provide guidance in calculating the combustion emissions expected from the dryer section of the web offset printing process.

The NPI EETM provides the data on the major pollutants emitted during the combustion of natural gas using tangential gas fired boilers (which is expected to be similar to the mechanism used in dryers), which are shown in Table 5-6.

Table 5-6: Referenced Emission Factors for the Estimation of Natural Gas Combustion Products from the National Pollutant Inventory Database

Pollutant	Emission Factor (kg per tonne of natural gas used)	Proportion
Carbon monoxide	5.20E-01	11.9%
NOx	3.68E+00	84.5%
Sulfur dioxide	3.50E-02	0.8%
Total VOCs	1.19E-01	2.7%
TOTAL	4.35E+00	100%

Estimation of Emission Rates for Individual VOCs

The referenced NPI EETM did not contain any data on individual VOCs that can be emitted. The referenced USEPA AP 42 document was then consulted in identifying the major VOC components that could be emitted from the combustion process. This has been summarised in Table 5-7.

Table 5-7: Referenced VOC Composition Breakdown from the USEPA AP 42 Database

Pollutant	Emission Factor (lbs per scf)	Proportion
Butane	2.10E+00	18.75%
Ethane	3.10E+00	27.68%
Hexane	1.80E+00	16.07%
Pentane	2.60E+00	23.21%
Propane	1.60E+00	14.29%
TOTAL	1.12E+01	100%

The proportions estimated in Table 5-7 have been used as multipliers in estimating the relevant emission factor for each VOC.

5.2.1.5 Trimmers

As discussed in Section 5.2.1.1, dust produced from paper off cuts using trimmers is very minimal. This has been excluded from the assessment.

5.2.2 Ancillary Processes

5.2.2.1 Pelletiser

The production of pellets from paper off cuts may potentially release dust. However, as discussed in Section 5.2.1.1, dust produced from paper off cuts using trimmers can be assumed to be negligible. Furthermore, the compaction of paper off cuts may not produce dust equivalent to what is produced during the trimming processes. It can be deduced that dust emissions from the palletiser would be negligible and can be excluded from the assessment.

The pelletiser operation would be enclosed in the building and air separated from the trim would be released into the building space.

5.3 CALCULATION OF AIR EMISSION RATES

The following emission sources have been considered in estimating the air emission rates for the assessment.

- Web Offset Printing Process:
  - ► Plate and Blanket Cylinders – Washing Operations;
  - ► Dryer:
    - – Evaporated Ink Emissions; and
    - – Natural Gas Combustion Emissions.

Each emission source has been discussed further in the following sub-sections, which include assumptions and estimates made in deriving the emission rates.

5.3.1 Plate and Blanket Cylinders – Washing Operations

The wash operation is divided into 2 parts. One is automatic wash, while the other one is manual wash. The amount of automatic wash is 7 kL per annum, while manual wash is 15 kL per annum.

The following assumptions have been made in estimating the emission rates, as follows:

- Due to similarity in some chemical properties, both wash solutions were treated as Jet Fuel A-1, flash point of 38°C;
- The wash contains 60 % organic compound (VOC) content, whereby 40% of this would be carried over to the heatset dryers and most would be degraded during the drying process;
- Control system overall efficiency is 99.0%, based on 99.5% capture rate and 99.5% destruction rate; and
- The Ink MSDS provides a density of 0.834 kg/L.

5.3.1.1 Stack Emissions

The estimated stack VOC emission rate from the automatic washing operations that are captured but not destroyed is calculated as:

$$E_{wash} = (7{,}000)(0.6)(1-[0.4][0.99])$$

$$E_{wash} = 2115.7 \text{ kg/year}$$

$$E_{wash} = 0.067 \text{ g/s}$$

The equation took into account that 40% of VOC from wash emissions is carried over to the heatset dryer whereby 99.5% of this would be destroyed during the VOC recirculation process. Utilising the Jet Fuel combustion factor for the degradation of the wash, the additional emission rates going through the stacks are shown in Table 5-8.

Table 5-8: NPI factor for Jet Fuel combustion for training fires, JP8 = Jet A-1, FP = 38oC		
Substances	Emission Factor (kg/kL)	Emission Rates (g/s)
Carbon Monoxide (CO)	538	0.0477676
Sulfur Dioxide (SO_2)	0.81	0.0000719
Nox	4	0.0003551
PM2.5	117	0.0103881
PM10	122	0.0108321
VOCs	16	0.0014384

5.3.1.2 Fugitive Emissions

The capture efficiency is 99.5%, thus giving 0.5% fugitive emission from the 40% amount of automatic wash operation. From the remaining 60% of the automatic wash, conservative assumption of 1% evaporation is taken. The same assumption for the manual wash evaporation is applied.

The fugitive VOCs from the automatic wash operation would be diluted within the press area. Using a conservative assumption of the whole 5 printer areas giving VOCs emissions, the area ratio between the 5 printers and the press area is taken, and applied as a dilution factor. This quantifies the building fugitive emission of 0.0026 g/s. The assumption of the 5 printer areas is very conservative, as in reality, the wash operation would probably be conducted in a space smaller than 10% of the total printer area.

Scenario 1 would take into account the total fugitive release as stated in the previous paragraph. Scenario 2 would have the fugitive emission multiplied with a factor of 1.4, to assume the worst impact possible.

Examination of the MSDS suggests that the species of VOCs released from this emission source would either be aliphatic hydrocarbons (C_1 – C_4), pentane or hexane.

5.3.2 Dryer

5.3.2.1 Ink Drying

The following assumptions have been made in estimating the emission rates from ink drying process:

- The quantity of ink used by the subject site per annum is 1,750 kL;
- The ink contains 30% organic compound (VOC) content (as discussed in Section 5.2.1.4);
- The Ink MSDS provides a density of 0.9 to 1.1 kg/L, equating to an average density of 1 kg/L;
- The retention factor of ink is 0.20 (default value from the referenced literature);
- Control system capture efficiency is 99.5% (default value from the referenced literature); and
- Control equipment destruction efficiency is 99.5%.

The estimated total stack VOC emission rate for the dryer that are captured but not destroyed is calculated as:

$$E_{print} = (1{,}750{,}000)\left[(0.30)(1-0.20)\right](1-[0.995][0.995]) \text{ kg/year}$$

$$E_{print} = 4.02 \times 10^3 \text{ kg/year}$$

$$E_{print} = 0.13 \text{ g/s}$$

The emission rate calculated above is true for 5 printers. Thus the emission rate for 1 printer is 0.027 g/s.

