PRELIMINARY HAZARD ANALYSIS FOR PACLIB GROUP ERSKINE PARK, NSW

Prepared for: Paclib Group
Penrith City Council
Department of Planning

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EXECUTIVE SUMMARY

This Preliminary Hazard Analysis (PHA) has been prepared by Benbow Environmental for the Paclib Group, in accordance with the Multi-Level Risk Assessment Guidelines stipulated by the Department of Planning, NSW. A Preliminary Hazard Analysis for the site on Lenore Drive, Erskine Park, NSW, has been conducted, as the facility will store quantities of Class 3 PG III, Combustible C1, Combustible C2, Class 8 PG II, and Class 8 PG III Dangerous Goods. These materials are assessed using State Environmental Planning Policy No. 33 (SEPP).

The purpose of the PHA is to assess whether the proposed volume of dangerous goods stored and the processes that occur at the site are offensive or hazardous, thereby posing an unacceptable risk to the surrounding community. The proposed facility would store large quantities of combustible inks and paper. An environmental risk analysis is included in the PHA as a result. The PHA also examines risks associated with paper dust.

Safeguard measures have been considered and included in the design and operation of the facility to ensure that the safety and amenity of the neighbouring premises would not be affected by the proposed development.

Section 6 of the report identified and examined a number of potential events/consequence scenarios that could occur at the site. The prevention and protection measures designed into the operations of each of the activities associated with each event were listed and discussed in a series of Hazard Identification Charts.

From the Hazard Identification Charts a list of potentially hazardous events was prepared, which was then examined in greater detail to determine which events would be credible and may have significant impacts outside the site boundary. As the Dangerous or Hazardous materials that are stored in the warehouse is not significant nor exceed SEPP 33 thresholds, the chance of having the scenarios in Section 6 occurs in practice is very small if not negligible.

The Preliminary Hazard Analysis has found that the operation of the proposed development meets the criteria laid down in HIPAP No. 4 *Risk Criteria for Land Use Safety Planning* and would not cause any risk, significant or minor, to the community, with the recommended safeguards in place. Furthermore, the site's proposed operations have not been found to be an offensive or hazardous industry based on applying the Department of Planning guidelines.

Through the following PHA, it has been determined that the proposed development meets all the safety requirements stipulated by Department of Planning and hence would not be considered to be an offensive or hazardous development.

In addition, the environmental risk analysis has recommended a number of safeguards that will ensure the facility meets its objective of being world class.

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1 INTRODUCTION

Benbow Environmental (BE) has been commissioned by Paclib Group to prepare a Preliminary Hazard Analysis to support a Major Project Application (Part 3A of Environmental Planning Assessment Act, 1979) for a proposed web offset printing facility and magazine distribution warehouse at Lenore Drive, Erskine Park.

This document presents a Preliminary Hazard Analysis (PHA) required to fulfil the requirements of the Department of Planning in accordance with the Multi-Level Risk Assessment Guidelines stipulated in conducting such an analysis. The purpose of the PHA is to assess whether or not the proposed development is offensive or hazardous, thereby preventing an unacceptable exposure of risk to the surrounding community.

The report is structured as follows:

- Section 1 presents the purpose and report structure;
- Section 2 provides a background introduction to the site and its operations;
- Section 3 discusses the relevant documents and guidelines that have been followed and referenced for this assessment;
- Section 4 assesses the proposed operations according to the relevant guidelines; and
- Section 5 assess the Dangerous Goods and Storage handling;
- Section 6 identifies possible hazards;
- Section 7 provides environmental safeguards procedures; and
- Section 8 states the concluding remarks.

1.1 SCOPE OF THE REPORT

This PHA has been carried out in accordance with the *Hazardous Industry Planning Advisory Paper No. 6 – Guidelines for Hazard Analysis* (HIPAP No. 6) as stipulated by the Department of Planning in conducting such studies.

This study includes the following key items:

- Evaluation of any potential hazards imposed by the proposed operation of the site on the surrounding environment and communities and makes recommendations on the relevant prevention/protection strategies necessary to minimise the impact and risk of human fatalities, property damage and environmental pollution;
- Review of the associated risks from the surrounding industrial areas that are considered as potential sources of risks in order to identify any possible cumulative hazards and risk impacts that can occur; and
- Qualitative environmental risks and identified safeguards that are needed.

This study evaluates potential hazards imposed by the proposed operation of the site on the surrounding environment and communities. It also evaluates specific hazards unique to the process being undertaken in relation to dust and the need to store significant quantities of a combustible liquid Class C2.

2 OVERVIEW OF THE DEVELOPMENT

2.1 PROPOSED DEVELOPMENT

The proposal involves the development of two warehouse size buildings located on Lenore Drive, Erskine Park, one of which is proposed to be a world class magazine printing and distribution facility. The web offset printing and distribution of magazines would operate 24 hours per day, 7 days per week. The printing process uses ink containing a solvent based on organic oils that behave as Class C2 combustible liquids.

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

- Receipt and Despatch of Raw Materials and Products;
- Publishing – Computer to Plate (CTP) Imaging;
- Press – Web Offset Printing;
- Product Binding and Packaging;
- Computer Room (CTP control), Office and Administration;
- Ancillary Processes, such as:
  - Heat integration using heat exchangers;
  - Collection and compacting of paper scraps using a pelletiser;
  - Waste treatment by the Reverse Osmosis (RO) process; and
- Finished product storage and distribution.

The publishing area will house the plate preparation equipment depicted in the figures provided. The image to be printed is transferred from the computer to the aluminium printing plate, hence the name Computer to Plate (CTP) imaging. This technology uses thermal laser to change the coating on the plate either physically or chemically by utilising heat to image the plate. After imaging, the plate would be immersed in the developer solution followed by the plate finisher solution. The finished plate would have an image area which is hydrophobic and therefore ink receptive and a hydrophilic non-image area.

The web offset printer is capable of printing material at high speeds. It contains the following operational units as a whole, where each unit has a specific role in achieving the required quality of the printed material. These are listed as follows:

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

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 printing facility will be located within a proposed warehouse building – part of a subject major project application.

One area of the warehouse 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.