As previously noted, the 99.5% of the ink VOC content would be destroyed. Examination of the Heatset Ink MSDS suggests that the petroleum distillates components in the ink would behave similar to diesel fuel. NPI factor of diesel combustion is adopted in the simulation and shown in Table 5-9.

Table 5-9: Emission rates of Heatset Ink degradation

Substances	Emission Factor (kg/m^3)	Ink VOC amount (m^3/yr)	Emission Rates (g/s)
Carbon Monoxide (CO)	10	525	1.665E-01
Sulfur Dioxide (SO2)	0.017		2.830E-04
NOx	6.7		1.115E-01
PM10	2.1		3.496E-02
VOCs	0.82		2.730E-03

5.3.2.2 Natural Gas Combustion Emissions

The dryer is operated by natural gas combustion and therefore, there will be emissions from fuel usage, also emitted from the stacks. From equipment specification, natural gas usage rate would be 2,100 kJ/s or approximately equal to 1,234 T p/a. Table 5-10 shows the list of emission rates estimated by using the referenced NPI emission factors in Table 5-6.

Table 5-10: Estimated Emission Rates from Natural Gas Combustion Based on NPI Emission Factors on individual stack

Pollutant	Emission Rates (g/s)
Carbon monoxide	2.04E-02
NOx	1.44E-01
Sulfur dioxide	1.37E-03
Total VOCs	4.66E-03
PM_{10}	6.26E-03

5.4 AIR EMISSIONS INVENTORY

Table 5-11 summarises the air emission sources and rates used in the air dispersion modelling obtained by combining the emission rates calculated in the previous section to determine the overall emission rate from dryer stacks and fugitive emissions. The total VOC has been broken down into individual hydrocarbons according to Table 5-7 and those containing 1 to 4 carbon atoms (C_1 – C_4) were grouped as Aliphatic Hydrocarbons.

Table 5-11: Air Emissions Inventory – Point Sources							
Emission Source	Source Type	Pollutant	Emission Rates (g/s)	Temperature (ºC)	Exit Velocity (m/s)	Stack Height (m)	Diameter (m)
Dryer Stack No. 1-7	Point	CO	4.69E-02	200	25	18	0.5
		NOx	5.12E-02				
		SOx	3.45E-04				
		Aliphatic Hydrocarbons	5.79E-02				
		Pentane	9.99E-03				
		Hexane	1.53E-02				
		PM_{10}	1.04E-02				

Table 5-12: Air Emissions Inventory – Volume Sources (Fugitive Emissions)						
Emission Source	Source Type	Pollutant	Emission Rates (g/s)	Horizontal Spread (m)	Vertical Spread (m)	Height (m)
Scenario 1	Volume	Wash VOCs	3.83E-02	205	49	13
Scenario 2	Volume	Wash VOCs	5.36E-02	205	49	13

Note: Scenario 1 applies during operation of 5 printer operation, while scenario 2 applies during 7 printing operation

5.5 Comparison to the Protection of Environment and Operations (Clean Air) Regulation Limits

A comparison to the Protection of Environment Operations (Clean Air) Regulation limits has been made in Table 5-13. Both scheduled and non-scheduled premises limits were used in the comparison.

Table 5-13: Comparison of Calculated Stack Concentrations against relevant limits in the Protection of Environment Operations (Clean Air) Regulation 2002

Sources	Compounds	Emission rates (g/s)	Stack Conc. (mg/Am^3)	Stack Conc. (mg/Nm^3)	POEO Limits (mg/m^3)
Dryer Stack no. 1-7	CO	4.69E-02	9.55	16.55	125
	NO_2	5.12E-02	10.42	18.06	350
	SO_2	3.45E-04	0.070	0.12	1000
	VOCs	9.54E-02	19.43	33.67	40
	PM_{10}	1.04E-02	2.12	33.67	50

No non-compliances were found based on the results of the calculations established. However, analysis of the limits found that it is critical to achieve a VOC destruction efficiency of 99.5% at each of the dryers in order to meet compliance with the total VOC limits (details discussed in Section 5.3.1.1).

5.6 Predictive Air Modelling

5.6.1 Simulation Model Used

AUSPLUME (version 6.0) Gaussian Plume model is used to simulate the impact associated with air pollutants emitted from the proposed site to the site's surroundings. AUSPLUME is a steady state plume model that is accepted by NSW DECC in regards to air impact assessment, where local topography does not adversely affect plume migration.

AUSPLUME utilises consecutive meteorological data records to define the conditions for plume rise, transport, diffusion and deposition. The basis of this model is the straight line, steady state Gaussian plume equation.

The model was used to estimate the impact concentrations for each hour of input meteorology and calculated using averaging times as consistent with NSW DECC criteria. Atmospheric dispersion curves and surface roughness heights were selected which specifically represented the industrial conditions present.

5.6.2 Meteorological Input Data

Meteorological conditions are the primary variable affecting the transport and dispersion of pollutants from an emissions source. Therefore it is crucial to use meteorological data that is specifically representative of the site and the surrounding region in general.

The meteorological data file described in Section 4.1 was used as an input to the AUSPLUME modelling program. With 8740 individual temperature, wind speed and wind direction records obtained over the year of 2007, the file was 97.6% complete. This ensures that sufficient meteorological data was available to guarantee that worst case conditions were adequately represented and considered in the simulation.

5.6.3 Terrain and Building Wake Effects

The terrain around subject site plays a role in the modelling simulation. The current series of topographic map for the region was digitised and incorporated into the air dispersion model. A spacing of 29 m grid spacing was used for the digitised terrain map, achieving a total grid size of 98 x 57.

Building wake effects have not been considered as it is expected that it would contribute very little to the modelling simulation.

5.6.4 Modelling Techniques

All air pollutants are simulated to run under 24 hours, 7 days per week operations. The dryer stack and the fugitive emissions from the printing and washing processes were found to be the major air emission sources from the subject site, and hence were assigned to release emissions constantly throughout all hours of the modelling year.

Emission rates were calculated based on the most relevant emission rates data available. Conservative assumptions were used where a degree of uncertainty were found. Emission sources were modelled based on the methodology provided by the NSW DECC Approved Methods.

5.6.5 Modelling Scenarios

The following scenarios were considered in the modelling:

- Scenario 1: 24 Hours Per Day, 7 Days Per Week Operations with:
  - 5 Dryers Operating (Dryers 1 to 5 Only); and
  - Fugitive Emissions.

- Scenario 2: 24 Hours Per Day, 7 Days Per Week Operations with:
  - All Dryers Operating (Dryers 1 to 7); and
  - Fugitive Emissions.

5.7 AIR DISPERSION MODELLING RESULTS

Table 5-14 and Table 5-15 show the air dispersion modelling results for Scenario 1 and 2 respectively. These are provided overleaf.

Table 5-14 : Scenario 1 Modelling Results using Ausplume - Incremental Impacts

Pollutant	Averaging Time	Concentrations at Receptors (mg/m^3)									Criteria (mg/m^3)	Pass
		A	B	C	D	E	F	G	H	I		
CO	15 min	2.59E-03	2.65E-03	3.71E-03	3.60E-03	3.72E-03	2.95E-03	2.77E-03	2.44E-03	2.21E-03	1.00E+02	Yes
	1 hour	3.15E-03	5.22E-03	5.69E-03	5.63E-03	6.12E-03	5.49E-03	8.88E-03	7.15E-03	6.68E-03	3.00E+01	Yes
	8 hours	1.68E-03	1.91E-03	2.67E-03	2.80E-03	3.05E-03	2.97E-03	2.64E-03	2.10E-03	1.39E-03	1.00E+01	Yes
Dust Deposition	Annual	1.86E-01	2.68E-01	4.01E-01	3.21E-01	3.83E-01	3.51E-01	3.55E-01	2.94E-01	1.48E-01	2 g/m2/month	Yes
NOx	1 hour	3.44E-03	5.70E-03	6.21E-03	6.14E-03	6.67E-03	5.99E-03	9.69E-03	7.80E-03	7.29E-03	2.46E-01	Yes
	Annual	1.30E-04	1.89E-04	2.78E-04	2.37E-04	2.82E-04	2.68E-04	2.69E-04	2.27E-04	1.17E-04	6.20E-02	Yes
PM10	24 hours	2.20E-04	3.04E-04	4.45E-04	3.52E-04	4.19E-04	3.91E-04	3.82E-04	3.05E-04	2.00E-04	5.00E-02	Yes
	Annual	2.64E-05	3.85E-05	5.66E-05	4.81E-05	5.73E-05	5.45E-05	5.48E-05	4.62E-05	2.39E-05	3.00E-02	Yes
SOx	10 min	2.06E-05	2.10E-05	2.93E-05	2.84E-05	2.90E-05	2.33E-05	2.19E-05	1.94E-05	1.76E-05	7.12E-01	Yes
	1 hour	1.45E-05	1.48E-05	2.08E-05	2.03E-05	2.10E-05	1.65E-05	1.55E-05	1.37E-05	1.24E-05	5.70E-01	Yes
	24 hours	6.95E-06	9.00E-06	1.20E-05	1.10E-05	1.26E-05	9.36E-06	9.21E-06	7.22E-06	6.09E-06	2.28E-01	Yes
	Annual	9.03E-07	1.24E-06	1.80E-06	1.59E-06	1.96E-06	1.75E-06	1.73E-06	1.46E-06	8.49E-07	6.00E-01	Yes
ALP	3 min	8.89E-03	6.63E-03	1.07E-02	6.79E-03	1.21E-02	8.74E-03	1.12E-02	9.18E-03	9.96E-03	3.60E-02	Yes
Pentane	3 min	3.40E-03	2.54E-03	4.09E-03	2.60E-03	4.62E-03	3.34E-03	4.29E-03	3.51E-03	3.81E-03	3.53E-02	Yes
Hexane	3 min	2.35E-03	1.76E-03	2.83E-03	1.80E-03	3.20E-03	2.31E-03	2.97E-03	2.43E-03	2.64E-03	3.52E-02	Yes

Table 5-15 : Scenario 2 Modelling Results using Ausplume - Incremental Impacts

Pollutant	Averaging Time	Concentrations at Receptors (mg/m^3)									Criteria (mg/m^3)	Pass
		A	B	C	D	E	F	G	H	I		
CO	15 min	3.57E-03	3.59E-03	4.97E-03	4.82E-03	4.77E-03	4.06E-03	3.79E-03	3.39E-03	3.12E-03	1.00E+02	Yes
	1 hour	4.51E-03	6.95E-03	6.37E-03	6.88E-03	7.39E-03	6.85E-03	9.05E-03	7.35E-03	7.54E-03	3.00E+01	Yes
	8 hours	2.23E-03	2.60E-03	3.50E-03	3.67E-03	4.06E-03	3.70E-03	3.39E-03	2.98E-03	2.00E-03	1.00E+01	Yes
Dust Deposition	Annual	1.77E-02	2.61E-02	3.82E-02	3.16E-02	3.73E-02	3.36E-02	3.69E-02	3.05E-02	1.52E-02	2 g/m2/month	Yes
NOx	1 hour	4.92E-03	7.58E-03	6.95E-03	7.51E-03	8.06E-03	7.48E-03	9.87E-03	8.02E-03	8.23E-03	2.46E-01	Yes
	Annual	1.75E-04	2.60E-04	3.75E-04	3.30E-04	3.86E-04	3.62E-04	3.94E-04	3.32E-04	1.70E-04	6.20E-02	Yes
PM10	24 hours	2.97E-04	4.02E-04	5.83E-04	5.05E-04	5.70E-04	5.33E-04	5.60E-04	4.48E-04	2.90E-04	5.00E-02	Yes
	Annual	3.56E-05	5.29E-05	7.62E-05	6.70E-05	7.85E-05	7.37E-05	8.02E-05	6.76E-05	3.45E-05	3.00E-02	Yes
SOx	10 min	2.48E-05	2.69E-05	3.00E-05	3.22E-05	3.73E-05	3.78E-05	3.91E-05	2.84E-05	2.84E-05	7.12E-01	Yes
	1 hour	2.00E-05	2.04E-05	2.82E-05	2.76E-05	2.82E-05	2.31E-05	2.15E-05	1.90E-05	1.75E-05	5.70E-01	Yes
	24 hours	9.44E-06	1.22E-05	1.62E-05	1.56E-05	1.73E-05	1.32E-05	1.35E-05	1.05E-05	8.73E-06	2.28E-01	Yes
	Annual	1.22E-06	1.70E-06	2.44E-06	2.21E-06	2.67E-06	2.41E-06	2.48E-06	2.09E-06	1.23E-06	6.00E-01	Yes
ALP	3 min	1.24E-02	9.29E-03	1.50E-02	9.51E-03	1.69E-02	1.22E-02	1.57E-02	1.29E-02	1.40E-02	3.60E-02	Yes
Pentane	3 min	4.76E-03	3.55E-03	5.72E-03	3.64E-03	6.47E-03	4.68E-03	6.00E-03	4.91E-03	5.33E-03	3.53E-02	Yes
Hexane	3 min	3.29E-03	2.46E-03	3.96E-03	2.52E-03	4.48E-03	3.24E-03	4.16E-03	3.40E-03	3.69E-03	3.52E-02	Yes