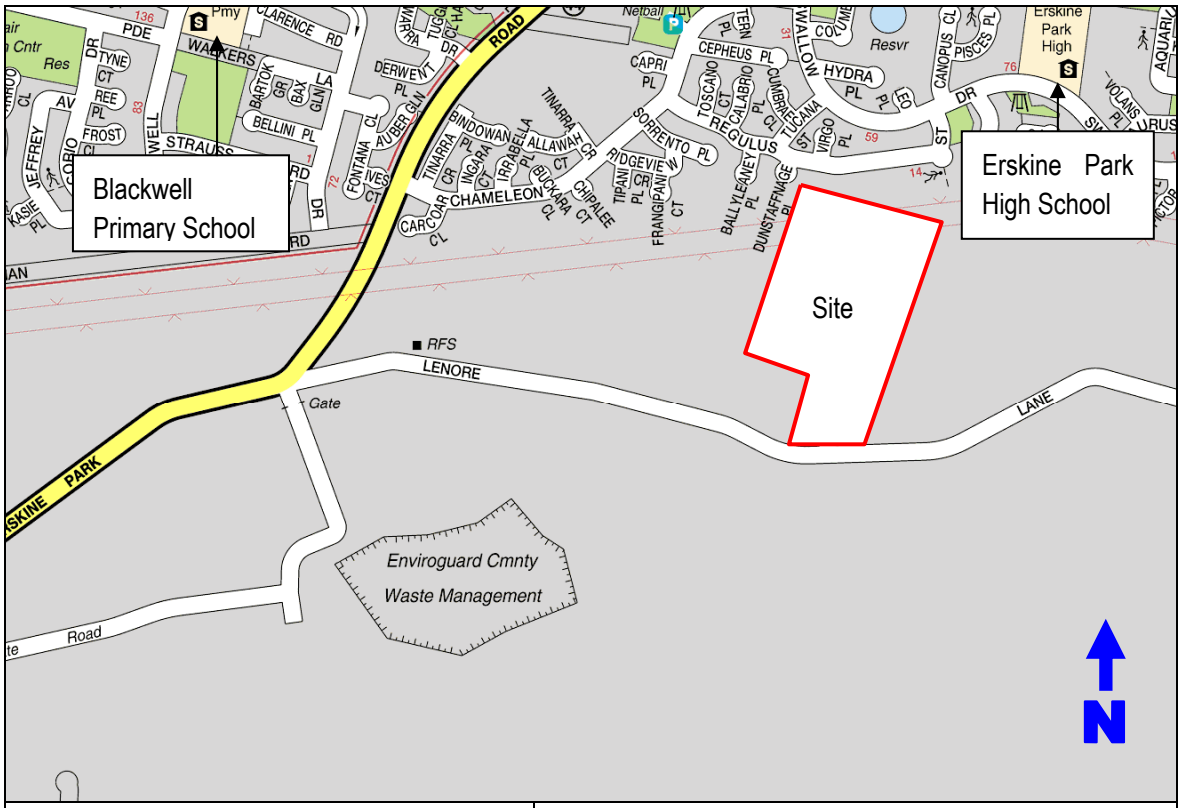
2.2 SITE DETAILS

2.2.1 Site Locality

The proposed site is to be located at Lot 62 DP 1090695 Lenore Drive, Erskine Park, 2759. The proposed site is located within the Penrith City Council Local Government Area. Figure 2-1 shows the location of the site in its local context.

The subject site is located within an industrial zoned area at Erskine Park. A large residential zoned area is located north of the site location, with major overhead power lines shown as the significant feature located between the two zoned areas. Blackwell Primary School is located approximately 1.4 km north-west of the subject site, whilst Erskine Park High School is located approximately 350 m north-east of the site. A second primary School – James Erskine Primary School is situated adjacent and immediately north of Erskine Park High School. In future, it is expected that more industrial premises will be developed and built around the subject site.

Figure 2-1: Local Site Map



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

2.2.2 Site Layout

Figure 2-2 shows the indicative site layout. Storage of raw materials would be divided into a paper store, ink farm, and consumables storage area as indicated in the site layout. As discussed, Ink would be stored in an aboveground ink tank farm located in south-east corner. The ink tank farm would occupy some 80 m^2 areas and will be bunded to contain a leak or spill to 110% of the largest tank, which is 18 kL. Other consumables would be stored in a bunded area adjacent to the ink tank farm. As discussed in later sections, most of these consumables are not classified as dangerous goods apart from the equipment washing chemicals. Figure 2-2 shows the location of the press area (the printing facility) and the finished product storage warehouse. Loading decks are provided on the eastern side of the site.

2.2.3 Nearest Residences

The site is located at the edge of an industrial zone area bordering residential premises to the north. The following residences were considered as the nearest receptors for the assessment.

Table 2-1: Location of the Nearest Residential Areas

Receptor ID	Residential Areas	Bearing	Approximate Distance (m)
A	5 Tipani Place, Erskine Park, 2759	NW	470
B	4 Toscano Court, Erskine Park, 2759	NW	370
C	6 Ballyleaney Place, Erskine Park, 2759	NW	230
D	38 Swallow Drive, Erskine Park, 2759	NE	200
E	16 Regulus Street, Erskine Park, 2759	N	50
F	76 Swallow Drive, Erskine Park, 2759	NE	320
G	18 Shaula Crescent, Erskine Park, 2759	NE	170
H	96 Swallow Drive, Erskine Park, 2759	NE	370
I	8 Pictor Street, Erskine Park, 2759	NE	500

Figure 2-3 provides an aerial photograph of the site location and shows the nature of existing land use within proximity of the site.

Figure 2-2: Indicative Site Plan

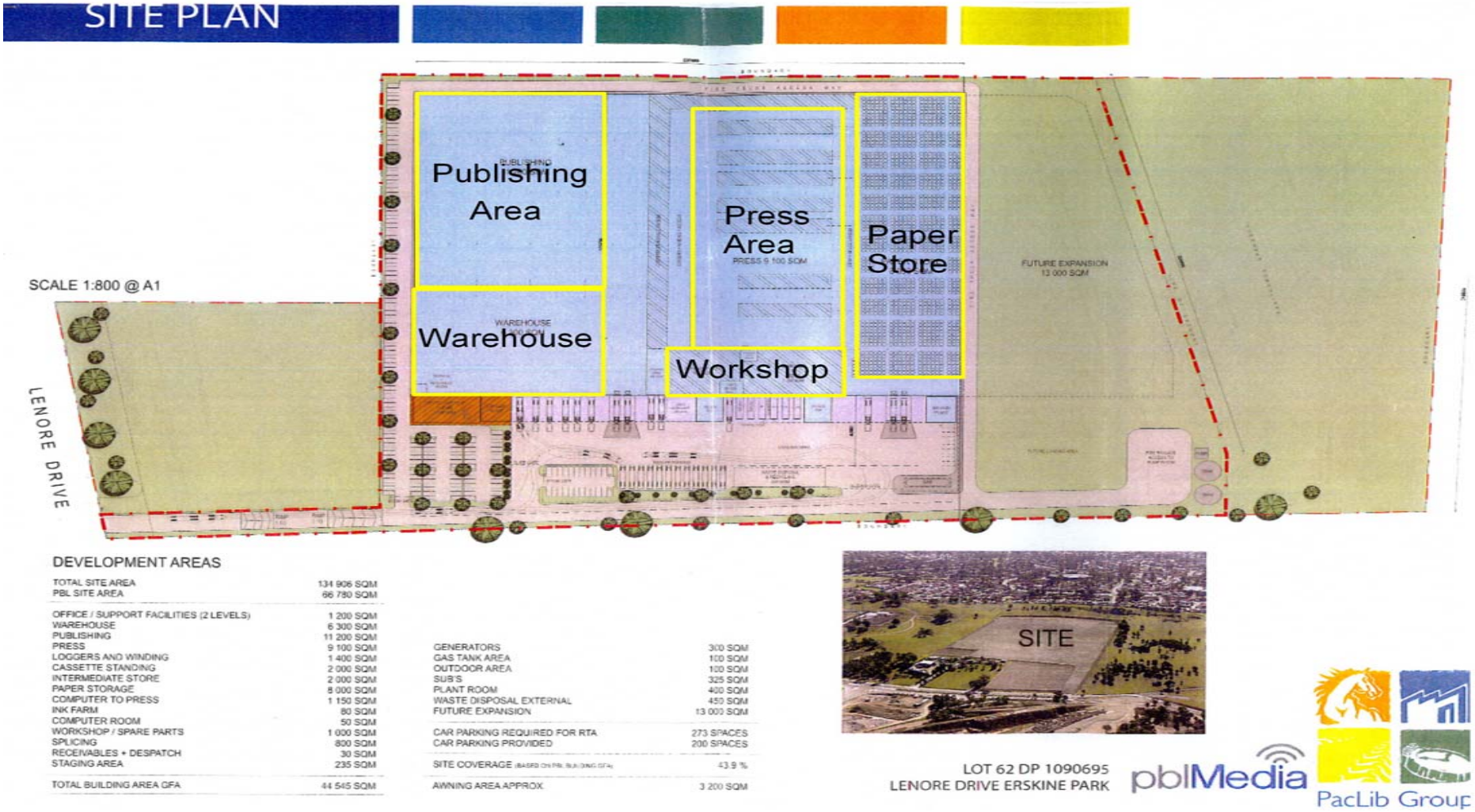
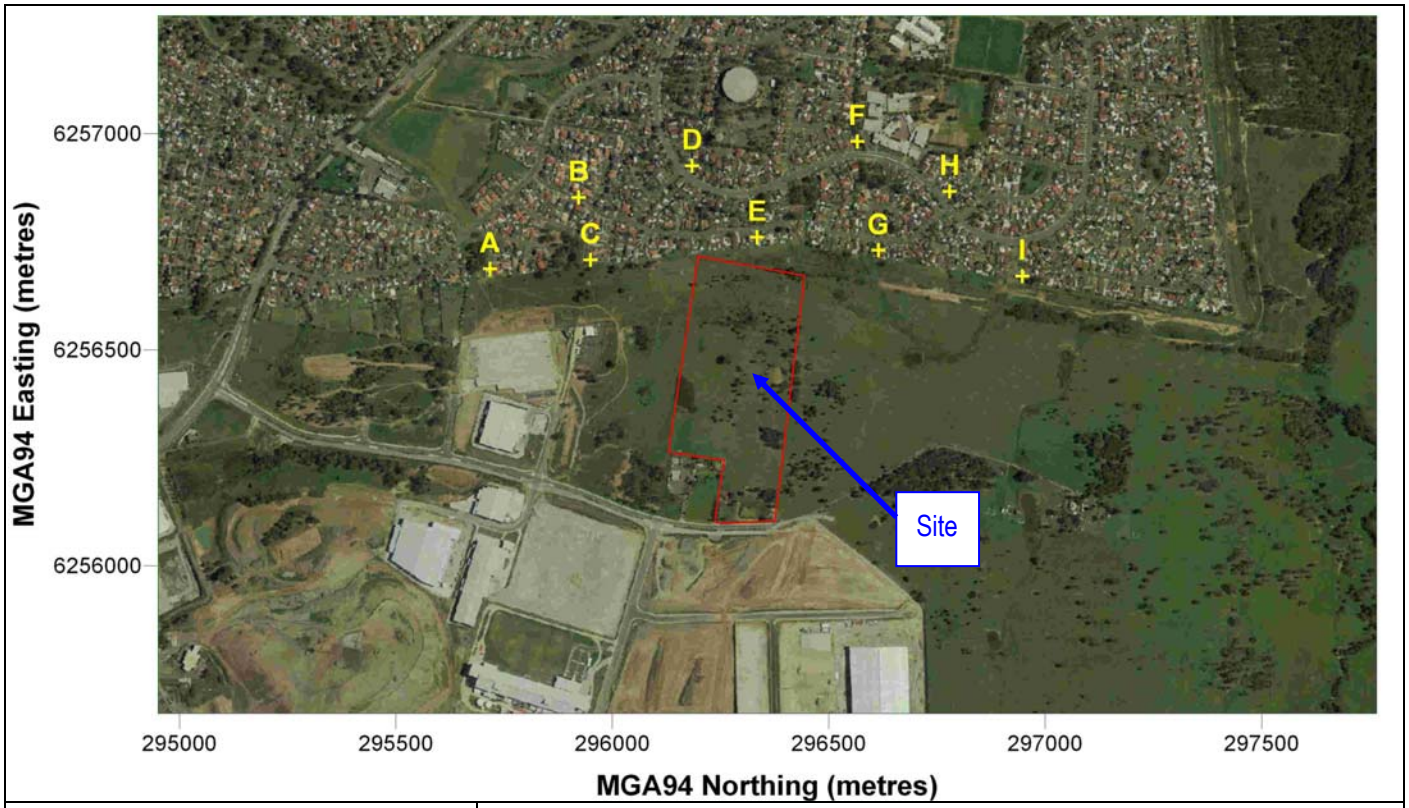


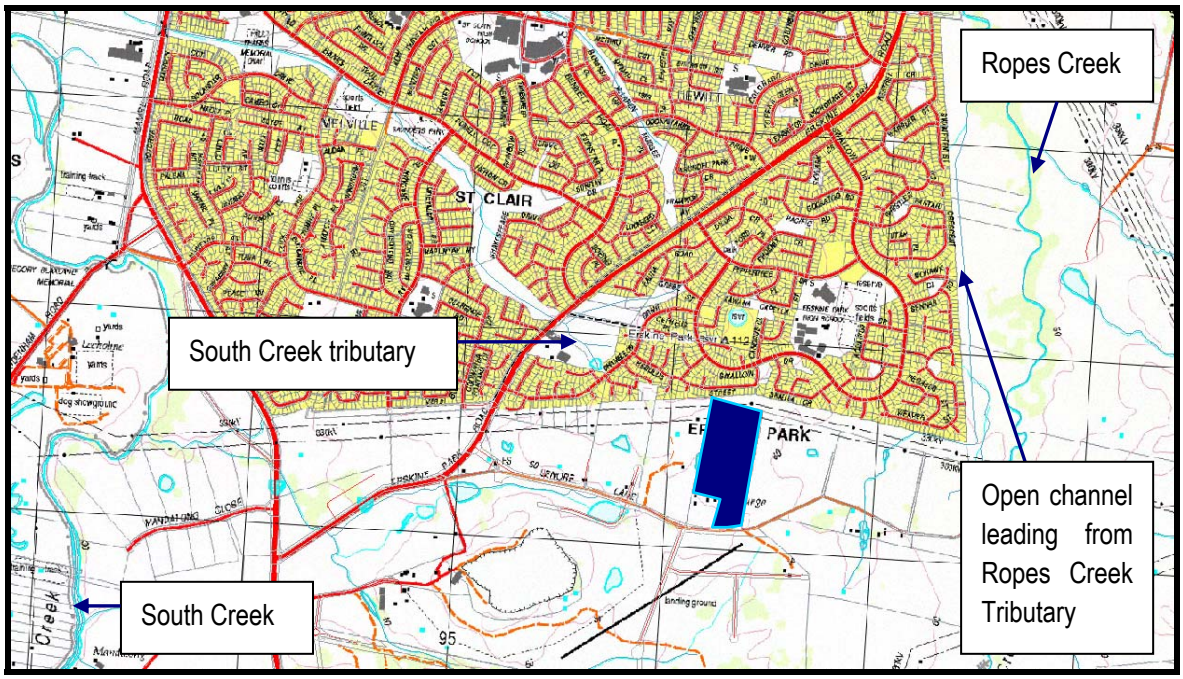
Figure 2-3: Site Location



2.2.4 Nearest Natural Waterway

The site is situated between Ropes Creek to the east, and South Creek, west of the site. Tributaries of both these creeks travel towards the site; the closest open channels are approximately 570 m west and 550 m east of the site boundaries.