Table 5-16 : Scenario 1 Modelling Results using Ausplume - Cumulative Impacts												
Pollutant	Averaging Time	Concentrations at Receptors (mg/m³)									Criteria (mg/m³)	Pass
		A	B	C	D	E	F	G	H	I		
CO	15 min	1.74E+00	1.74E+00	1.74E+00	1.74E+00	1.74E+00	1.74E+00	1.74E+00	1.74E+00	1.74E+00	1.00E+02	Yes
	1 hour	1.74E+00	1.75E+00	1.75E+00	1.75E+00	1.75E+00	1.75E+00	1.75E+00	1.75E+00	1.75E+00	3.00E+01	Yes
	8 hours	1.24E+00	1.24E+00	1.24E+00	1.24E+00	1.24E+00	1.24E+00	1.24E+00	1.24E+00	1.24E+00	1.00E+01	Yes
Dust Deposition	Annual	2	2	2	2	2	2	2	2	2	4 g/m2/month	Yes
NOx	1 hour	2.07E-01	2.07E-01	2.07E-01	2.07E-01	2.07E-01	2.07E-01	2.07E-01	2.07E-01	2.07E-01	2.46E-01	Yes
	Annual	2.17E-02	2.18E-02	2.19E-02	2.18E-02	2.19E-02	2.19E-02	2.19E-02	2.18E-02	2.17E-02	6.20E-02	Yes
PM10	24 hours	2.50E-02	2.51E-02	2.52E-02	2.52E-02	2.52E-02	2.52E-02	2.52E-02	2.51E-02	2.50E-02	5.00E-02	Yes
	Annual	2.51E-02	2.51E-02	2.52E-02	2.51E-02	2.52E-02	2.52E-02	2.52E-02	2.51E-02	2.51E-02	3.00E-02	Yes
SOx	10 min	2.03E-02	2.03E-02	2.03E-02	2.03E-02	2.03E-02	2.03E-02	2.03E-02	2.03E-02	2.03E-02	7.12E-01	Yes
	1 hour	2.03E-02	2.03E-02	2.03E-02	2.03E-02	2.03E-02	2.03E-02	2.03E-02	2.03E-02	2.03E-02	5.70E-01	Yes
	24 hours	4.11E-03	4.11E-03	4.11E-03	4.11E-03	4.11E-03	4.11E-03	4.11E-03	4.11E-03	4.11E-03	2.28E-01	Yes
	Annual	1.10E-03	1.10E-03	1.10E-03	1.10E-03	1.10E-03	1.10E-03	1.10E-03	1.10E-03	1.10E-03	6.00E-01	Yes
ALP	3 min	8.89E-03	6.63E-03	1.07E-02	6.79E-03	1.21E-02	8.74E-03	1.12E-02	9.18E-03	9.96E-03	3.60E-02	Yes
Pentane	3 min	3.40E-03	2.54E-03	4.09E-03	2.60E-03	4.62E-03	3.34E-03	4.29E-03	3.51E-03	3.81E-03	3.53E-02	Yes
Hexane	3 min	2.35E-03	1.76E-03	2.83E-03	1.80E-03	3.20E-03	2.31E-03	2.97E-03	2.43E-03	2.64E-03	3.52E-02	Yes

Table 5-17 : Scenario 2 Modelling Results using Ausplume - Cumulative Impacts												
Pollutant	Averaging Time	Concentrations at Receptors (mg/m³)									Criteria (mg/m³)	Pass
		A	B	C	D	E	F	G	H	I		
CO	15 min	1.74E+00	1.74E+00	1.75E+00	1.75E+00	1.75E+00	1.75E+00	1.74E+00	1.74E+00	1.74E+00	1.00E+02	Yes
	1 hour	1.75E+00	1.75E+00	1.75E+00	1.75E+00	1.75E+00	1.75E+00	1.75E+00	1.75E+00	1.75E+00	3.00E+01	Yes
	8 hours	1.24E+00	1.24E+00	1.24E+00	1.24E+00	1.24E+00	1.24E+00	1.24E+00	1.24E+00	1.24E+00	1.00E+01	Yes
Dust Deposition	Annual	2	2	2	2	2	2	2	2	2	4 g/m2/month	Yes
NOx	1 hour	2.07E-01	2.07E-01	2.08E-01	2.08E-01	2.08E-01	2.08E-01	2.08E-01	2.07E-01	2.07E-01	2.46E-01	Yes
	Annual	2.18E-02	2.19E-02	2.20E-02	2.19E-02	2.20E-02	2.20E-02	2.20E-02	2.19E-02	2.18E-02	6.20E-02	Yes
PM10	24 hours	2.51E-02	2.52E-02	2.54E-02	2.53E-02	2.54E-02	2.53E-02	2.54E-02	2.52E-02	2.51E-02	5.00E-02	Yes
	Annual	2.51E-02	2.52E-02	2.52E-02	2.52E-02	2.52E-02	2.52E-02	2.52E-02	2.52E-02	2.51E-02	3.00E-02	Yes
SOx	10 min	2.03E-02	2.03E-02	2.03E-02	2.03E-02	2.03E-02	2.03E-02	2.03E-02	2.03E-02	2.03E-02	7.12E-01	Yes
	1 hour	2.03E-02	2.03E-02	2.03E-02	2.03E-02	2.03E-02	2.03E-02	2.03E-02	2.03E-02	2.03E-02	5.70E-01	Yes
	24 hours	4.11E-03	4.11E-03	4.12E-03	4.12E-03	4.12E-03	4.11E-03	4.11E-03	4.11E-03	4.11E-03	2.28E-01	Yes
	Annual	1.10E-03	1.10E-03	1.10E-03	1.10E-03	1.10E-03	1.10E-03	1.10E-03	1.10E-03	1.10E-03	6.00E-01	Yes
ALP	3 min	1.24E-02	9.29E-03	1.50E-02	9.51E-03	1.69E-02	1.22E-02	1.57E-02	1.29E-02	1.40E-02	3.60E-02	Yes
Pentane	3 min	4.76E-03	3.55E-03	5.72E-03	3.64E-03	6.47E-03	4.68E-03	6.00E-03	4.91E-03	5.33E-03	3.53E-02	Yes
Hexane	3 min	3.29E-03	2.46E-03	3.96E-03	2.52E-03	4.48E-03	3.24E-03	4.16E-03	3.40E-03	3.69E-03	3.52E-02	Yes

5.8 DISCUSSIONS

As seen in Table 5-14 and Table 5-15, the simulation results are well within the legislation limit. Scenario 2 is modelled due to the capability of running 7 printing press at the same time, although 2 of them would not be introduced until later in the future. The resulting cumulative impacts from each pollutant category of the Approved Method for Modelling and Air Assessment in NSW 2005 (DECC 2005) consist of mainly background air concentration. The proposed printing industry itself contributes very low if not negligible concentration of air pollutants.