Figure 2-4: Nearest Natural Waterways



2.2.5 Hours of Operation

It has been proposed that the site will conduct operations 24 hours per day and 7 days per week.

3 REFERENCED DOCUMENTS AND GUIDELINES

The following documents have been considered during the preparation of this risk assessment:

- Applying SEPP 33 (State Environmental Planning Policy No. 33) – Hazardous and Offensive Development Application Guidelines, NSW Department of Planning;
- Multi-Level Risk Assessment Guidelines, NSW Department of Planning*;
- Hazardous Industry Planning Advisory Paper No. 4 – Risk Criteria for Land Use Safety Planning (HIPAP No 4), NSW Department of Planning*;
- Hazardous Industry Planning Advisory Paper No. 6 – Guidelines for Hazard Analysis (HIPAP No 6), NSW Department of Planning*; and
- Relevant Australian Standards for the Classes of Dangerous Goods to be used on site.

The Department of Planning documents on Applying SEPP 33, Multi-Level Risk Assessment, Risk Criteria for Land Use Safety Planning (HIPAP No. 4), and Hazard Analysis (HIPAP No. 6) provide guidelines in quantifying the hazards and risks for any industrial or commercial development.

* Formerly known as DIPNR and the Department of Urban Affairs and Planning (DUAP)

4 DANGEROUS GOODS STORAGE & HANDLING

4.1 QUANTITIES OF DANGEROUS GOODS

The quantities of ink and other consumables used onsite have been estimated based on raw material usage of 65,000 tonnes of paper per with average weight of 80 g/m^2. Other non dangerous goods consumables have been estimated based on the typical consumption rate for an offset printing operation. These volumes are not considered critical in this PHA due to the low risk associated with the properties of the chemicals examined.

The site involves the storage and handling of Class 3 PG III, Combustible C1, Combustible C2, Class 8 PG II, and Class 8 PGIII dangerous goods. The dangerous goods and flammable items stored on site are as highlighted in Table 4-1. In most instances, the estimation of maximum quantities (if dangerous goods have been identified on site) needs to be determined whilst thoroughly considering the feasibility of delivery frequency, storage capacity and production rate for the proposed operation.

The CTP imaging process requires the use of *KODAK 182 RTU Developer* solution and *KODAK 850S Plate Finishers*. *KODAK 182 RTU Developer* solution is classified as an alkaline, corrosive solution, Class 8 PG III dangerous goods. *KODAK 850S Plate Finisher* is not classified as hazardous nor a dangerous good.

The printing process utilises a specialised ink called *TOYO Heatset Offset Printing Ink*. The Material Safety Data Sheet (MSDS) of ink classifies it as non-hazardous. However, due to the amount of the hydrocarbon content in the ink of approximately 30%, the ink is a dangerous good of Class C2, i.e. a combustible liquid with a flash point above 150^{o}C. There are 8 aboveground ink storage tanks of 15 tonnes capacity each, allowing maximum storage capacity of 120 tonnes. The total ink usage is expected to be typically 1,750 tonnes per annum.

VARN Webspeed AC is used as additive in the paper dampening solution. The maximum usage rate would be 0.5 g/m^2 of paper, which equates to approximately 2,144 tonnes per annum. *VARN Proweb Platinum* is used as a paper lubricating solution at typical concentration of 10%. Application rate would be approximately 183 Litres per hour, equating to approximately 160 tonnes per annum. Both chemicals are not classified as hazardous nor dangerous goods.

The washing operations would include the use of the chemicals, *VARN natural wash* and *VARN A230 wash*. Both are classified as Class 3 PG III and C1 respectively. Class C1 is a combustible liquid with a flash point above 61.5^{o}C, and below 150^{o}C. Annual consumption of washing chemicals was obtained from the process description. The magazine binding process uses *Planatol*, a water based adhesives, which is not classified as hazardous nor dangerous goods. Usage rate was assumed to be 1% of annual paper consumption.

MSDS of the chemicals mentioned above are provided in Attachment 1.

Table 4-1: Features of Chemical Products used on Site

Activity	Input	Chemical composition	Weight (%)	Max Annual Consumption (Estimates)	Max Qty Stored at Any Time	DG Class & Packing Group
Plate-making	*182 RTU Developer Solution* • Corrosives – pH 13 • Incompatible with oxidising material • Does not flash	Ethylene glycol Sodium silicate Glycerol Trisodium phosphate Water	5-10 5-10 5-10 1-5 90-95	80.6 tonnes	20 tonnes or 18 m^3	Class 8 PG III
	850S Plate Finisher • Odourless liquid – pH 3.5 • Does not flash	Boric Acid Other minor ingredients Water	1-5 <1 95	9.1 tonnes	N/A	Non-Dangerous Goods
Printing	*Toyo Heatset Ink* • Coloured paste • Not volatile • Not soluble in water • Flash point >100^oC	Various pigments Resin binder – phenolic Resin binder – petroleum Linseed oil Solvent – petroleum distillates Miscellaneous additives	10-20 10-30 1-10 1-10 1-30 <5	1,750 tonnes	120 tonnes	Class C2
	Dampening solution - *VARN Webspeed* • Not volatile • Not combustible	Glycerol Glycol Water	10-30 10-30 30-60	2,144 tonnes	N/A	Non-hazardous, Non Dangerous Goods
	VARN Proweb Platinum • Liquid – water soluble • Not volatile	Dimethylsiloxane Water	30-60 >60	160 tonnes	N/A	Non-hazardous, not Dangerous Goods
Washing	*VARN Natural Wash*	Isoparafins petroleum	30-60	7.3 tonnes	1.8 tonnes or 2.2 m^3	Class C1

Table 4-1: Features of Chemical Products used on Site

Activity	Input	Chemical composition	Weight (%)	Max Annual Consumption (Estimates)	Max Qty Stored at Any Time	DG Class & Packing Group
Equipment	• Liquid – not volatile • Soluble in water • Flash point 96°C	Low volatility solvent Other petroleum based substance	30-60 <10			
	VARN A230 Wash • Not water soluble • Flash point 38°C	White Spirit Aromatic hydrocarbons Sorbitan monoleate	>60 <10 <10	10.8 tonnes	2.7 tonnes or 2.5 m^3	Class 3 PG III
Binding	*Planatol FK 735* • Liquid – pH 5 • Does not flash	Polyvinyl acetate copolymer in water	N/A	162.5 tonnes	N/A	Non-hazardous, not Dangerous Goods
Forklift	Liquefied Petroleum Gas (LPG)	Propane (C_3) Butane plus (C_4)	60 40	128.5 tonnes	3 tonnes	Class 2.1
	Batteries (electric forklifts)	N/A	N/A	Minimal	Minimal	Class 8 PG III

Note: Class 2.1 is Flammable Gas.
Class 3 is Flammable liquid.
PG III means Packing Group III which is the lowest level of danger. PG I and PG II apply for flammable liquids with greater danger.
Class C1 is combustible liquid of flash point above 61.5°C and below 150°C.
Class C2 is combustible liquid of flash point above 150°C.
Class 8 is a corrosive substances.
Class 9 is an Environmentally Hazardous Substance.
3 tonne of LPG is equivalent to 7,200 L water capacity of gas cylinder storage.

4.2 DANGEROUS GOOD STORAGE REQUIREMENTS

4.2.1 Class 3 Flammable Liquids and Class C1/C2 Combustible Liquids

There would be up to 2.7 tonnes of Class 3 PG IIII, 1.8 tonnes of Class C1 combustible and 120 tonnes of Class C2 combustible stored on-site, the bulk being the heatset printing ink which is not classified as flammable. The ink and other consumable storage areas are located approximately 45 m from the western side of the site boundary. All the Class 3 Flammable liquids and Class C1/C2 Combustible liquids would be stored within a bunded area inside the ink tank farm with the area size of 80 m^2. The wall would separating the ink tank from the press area and be built as a fire rated wall of 240 x 240 x 240.

VARN Natural Wash is classified as a combustible liquid, however since it is stored in the same area as the VARN A230 Wash (flammable), it would be treated as Class 3 PG III dangerous goods based on the definition of SEPP 33.

Handling and dispensing activities may be conducted in this area, therefore it is recommended to provide spillage containment on 3 different levels:

- Use of spill control kits placed strategically within the press area and able to contain liquid spillages of 10 L to 20 L if these should occur;
- Liquid storage areas would have a bunding capacity to 110% of the largest tank (18 kL) and first 20 minutes of fire fighting water; and
- The warehouse is then connected to a fire fighting water containment system with a capacity to store the first 90 minutes of fire fighting water.

The Class 3 storage would have hazardous area zoning classifications in accordance with AS/NZS 2430-2004: “Classification of Hazardous Areas” series of standards and AS/NZS 60079-2005: “Electrical Apparatus for Explosive Gas Atmospheres” series of standards.

The storage of flammable liquids would require the ink tank farm to be sufficiently ventilated. A natural ventilation system using a combination of wall vents in 2 opposite walls and a roof ridge line ventilation opening would be provided and would be required to be constructed in accordance with the Australian Standard AS 1940-2004: “The storage and handling of flammable and combustible liquids”.

4.2.2 Flammable Gas (Class 2.1)

The site will store LPG cylinders (Class 2.1) in the workshop area, which are to be used as fuel for the forklifts. The LPG quantity to be stored on-site is 3 tonnes at all time. The method of gas cylinder storage would comply in accordance with AS 4332-2004: "The storage and handling of gases in cylinders". Up to 7,200 L (water capacity) is expected to be required. As the LPG cylinders would be stored without other gases the storage area would also need to comply with AS/NZS 1596: 2008 The Storage and Handling of LPG Gas. Then cylinders would be held in a secured cage over the loading dock area and outside the building on the east facing side.

4.2.3 Corrosive Substances (Class 8)

Corrosive substances to be used at the proposed operations are 182 RTU Positive Developer and Batteries used in two forklifts. The Positive Developer would be stored separate from the flammable and combustible liquids, separated by bunding and 5 m distance. The total estimated volume of corrosive materials stored is 18.1 m^3, as detailed in Table 4-2. Provision for natural ventilation and method of storage would be established in accordance with the AS 3780-2008: "The Storage and Handling of Corrosive Substances".

Two forklifts powered by batteries would be used on-site, with the capability of 5 hours of operation per charge/discharge. A designated battery storage/charging room is provided on the west side of the paper store. Four batteries would be stored and charged within the designated area of 10 m x 2 m. The maximum volume of corrosive solution within the batteries, based on the maximum volume available for the commercial battery of a forklift is 16.1 L. The total amount of corrosive solution from the batteries is 64.4 L. As the charging process begins, hydrogen gas would be released from the battery itself, thus natural ventilation would be needed to ensure proper dispersion of the hydrogen gas, in accordance with AS 2676.1- 1992: "Guide to the Installation and Maintenance, Testing and Replacement of Secondary Batteries in Buildings" and AS 3011-1992: "Electrical Installations—Secondary Batteries Installed in Buildings".

4.2.4 Preliminary Fire Protection Requirements

A preliminary fire safety assessment detailing specifications on fire protection measures required has been prepared by the Global Asset Protection Services. The summary of recommendations provided from the assessment is listed as follows (refer to Attachment 2 for details):

- Automatic sprinklers to be installed in all buildings and covered areas. Areas to be examined have been specified in the report;
- Automatic sprinklers to be installed in storage areas subject to further evaluation of other design factors;
- A 3-hour fire rated wall between the paper store and the production area has been recommended based on the high risk and value of goods at stake. All openings should also be 3-hour fire rated with automatic closing mechanism;
- All fire alarms should be connected to a locally approved fire alarm panel with alarms transmitted to a constantly attended location;
- Protect the diesel generator with automatic sprinklers and 2 hour fire rated separation; and
- All building construction materials used should be non combustible/non plastic.

Refer to Attachment 2 for further details. A fire safety study would be prepared on receiving development consent and prior to a construction certificate being issued.

4.3 DANGEROUS GOODS SCREENING AGAINST SEPP33 THRESHOLDS

Dangerous goods to be stored and used on site have been screened against thresholds outlined in the document "Applying SEPP 33 Hazardous and Offensive Development Application Guidelines". This initial screening process determines whether the proposal is potentially hazardous, and provides guidance on the level of analysis that is required. Table 4-2 below shows the amounts of each dangerous goods class on site, and whether the SEPP33 thresholds have been exceeded.

Table 4-2 shows the Dangerous Goods screening against SEPP33 Thresholds.

Table 4-2: Comparison of Screening Threshold Quantities by SEPP 33

Class	Description	Quantity to be stored	Threshold Quantity	Triggers SEPP33
Class 1.2	Explosives	None	N/A	N/A
Class 1.3	Explosives	None	N/A	N/A
Class 2.1	Flammable Gases (LPG)	7.2 kL[1]	16 m^3 (above ground)	NO
Class 2.2	Non-Flammable Gases	None	N/A	N/A
Class 2.3	Toxic gases	None	N/A	N/A
Class 3 PGI	Flammable Liquid	None	N/A	N/A
Class 3 PGII	Flammable Liquid	None	N/A	N/A
Class 3 PGIII	Flammable Liquid	2.5 m^3	1000 m^3 at 40 m distance	NO
Class 4.1	Flammable Solid	None	N/A	N/A
Class 4.2	Flammable Solid	None	N/A	N/A
Class 4.3	Dangerous when wet	None	N/A	N/A
Class 5.1	Oxidising Substances	None	N/A	N/A
Class 5.2	Organic Peroxides	None	N/A	N/A
Class 6.1	Toxic Substances	None	N/A	N/A
Class 6.2	Infectious Substances	None	N/A	N/A
Class 8 PGI	Corrosive Substances	None	N/A	N/A
Class 8 PGII	Corrosive Substances	< 0.1 m^3	25 m^3	NO
Class 8 PGIII	Corrosive Substances	18 m^3	50 m^3	NO
Class 9	Miscellaneous	None	N/A	N/A

Note: [1] – Water Capacity

The initial screening has shown that the storage amounts of Dangerous Goods on site do not exceed the SEPP33 thresholds. This indicates that the proposal is not classified as potentially hazardous. The amount of Dangerous Goods that is expected to be stored on-site does not exceed the threshold quantity in SEPP 33. Therefore, further assessment in accordance with SEPP 33 is not deemed necessary. However, assessment of potential events and consequences has been undertaken to assess the environmental risks.