The heatset printing ink consists of heavy petroleum distillates as the solvent. The behaviour of this solvent is similar to diesel, which is combustible, but has volatility at ambient temperature. The NPI factor of diesel is taken and the emission rate is calculated for each of the 5 printers available. A conservative assumption is made to take into account that the ink usage would be in excess of 1,750 tonnes per year when 7 printers are operated at the same time. Scenario 2 took into account 7 printers emissions, with the same stack emission rates as scenario 1, thus having 7/5 times higher emission rates in total when compared to scenario 1.

The VOCs fugitive emissions do produce a cumulative impact close to the limit adopted from "Good Practice Guide for Assessing Discharges to Air from Industry", by the Ministry of Environment, New Zealand (MOE NZ 2008). This however, does not exceed the limit, and the assumption made to calculate the emission rates is very conservative.

5.9 RECOMMENDATIONS

It is recommended that these safeguards be placed to maintain good air quality:

- Regular maintenance of dryer burners;
- Good environmental housekeeping within the facility with special emphasis on the following:
  - Removal of any build up of dust from trim cutters;
  - Routine use of floor sweeps to remove trim not captured by the trim collection system;
  - Routine removal of dust from horizontal surfaces; and
  - Routine removal of dust within the pellitiser area to prevent its accumulation on horizontal surfaces.
- Properly maintained ventilation of the printing press area by ensuring natural ventilation louvers are not blocked;
- Maintain trafficked areas free of dust;
- Maintenance of roadway surfaces; and
- Stack heights of dryers 5m above the apex of the building and with stack discharge velocities of 15m/sec, achieved by trim cutting the end of the stacks.

6. CONCLUDING REMARKS

The assessment has adopted criteria from Protection of the Environment Act 1997, Protection of the Environment Operation (Clean Air) 2002, Good Practice Guide for Assessing Discharges to Air from Industry 2008, and the Approved Methods of Modelling and Approved Methods for Modelling and Assessment of Air Pollutants in New South Wales, 2005. These criteria are an essential limit to use in assessing against air pollutants for the proposed printing industry in Erskine Park Industrial Area, NSW.

After performing simulation of normal and extended operating load, it is found that the proposed printing, distribution, and warehouse facility contributed a very low to negligible concentration of pollutants to the environment. With this fact, the legislation limits are easily complied.

This concludes the report.

Prepared by:

Duke Ismael
Environmental Engineer

Gusni Melington
Senior Environmental Engineer

Filbert Hidayat
Environmental Engineer

R. T. Benbow
Principal Consultant

7. LIMITATIONS

Our services for this project are carried out in accordance with our current professional standards for site assessment investigations. No guarantees are either expressed or implied.

This report has been prepared solely for the use by Paclib Group, as per our agreement for providing environmental assessment services. Although all due care has been taken in the preparation of this study, no warranty is given, nor liability accepted (except that required by law) in relation to the information contained within this document.

Paclib Group is entitled to rely upon the findings in the report within the scope of work described in this report. No responsibility is accepted for the use of any part of the report in any other context or for any other purpose.

Opinions and judgements expressed herein, which are based on our understanding and interpretation of current regulatory standards, should not be construed as legal opinions.

8. REFERENCES

DECC 2002
Protection of the Environment Operation (Clean Air) Regulation, 2002

DECC 2005
Approved Methods for the Modelling and Assessment of Air Pollutant in NSW, August 2005

Goss International, 2008
Sunday 4000 and 5000 Gapless Web Offset Press System, Goss International, 2008

Kjell et al, 1995
"Health Effects of Working in Pulp and Paper Mills: Exposure, Obstructive Airways Diseases, Hypersensitivity Reactions, and Cardiovascular Diseases", 1995

MOE NZ 2008
"Good Practice Guide for Assessing Discharges to Air from Industry" published by the Ministry of Environment, New Zealand, 2008

NPI 1999
"Emission Estimation Technique Manual (EETM) for Combustion in Boilers", 1999

POEO 1997
Protection of the Environment Operations Act, May 2006

SCAQMD 2001
"VOC Emission Calculation Methodology for Lithographic Printing Operations", South Coast Air Quality Management District of California USA, 2001

US EPA 1998
"Chapter 1: External Combustion Sources – Natural Gas Combustion", U.S. Environmental Protection Agency 1998