4.4 HAZARDOUS AREA ZONING

This section outlines the hazardous area zones to be implemented at the proposed facility.

The hazardous area zones are required to enable the protection for electrical equipment to be determined. Specific protection techniques can be one or more of the following:

- Separation distances;
- Enclosures according to relevant Australian Standards;
- Flame proof rated electrical equipment;
- Intrinsically safe electrical equipment;
- Encapsulation of electrical devices;
- Vapour barriers;
- Ventilation; and
- Safety interlocks.

Hazardous areas are classified into one of three zones – Zone 0, Zone 1, and Zone 2. The type of protection required to prevent electrical equipment from being an ignition source depends on the Zone the electrical apparatus is contained within.

The definition of each Zone classification is provided below, as sourced from AS/NZS 60079.10:2004 – Electrical apparatus for explosive gas atmospheres – Classification of hazardous areas.

Zone 0 – A place in which an explosive atmosphere consisting of a mixture with air of flammable substances in the form of gas, vapour or mist is present continuously or for long periods or frequently.

Zone 1 – A place in which an explosive atmosphere consisting of a mixture with air of flammable substances in the form of gas, vapour or mist is likely to occur in normal operation occasionally.

Zone 2 – A place in which an explosive atmosphere consisting of a mixture with air of flammable substances in the form of gas, vapour or mist is not likely to occur in normal operation but, if it does occur, will persist for a short period only.

4.4.1 Hazardous Zones Applicable to the Site

As noted the site will be developed as a printing, warehouse and distribution facility with the following activities undertaken:

- Storage of flammable washing chemicals in the workshop area. There maybe some decanting of flammable liquids as required for washing equipment. All liquid materials will be stored in a bunded area;
- Storage of LPG cylinders for forklifts outside the workshop area;
- Drying of ink with potential emissions of organic hydrocarbon vapours originated from the petroleum distillate solvent used in ink;
- Gas exhaust from the dryer will be re-circulated with air for natural gas combustion in the dryer. Exhaust gases may contain light hydrocarbons as a by-product of solvent degradation; and
- Forklift battery charging area due to the potential release of hydrogen gas during the charging process.

4.4.2 Materials Requiring Hazardous Zone

The facility will involve the storage and use of Class 3 PG III flammable liquids with the potential during a spill to release flammable vapour. Drying of ink would have potential to release organic hydrocarbon vapours if heated and would then become flammable.

As noted earlier, exhaust gas from the drier may contain light hydrocarbons as a by-product of solvent degradation during the combustion of this solvent. Failure or pipe leakage could potentially lead to accumulation of flammable light hydrocarbons. There would also be the storage of LPG cylinders for forklifts, which would release flammable gas in the event of a leakage occurring. Although unlikely, the inherent flammability of these substances would require specific hazardous area zones to be established to minimise the risks of fire or explosion.

4.4.2.1 Class 3 PG III Flammable Liquids

The flash point of *VARN A230 Wash* is 38^{o}C as stated in the MSDS. A slightly more conservative approach has been taken in the hazardous area zoning.

The substance found in most flammable liquids to have the most extreme flammability data is Xylene. Flammability data of Xylene is outlined below, as defined by AS/NZS 60079.20:2000 – *Electrical apparatus for explosive gas atmospheres – Data for flammable gases and vapours, relating to the use of electrical apparatus:*

- Flashpoint: 30° C
- Lower Flammability Limit: 1.0 Vol. %
- Upper Flammability Limit: 7.6 Vol. %
- Ignition Temperature: 464° C
- T Class: T1
- Group: IIA

4.4.3 Areas Potentially Requiring Hazardous Zones

Equipment and areas where flammable liquids are stored will require hazardous area zones. Specifically as the flammable liquid would be stored in the ink tank farm, then the hazardous zone areas are limited to this farm. Areas where flammable liquids are used in cleaning would be examined on an individual basis and are not expected to require hazardous area zoning as a result.

Hazardous zoning would be established upon confirmation of design factors and accurate equipment locations at the construction phase of the project. Hazardous areas are considered to be restricted to the ink tank farm where the IBC's of Class 3 PG III flammable liquid would be kept.

5 HAZARD IDENTIFICATION

The hazard analysis and quantified risk assessment approach developed and recommended by the Department of Planning (formerly DIPNR) relies on a systematic and analytical approach to the identification and analysis of hazards and the quantification of off-site risks to assess risk tolerability and land use safety implications. The Department of Planning has advocated a merit-based approach, whereby the level and extent of analysis must be appropriate to the hazards present and, therefore, need only progress to the extent necessary for the particular case.

5.1 METHODOLOGY

The procedures adopted by this study for assessing hazardous impacts involve the following steps:

Step 1: Hazard identification;
Step 2: Hazard analysis (consequence and probability estimations); and
Step 3: Risk evaluation and assessment against specific criteria.

The following sections of the report discusses the hazard identification and analysis process as prescribed by the Department of Planning in the document *Hazardous Industry Planning Advisory Paper No 6* (HIPAP No. 6) – *Guidelines for Hazard Analysis* (Department of Planning 1992).

5.1.1 Hazard Identification

This is the first step in the risk assessment approach. It involves the identification of all theoretically possible hazardous events as the basis for further quantification and analysis. This does not in any way imply that the hazard identified or its theoretically possible impact will occur in practice. Essentially, it identifies the particular characteristics and nature of hazards to be further evaluated in order to quantify potential risks.

To identify hazards, a survey of operations was carried out to isolate the events which are outside normal operating conditions and which have the potential to impact outside the boundaries of the site. In accordance with HIPAP No. 6, these events do not include occurrences that are a normal part of the operational cycles of the site but rather the atypical and abnormal, such as the occurrence of a significant liquid spill during product transfer operations.

5.1.2 Hazard Analysis

After a review of the events identified in the hazard identification stage and the prevention/protection measures incorporated into the design of the site, any events which are considered to have the potential to result in impacts off-site or which have the potential to escalate to larger incidents are carried over to the next stage of analysis.

5.1.3 Consequence Estimation

This aspect involves the analysis and modelling of the credible events carried forward from the hazard identification process in order to quantify their impacts outside the boundaries of the site. In this case, these events typically include fire and the potential effects on people and/or damage to property.