ATTACHMENTS

Attachment 1: Sample AUSPLUME Configuration File (Scenario 1, NO_2, 1 hour averaging time criteria)

```
  6.0 version
*************************************************************
* WARNING - WARNING - WARNING - WARNING - WARNING - WARNING *
*                                                           *
* This is a generated file. Please do not edit it manually. *
* If  editing  is  required, under any circumstances do not *
* edit information enclosed in curly braces.  Corruption of *
* this information or changed order of data blocks enclosed *
* in curly braces may render the file unusable.             *
*                                                           *
*************************************************************

Simulation Title
{109026 - SC1 NOx Modelling - 1 Hr}
Concentration(1)/Deposition(0),  Emission  rate  units,  Concentration/Deposition
units,Background Concentration, Variable Background flag,Variable Emission Flag
{True grams/second milligrams/m3 0 False False }

Terrain influence tag, 0-ignore, 1 - include
{2}
Egan coefficients
{0.5 0.5 0.5 0.5 0.7 0.7 }
Number of source groups
{0}
Total number of sources (Stack + Area + Volume sources)
{5}

Source Group information
BPIP Run (1-True, 0-False)
{0 }
Total number of buildings
{0 }

Source Information

Source ID, Source Type (1 - stack, 2 - area, 3- volume) and X, Y, Z coordinates
{Dry1 1 296178 6256427 60 }
Stack height and diameter
{18 0.5 }
Stack temperature, Velocity, Cross, Height
{473 25 0 0 }
Emission type (1-constant, 2-monthly, 3-hours of the day, 4-wind and stability,
5-hour and season, 6-temperarture), Number of particle fractions
{1 0 }
Constant emission rate
{0.040533}
```

```
Source ID, Source Type (1 - stack, 2 - area, 3- volume) and X, Y, Z coordinates
{Dry2 1 296193 6256425 60 }
Stack height and diameter
{18 0.5 }
Stack temperature, Velocity, Cross, Height
{473 25 0 0 }
Emission type (1-constant, 2-monthly, 3-hours of the day, 4-wind and stability,
5-hour and season, 6-temperarture), Number of particle fractions
{1 0 }
Constant emission rate
{0.040533}

Source ID, Source Type (1 - stack, 2 - area, 3- volume) and X, Y, Z coordinates
{Dry3 1 296206 6256423 60 }
Stack height and diameter
{18 0.5 }
Stack temperature, Velocity, Cross, Height
{473 25 0 0 }
Emission type (1-constant, 2-monthly, 3-hours of the day, 4-wind and stability,
5-hour and season, 6-temperarture), Number of particle fractions
{1 0 }
Constant emission rate
{0.040533}

Source ID, Source Type (1 - stack, 2 - area, 3- volume) and X, Y, Z coordinates
{Dry4 1 296221 6256420 60 }
Stack height and diameter
{18 0.5 }
Stack temperature, Velocity, Cross, Height
{473 25 0 0 }
Emission type (1-constant, 2-monthly, 3-hours of the day, 4-wind and stability,
5-hour and season, 6-temperarture), Number of particle fractions
{1 0 }
Constant emission rate
{0.040533}

Source ID, Source Type (1 - stack, 2 - area, 3- volume) and X, Y, Z coordinates
{Dry5 1 296233 6256417 60 }
Stack height and diameter
{18 0.5 }
Stack temperature, Velocity, Cross, Height
{473 25 0 0 }
Emission type (1-constant, 2-monthly, 3-hours of the day, 4-wind and stability,
5-hour and season, 6-temperarture), Number of particle fractions
{1 0 }
Constant emission rate
{0.040533}
```

Receptor information

Discrete receptors
Receptor coordinates type (1-Cartesian,0-Polar),Number of Receptors
{1 9 }
X, Y coordinates and Elevation
{295717 6256688 0 }
X, Y coordinates and Elevation
{295939 6256864 0 }
X, Y coordinates and Elevation
{295959 6256726 0 }
X, Y coordinates and Elevation
{296184 6256926 0 }
X, Y coordinates and Elevation
{296334 6256761 0 }
X, Y coordinates and Elevation
{296566 6256982 0 }
X, Y coordinates and Elevation
{296615 6256730 0 }
X, Y coordinates and Elevation
{296779 6256867 0 }
X, Y coordinates and Elevation
{296947 6256671 0 }

Gridded receptors
Receptor coordinates type (1-Cartesian, 0-Polar), Number of X and Y coordinates, Receptor height
{1 98 57 0 }

X grid coordinates
{294950 294979 295008 295037 295066 295095 295124 295153 295182 295211 295240 295269 295299 295328 295357 295386 295415 295444 295473 295502 295531 295560 295589 295618 295647 295676 295705 295734 295763 295792 295821 295850 295879 295908 295937 295966 295995 296024 296053 296082 296111 296140 296169 296198 296228 296257 296286 296315 296344 296373 296402 296431 296460 296489 296518 296547 296576 296605 296634 296663 296692 296721 296750 296779 296808 296837 296866 296895 296924 296953 296982 297011 297040 297069 297098 297127 297157 297186 297215 297244 297273 297302 297331 297360 297389 297418 297447 297476 297505 297534 297563 297592 297621 297650 297679 297708 297737 297766 }

Y grid coordinates
{6255658 6255687 6255716 6255745 6255774 6255803 6255832 6255861 6255890 6255919 6255948 6255977 6256006 6256035 6256064 6256093 6256122 6256151 6256180 6256209 6256238 6256267 6256296 6256325 6256354 6256383 6256412 6256441 6256470 6256499 6256528 6256557 6256586 6256615 6256644 6256673 6256702 6256731 6256760 6256789

6256818 6256847 6256876 6256905 6256934 6256963 6256992 6257021 6257050 6257079 6257108 6257137 6257166 6257195 6257224 6257253 6257282 }

Model settings and parameters
Emission conversion factor, Averaging Time
{1000 0 }

Land use (surface roughness)
{0.6}

Averaging time flags (1,2,3,4,6,8,12,24 hrs, 7, 90 days, 3 month, All hrs
{1 0 0 0 0 0 0 0 0 0 0 0 }

Statistical output options
{0 0 }

Output options (All meteodata, Every concentration/deposition, Highest/2nd highest, 100 worst case table, Save all calculations
{0 0 0 1 1 1 }
Write concentration (1-yes, 0-no), Concentration rank, Write frequency, Frequency Level
{0 1 0 -1 }

Disregard exponents (1-yes, 0-no), Exponent Scheme (1-Irvin urban, 2-Irvin rural, 3-ISCST, 4-User Defined
{0 1 }
Dispersion exponents
{0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.2 0.2 0.2 0.2 0.2 0.2 0.25 0.25 0.25 0.25 0.25 0.25 0.4 0.4 0.4 0.4 0.4 0.4 0.6 0.6 0.6 0.6 0.6 0.6 }

Building wake effects (1-include,0-not) , Default decay coefficient, Anemometr height, Sigma-theta averaging period, Roughness at vane site, Smooth stability changes, ConvectivePDF)
{1 0 10 60 0.3 0 0 }

Deposition options, Depletion options
{False False False False False False }

Stability class adjustments (0-None, 1-Urban1, 2-Urban2)
{0}
Building wake algorithms (1-Huber-Sneider, 2-Hybrid, 3-Schulman-Scire)
{4}

Gradual plume rise (1-yes,0-no), Stack tip downwash (1-yes,0-no), Disregard Temperature Gradient (1-yes,0-no), Partial Penetration, Temp Gradient, Adiabatic Entrainment, Stable Entrainment

{1 1 0 0 0.004 0.6 0.6 }
Temperature Gradients for Wind and Stability categories
{0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0.02 0.02 0.02 0.02 0.02 0.02 0.035 0.035 0.035 0.035 0.035 0.035 }

Dispersion curves (1-Pasquill Gifford, 2- Briggs rural, 3-Sigma theta) horizontal < 100 m, ditto vertical < 100 m, ditto horizontal > 100 m, ditto vertical > 100 m
{3 1 2 2 }
Adjust PG curves for roughness - Horizontal, Vertical (1-yes,0-no)
{1 1 }
Enhance plume for buyoancy - Horizontal, Vertical (1-yes,0-no)
{1 1 }
Adjust for wind direction shear
{0}
Shear rates
{0.005 0.01 0.015 0.02 0.025 0.035 }