5.1.4 Risk Evaluation and Assessment against Specific Criteria

The risk analysis includes the consequences of each hazardous event and the frequencies of each initiating failure. The results of consequence calculations together with the probabilities and likelihood's estimated are then compared against the accepted criteria, as specified by Department of Planning risk criteria applicable for the site. Whether it is considered necessary to conduct the predictions would depend on the probabilities and likelihood's estimated and if the risk criteria are exceeded.

5.2 ASSESSMENT CRITERIA

The risk criteria applied by Department of Planning is published in the document *Hazardous Industry Planning Advisory Paper No 4* (HIPAP No. 4) - *Risk Criteria for Land Use Safety Planning* (Department of Planning 1992). The following is a general discussion of the criteria that is used to assess the risk of a development on the surrounding community and environment.

5.2.1 Individual Fatality Risk Levels

The following paragraphs are reproduced from HIPAP No. 4 relating to individual fatality risk levels:

"People in hospitals, children at school or old-aged people are more vulnerable to hazards and less able to take evasive action, if need be, relative to the average residential population. A lower risk than the one in a million criteria (applicable for residential areas) may be more appropriate for such cases. On the other hand, land uses such as commercial and open space do not involve continuous occupancy by the same people.

The individual's occupancy of these areas is on an intermittent basis and the people present are generally mobile. As such, a higher level of risk (relative to the permanent housing occupancy exposure) may be tolerated. A higher level of risk still is generally considered acceptable in industrial areas" (Department of Planning 1992).

The risk assessment criteria for individual fatality risk are presented below.

Table 5-1: Individual Fatality Risk Criteria	
Land Use	Risk Criteria x 10^{-6}
Hospitals, schools, etc	0.5
Residential	1
Commercial	5
Sporting and active open space	10
Industrial	50

5.2.2 Injury Risk Levels

Injury risk levels from HIPAP No. 4 are stated below for heat of radiation.

- Incident heat flux radiation at residential areas should not exceed 4.7 kW/m^2, at frequencies of more than 50 chances in a million per year; and
- Incident explosion overpressure at residential areas should not exceed 7 kPa, at frequencies of more than 50 chances in a million per year.

The requirements for toxic exposure are stated as follows:

- Toxic concentrations in residential areas should not exceed a level that would be seriously injurious to sensitive members of the community following a relatively short period of exposure at maximum frequency of 10 in a million per year; and
- Toxic concentrations in residential areas should not cause irritation to the eyes or throat, coughing or other acute physiological responses in sensitive members of the community over a maximum frequency of 50 in a million per year.

Please note that a risk hazard assessment only examines events that are considered to have the potential for significant off-site consequences.

5.2.3 Risk of Property Damage and Accident Propagation

HIPAP No. 4 indicates that citing of a hazardous installation must account for the potential for propagation of an accident, causing a "domino" effect on adjoining premises. This risk would be expected within an industrial estate where siting of hazardous materials on one site may potentially cause hazardous materials on an adjoining premises to further develop the size of the accident.

The criteria for risk of damage to property and of accident propagation are stated as follows:

- Incident heat flux at neighbouring potentially hazardous installations or at land zones to accommodate such installations should not exceed a risk of 50 in a million per year for the 23 kW/m^2 heat flux level; and
- Incident explosion overpressure at neighbouring potentially hazardous installations, at land zoned to accommodate such installations or at nearest public buildings should not exceed a risk of 50 in a million per year for the 14 kPa explosion overpressure level.

5.2.4 Criteria for Risk Assessment to the Biophysical Environment

The assessment of the ultimate effects from toxic releases into the natural ecosystem is difficult, particularly in the case of atypical accidental releases. Consequence data is limited and factors influencing the outcome variable and complex. In many cases, it may not be possible or practical to establish the final impact of any particular release. Because of such complexity, it is inappropriate to provide generalised criteria to cover any scenario. The acceptability of the risk will depend upon the value of the potentially affected zone or ecosystem to the local community and wider society.

The suggested criteria for sensitive environmental areas relate to the potential effects of an accidental release or an emission on the long-term viability of the ecosystem or any species within it and are expressed as follows:

- Industrial developments should not be sited in proximity to sensitive natural environmental areas where the effects or consequences of the more likely accidental emissions may threaten the long-term viability of the ecosystem or any species within it; and
- Industrial developments should not be sited in proximity to sensitive natural environmental areas where the likelihood or probability of impacts that may threaten the long-term viability of the ecosystem or any species within it is not substantially lower than the existing background level threat to the ecosystem.

5.2.5 Assessment Criteria Applicable to the Proposed Major Project Application

The initial SEPP 33 screening did not classify the proposed operation as a potentially hazardous or offensive development.

An examination of potential hazardous incidents has been undertaken to assess environmental consequences and the adequacy of the safeguards needed.

5.3 HAZARD IDENTIFICATION CHARTS

Hazard Identification Charts have been prepared for the proposed site based on operating scenarios that are relevant to the proposed development. Each chart consists of four columns:

Column 1
Heading: Functional/Operation Area
The area of the site involved with the potential event is listed.

Column 2
Heading: Possible Initiating Event
The individual events that are considered to be likely or realistic are then listed. Where the possible consequences are similar the events are listed together, each one individually numbered.

Column 3
Heading: Possible Consequences
The outcomes of an event if it occurred are listed.

Column 4
Heading: Prevention/Protection Measures
The measures designed into the functional/operation area and the site are listed. These measures may include for example safeguards, design features, management methods and/or operator training.

Table 5-2: Event/Consequence Analysis Table

Functional/Operational Area	Possible Initiating Event	Possible Consequences	Prevention/Protection Measures
1. Ink Tank Farm	1. Tank leak / rupture while stored. 2. Open container spill. 3. Container knocked over or pierced by forklift tyne while being handled in store.	1. Prolonged leak escapes the bund, reaches empty spaces and enters stormwater drain(s). 2. Leak goes unnoticed and finds a source of ignition resulting in a pool or running fire in the store. 3. Fire spreads to involve all stored material. Pool fire can develop to involve whole bund. 4. Radiation from pool fire causes damage to living and non-living things surrounding the site, and may initiate a spread of fire.	1. Ventilation systems are installed in accordance with AS 1940-2004 in the ink farm using natural ventilation. 2. Hazardous zoning is implemented in accordance with AS 2430-2004 in the ink farm. 3. The ink tanks will be stored in an area complying with AS 1940-2004 including a fire rated wall and bunding. 4. Site induction is established on site for employees and visitors, which would address matters on safety, hazards, and procedures to adhere with on site. 5. Procedures, facilities and absorbent materials for spillage control are maintained on-site. Handled materials are supervised at all times. 6. Hot work permit system is established on site. 7. Smoking is not permitted on the site in exception to designated areas for smoking. 8. Trained emergency response/fire team is on stand-by during working hours to provide first response to emergencies. 9. Fire extinguishers are installed in accordance with the AS/NZS 1841-2007 series. 10. Fire hose reels are installed in accordance with AS/NZS 3504-2006 and AS 2444-2001 respectively. 11. Ink and other liquid consumables are stored in bunded area. Incompatible materials would be segregated as suggested by the MSDS. 12. Minimal handling of liquid chemicals, limiting the likelihood of spills. 13. Spill control kits are available.