Wind Speed categories
{1.54 3.09 5.14 8.23 10.8 }

Output file
{'C:\Filbert\109026 - Paclib Air\Result\SC1 - NOx 1 hr.txt'}
Meteorological file
{'C:\Filbert\109026 - Paclib Air\Horsley Park 2007 Met Data.met'}
Receptor file
{'C:\Filbert\109026 - Paclib Air\109026_terrain.ter'}
SaveAll file
{'C:\Filbert\109026 - Paclib Air\Result\SC1 - NOx 1 hr.cal'}
Statistics output file
{'C:\Active Jobs\109026\Sc2\NOx\1Hr\NOx1Hr.sta'}

Attachment 2: Material Safety Data Sheets

VARN A230 WASH

Hazard Alert Code: MODERATE

Chemwatch Material Safety Data Sheet *Revision No: 4* *Chemwatch 8530-95*

Issue Date: 19-Jul-2006 *CD 2007/4*

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: *VARN A230 WASH*

PROPER SHIPPING NAME

PETROLEUM DISTILLATES, N.O.S. (contains white spirit and aromatic hydrocarbon solvent)

PRODUCT USE

Blanket, roller and press wash for the printing industry. May be diluted with water.

SUPPLIER

Company: Day International
Address:
53 Westpool Drive
Hallam
VIC, 3803
AUS
Telephone: +61 3 9703 2300
Emergency Tel: +61 414 348 078 (Mon-Fri: 8am-6pm)
Fax: +61 3 9796 4771

Section 2 - HAZARDS IDENTIFICATION

STATEMENT OF HAZARDOUS NATURE

HAZARDOUS SUBSTANCE. DANGEROUS GOODS. According to the Criteria of NOHSC, and the ADG Code.

POISONS SCHEDULE

S5

RISK

Risk Codes	Risk Phrases
R10	Flammable.
R38	Irritating to skin.
R52/53	Harmful to aquatic organisms may cause long-term adverse effects in the aquatic environment.
R65	HARMFUL - May cause lung damage if swallowed.
R67	Vapours may cause drowsiness and dizziness.

SAFETY

Safety Codes	Safety Phrases
S23	Do not breathe gas/ fumes/ vapour/ spray.
S51	Use only in well ventilated areas.
S09	Keep container in a well ventilated place.
S53	Avoid exposure - obtain special instructions before use.
S401	To clean the floor and all objects contaminated by this material use water and detergent.
S07	Keep container tightly closed.
S13	Keep away from food drink and animal feeding stuffs.
S27	Take off immediately all contaminated clothing.
S26	In case of contact with eyes rinse with plenty of water and contact Doctor or Poisons Information Centre.
S46	If swallowed IMMEDIATELY contact Doctor or Poisons Information Centre (show this container or label).
S60	This material and its container must be disposed of as hazardous waste.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
white spirit	8052-41-3.	>60
aromatic hydrocarbon solvent	64742-95-6.	<10
sorbitan monooleate	1338-43-8	<10

Section 4 - FIRST AID MEASURES

SWALLOWED

If spontaneous vomiting appears imminent or occurs, hold patient's head down, lower than their hips to help avoid possible aspiration of vomitus.

Hazard Alert Code: MODERATE

VARN NATURAL WASH

Chemwatch Material Safety Data Sheet *Revision No: 4* *Chemwatch 8540-18*

Issue Date: 3-Aug-2006 *CD 2007/4*

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: *VARN NATURAL WASH*

SYNONYMS

"blanket / roller / press wash", "printing industry", LO11003

PRODUCT USE

Blanket roller and press wash for the printing industry. May be diluted with water.

SUPPLIER

Company: Day International
Address:
53 Westpool Drive
Hallam
VIC, 3803
AUS
Telephone: +61 3 9703 2300
Emergency Tel: +61 414 348 078 (Mon-Fri: 8am-6pm)
Fax: +61 3 9706 4771

Section 2 - HAZARDS IDENTIFICATION

STATEMENT OF HAZARDOUS NATURE

HAZARDOUS SUBSTANCE. NON-DANGEROUS GOODS. According to the Criteria of NOHSC, and the ADG Code.

POISONS SCHEDULE

S5

RISK

Risk Codes	Risk Phrases
R65	HARMFUL - May cause lung damage if swallowed.

SAFETY

Safety Codes	Safety Phrases
S23	Do not breathe gas/ fumes/ vapour/ spray.
S25	Avoid contact with eyes.
S36	Wear suitable protective clothing.
S51	Use only in well ventilated areas.
S09	Keep container in a well ventilated place.
S40	To clean the floor and all objects contaminated by this material use water.
S07	Keep container tightly closed.
S13	Keep away from food drink and animal feeding stuffs.
S27	Take off immediately all contaminated clothing.
S26	In case of contact with eyes rinse with plenty of water and contact Doctor or Poisons Information Centre.
S46	If swallowed IMMEDIATELY contact Doctor or Poisons Information Centre (show this container or label).

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
isoparaffins petroleum hydrotreated HFP	64742-47-8.	30-60
low volatility solvent, unspecified		30-60
petroleum distillates HFP	64742-48-9.	<10
naphtha petroleum, heavy, hydrotreated	64742-48-9.	<10
emulsifiers and wetters		<10

Section 4 - FIRST AID MEASURES

SWALLOWED

If spontaneous vomiting appears imminent or occurs, hold patient's head down, lower than their hips to help avoid possible aspiration of vomitus.

- *If swallowed do NOT induce vomiting.*

Material Safety Data Sheet

Kodak

1. Identification of the substance/preparation and of the company/undertaking

Product name: KODAK Polychrome Graphics Thermal 182 RTU Positive Developer

Product code: 9311283

Supplier: KODAK AUSTRALASIA Pty. Ltd., 181 Victoria Parade, Collingwood, Victoria, 3066

For Chemical Emergency Information, in Australia call 1800 033111 (24 hour service Australia-wide); in New Zealand call 0800 734 607 (24 hour service); in Asia call +86 21 63500836

For Other Information, call 61 3 8417 8000.

Synonyms: PCD F1715

Product Use: plate processing chemical (developer), For industrial use only.

2. Hazards identification

STATEMENT OF HAZARDOUS NATURE: Hazardous according to criteria of Australian Safety and Compensation Council

Irritant. Irritating to eyes and skin.

Poisons Schedule: 6
Contains: Ethylene glycol, Trisodium phosphate, Sodium silicate (1-<=1.6), Phosphoric acid, monosodium salt

3. Composition/information on ingredients

Weight %	Components (CAS-No.)
5 -10	Ethylene glycol (107-21-1)
5 -10	Sodium silicate (1-<=1.6) (1344-09-8)
5 -10	Glycerol (56-81-5)
1 -5	Trisodium phosphate (7601-54-9)

4. First aid measures

Inhalation: If inhaled, remove to fresh air. Get medical attention if symptoms occur.

Eyes: If in eyes, hold eyelids apart and flush the eye continuously with running water. Continue flushing until advised to stop by the Poisons Information Centre or a doctor, or for at least 15 minutes.

Skin: If skin or hair contact occurs, remove contaminated clothing and flush skin and hair with running water. Get medical attention if symptoms occur. Wash contaminated clothing before re-use. Destroy or thoroughly clean contaminated shoes.

Ingestion: If swallowed, DO NOT induce vomiting. Call a physician or poison control centre immediately. Never give anything by mouth to an unconscious person.

Notes to physician:

Material Safety Data Sheet

Kodak

1. Identification of the substance/preparation and of the company/undertaking

Product name: 850S Plate Finisher

Product code: 5270517

Supplier: KODAK AUSTRALASIA Pty. Ltd., 181 Victoria Parade, Collingwood, Victoria, 3066

For Chemical Emergency Information, in Australia call 1800 033111 (24 hour service Australia-wide); in New Zealand call 0800 734 607 (24 hour service); in Asia call +86 21 63500836

For Other Information, call 61 3 8417 8000.

Synonyms: PCD F1631

Product Use: Graphic Arts product, For industrial use only.

2. Hazards identification

STATEMENT OF HAZARDOUS NATURE: Not classified as hazardous according to criteria of Australian Safety and Compensation Council

Contains no scheduled poisons

3. Composition/information on ingredients

Weight %	Components (CAS-No.)
1 - 5	Boric acid (10043-35-3)
0.1 - <1	sodium 2-biphenylate (132-27-4)
0.1 - <1	Benzenesulfonic acid, hexadecyl(sulfophenoxy)-, disodium salt (65143-89-7)

4. First aid measures

Inhalation: If inhaled, remove to fresh air. Get medical attention if symptoms occur.

Eyes: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention. If easy to do, remove contact lens, if worn.

Skin: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention if symptoms occur. Wash contaminated clothing before re-use. Destroy or thoroughly clean contaminated shoes.

Ingestion: If swallowed, DO NOT induce vomiting. Never give anything by mouth to an unconscious person. Call a physician or poison control centre immediately.

5. Fire-fighting measures

Hazchem Code: Not specified

Extinguishing Media: Water spray, Carbon dioxide (CO2), Dry chemical, Alcohol-resistant foam.

DAY

Hazard Alert Code: MODERATE

VARN PROWEB PLATINUM

Chemwatch Material Safety Data Sheet (REVIEW) *Revision No: 4* *Chemwatch 4676-90*

Issue Date: 6-Jul-2007 *CD 2007/4*

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: *VARN PROWEB PLATINUM*

PRODUCT USE

Concentrated mixture of lubricating chemicals for high speed web printing press and bindery use.

SUPPLIER

Company: Day International Pty Ltd
Address:
53 Westpool Drive
Hallam 3803
Victoria
Telephone: +613 9703 2300
Emergency Tel: +61414348078 (8.30AM-5PM)
Fax: +613 9796 4771

Section 2 - HAZARDS IDENTIFICATION

STATEMENT OF HAZARDOUS NATURE

NON-HAZARDOUS SUBSTANCE. NON-DANGEROUS GOODS. According to the Criteria of NOHSC, and the ADG Code.

POISONS SCHEDULE

None

RISK

None under normal operating conditions.

SAFETY

Safety Codes	Safety Phrases
S24	Avoid contact with skin.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
dimethylsiloxane, hydroxy-terminated	70131-67-8	30-60
wax emulsion		<10
water	7732-18-5	>60

Section 4 - FIRST AID MEASURES

SWALLOWED

- *Immediately give a glass of water.*
- *First aid is not generally required. If in doubt, contact a Poisons Information Centre or a doctor.*

EYE

If this product comes in contact with eyes:

- *Wash out immediately with water.*
- *If irritation continues, seek medical attention.*

SKIN

If skin contact occurs:

- *Immediately remove all contaminated clothing, including footwear.*
- *Flush skin and hair with running water (and soap if available).*

INHALED

- *If fumes or combustion products are inhaled remove from contaminated area.*
- *Other measures are usually unnecessary.*

NOTES TO PHYSICIAN

Treat symptomatically.

Section 5 - FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

Hazard Alert Code: MODERATE

VARN WEBSPEED AC

Chemwatch Material Safety Data Sheet | *Revision No: 4* | *Chemwatch 4676-98*

Issue Date: 3-Aug-2006 | *CD 2007/4*

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: *VARN WEBSPEED AC*

PRODUCT USE

Fountain additive for lithographic printing.

SUPPLIER

Company: Day International Pty Ltd
Address:
53 Westpool Drive
Hallam 3803
Victoria
Telephone: +613 9703 2300
Emergency Tel: +61414348078 (8.30AM-5PM)
Fax: +613 9796 4771

Section 2 - HAZARDS IDENTIFICATION

STATEMENT OF HAZARDOUS NATURE

NON-HAZARDOUS SUBSTANCE. NON-DANGEROUS GOODS. According to the Criteria of NOHSC, and the ADG Code.

POISONS SCHEDULE

None

RISK

None under normal operating conditions.

SAFETY

Safety Codes	*Safety Phrases*
S23	*Do not breathe gas/ fumes/ vapour/ spray.*
S24	*Avoid contact with skin.*
S39	*Wear eye/ face protection.*
S26	*In case of contact with eyes rinse with plenty of water and contact Doctor or Poisons Information Centre.*

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	*CAS RN*	*%*
glycerol	*56-81-5*	*10-30*
glycol, as		*10-30*
diethylene glycol monobutyl ether	*112-34-5*	
other ingredients, including		
water	*7732-18-5*	*30-60*

Section 4 - FIRST AID MEASURES

SWALLOWED

- *Immediately give a glass of water.*
- *First aid is not generally required. If in doubt, contact a Poisons Information Centre or a doctor.*

EYE

If this product comes in contact with the eyes:

- *Wash out immediately with fresh running water.*
- *Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.*

SKIN

If skin contact occurs:

- *Immediately remove all contaminated clothing, including footwear.*
- *Flush skin and hair with running water (and soap if available).*

INHALED

- *If fumes or combustion products are inhaled remove from contaminated area.*
- *Other measures are usually unnecessary.*