Table 5-2: Event/Consequence Analysis Table

Functional/Operational Area	Possible Initiating Event	Possible Consequences	Prevention/Protection Measures
2. Loading / Unloading Area	1. Leak during goods movement. 2. Rupture of the hose during tanker transfer. 3. Tanker drives away with hose still connected. 4. Tanker rupture.	1. Spillage contained in bunded area. 2. Spill enters stormwater drain(s). 3. Vapour from bund contents finds a source of ignition and a pool fire develops in the bund. 4. Radiation from pool fire causes heating of adjacent areas, thus spreading the fire. 5. Toxic vapours / clouds are formed due to evaporating pool or pool fire.	1. Tanker unloading area is bunded in accordance with AS 1940-2004. 2. Tanker unloading area is naturally ventilated in accordance with AS 1940-2004. 3. Tanker unloading area has appropriate hazardous area zones according to AS 2430-2004. All electrical equipment is appropriate to the hazardous zone it is within. 4. The site would be protected via hose reels, hydrants and fire extinguishers and are installed and maintained in accordance with the relevant Australian Standards. 5. Spill kits are readily available for treatment of spills 6. Site induction is established on site for employees and visitors, which would address matters on safety, hazards, and procedures to adhere with on site. 7. Appropriate emergency procedures would be available for the site and all staff will be trained in the appropriate emergency procedures 8. Transfer equipment would be earthed to prevent build up of static electricity that could initiate a spark. 9. The building has sufficient separation distances from existing nearby properties and structures to prevent the spread of fire. 10. Transfer operations would be supervised at all times. 11. Delivery system has emergency shut-off valves.

Table 5-2: Event/Consequence Analysis Table

Functional/Operational Area	Possible Initiating Event	Possible Consequences	Prevention/Protection Measures
3. Battery Storage/Charging Area	1. Forklift accident, causing spillage of limited corrosive substance. 2. Leak of corrosive substance due to faulty or damaged batteries.	1. Spill is immediately detected and cleaned up without incident. 2. Spillage of corrosive substance escapes to stormwater 3. Spilt materials come into contact with incompatible substance	1. Forklifts regularly inspected and damaged batteries are removed from the Warehouse. 2. Employees are in regular attendance of Warehouse and control action can be immediately implemented. Buildings are locked when unattended. 3. Incompatible substances not stored within the same areas. 4. Batteries would be stored in accordance with AS 3011-1992 and AS 2676.1-1992. 5. Procedures, facilities and absorbent materials for spillage control are maintained on site. 6. Emergency evacuation plan and emergency response plan involve adjoining warehouse occupants are implemented.
4. LPG Forklift Gas Cylinders	1. Gas cylinders valve left open when being replaced on a forklift. 2. Gas cylinder impacted by truck or vehicle.	1. Leak is noticed by distinctive odour and valve sealed. 2. Gas continues to escape and finds a source of ignition resulting in a fire. 3. Impact causes gas release and gas finds a source of ignition.	1. Forklift truck drivers are trained in the use, handing and fitting of gas cylinders. 2. Forklift truck drivers are trained in preventative measures if a gas leak occurs. 3. Valves always closed before removing connecting hose. 4. Forklifts turned off when replacing gas cylinders. 5. Gas cylinder storage located 3 m away from ignition sources. 6. Gas cylinders kept in a secure area, either within a cage or an enclosed area protected from impact. 7. Warning signs erected in accordance with AS/NZS 1596:2008. 8. Gas cylinder storage stored in accordance with AS/NZS 1596:2008. 9. Site emergency response plan in place. 10. Adequate fire safety provided near to gas cylinder storage.

Table 5-2: Event/Consequence Analysis Table

Functional/Operational Area	Possible Initiating Event	Possible Consequences	Prevention/Protection Measures
5. Fire due to paper dust build up.	1. Dust particles accumulate on electrical equipment and result in a fire. 2. Build up of dust occurs due to poor housekeeping and is able to support a fire. 3. Failure of ducting transferring trim off cuts and dust is released onto electrical equipment.	1. Fire occurs. 2. Sprinklers activated. 3. Fire is extinguished. 4. Fire fighting water collected onsite by the containment system.	1. Routine housekeeping maintains cleanliness of the facility; this is a standard requirement in magazine printing. 2. Dust and trim collection system operates to a high level of efficiency. 3. Equipment would be well maintained. 4. Paper dust is coarse and unable to result in a dust explosion. 5. Building fully protected by fire sprinklers.

5.4 DISCUSSION

The events identified above are unlikely to happen, due to the amount of materials that are stored and in use at any point of time. Implementation of hazardous zoning would minimise the probability of having ignition source, hence reducing the likelihood of fire event. In addition, there would be spill and fire protection equipment onsite.

Flash fire of natural gas is unlikely as ventilation system would allow sufficient air circulation, preventing accumulation of organic vapour in the area. All electrical equipments used would be intrinsically safe as required by hazardous zoning, therefore limiting ignition sources.

Fire resulting from liquid spill is minimal due to the amount of flammable (Class 3 PG III) materials stored and used on site. The material would not readily evaporate (flash point of 38^{o}C) and hazardous zoning would limit ignition sources, significantly reducing the chance of fire happening. Fire rated wall of 240 x 240 x 240 would be installed to isolate the ink farm, altogether with sprinklers and fire extinguishers system that would be readily accessible.

Dangerous and hazardous materials are stored within bunded wall, with spill kit nearby, thus the possibility of it escaping to the storm water drain would be minimal.

6 ENVIRONMENTAL SAFEGUARD PROCEDURES

The proposed design and operation of the facility would include environmental safeguards to provide sufficient protection to the site such that if a pollution incident occurred, there would be minimal impact to the natural environment or nuisance caused to the amenity of adjacent occupiers of neighbouring premises.

These safeguards would enable the majority of the untoward events associated with storage, handling and process operations to be contained avoiding pollution incidents or off-site hazards. This section of the report provides a summary of these environmental safeguards.

All of the procedures and environmental safeguards outlined would be implemented as part of the site's operational activities.

Procedures would be prepared for the following:

- Identification of flammable and combustible liquids;
- Storage and handling of flammable and combustible liquids;
- Use of fire fighting equipment;
- Safe forklift operating procedure;
- Use of static earth straps;
- Safety inspections;
- Spill Procedure;
- General emergency procedures;
- Fire and explosion emergency procedures;
- Evacuation procedure;
- Medical emergency procedure;
- Environmental housekeeping; and
- Operation of the fire fighting water containment system.

As part of these procedures, it is essential that hardware is provided on-site in close proximity to the dangerous good storage areas. This would include:

- Means of isolating a spill would be held in designated areas and clearly signposted;
- Fire protection would rely heavily on the use of fire extinguishers and hose reels;
- Location of dangerous goods to assist in reducing the hazard to fire fighters and to maximise the ability to control fires;
- Site declared non-smoking areas and clearly signposted;
- Signposting of each bunded area includes the Hazchem sign, depot number, and necessary warning signs and location of the spill control kits;
- Marking boundaries of the hazardous area zone; and
- It is recommended that an emergency response plan with chemical register and manifest be prepared and located at the entrance to the general office. The manifest is now usual practice and aids the fire brigades by providing the following information:
  - Manifest plan;
  - Material Safety Data Sheets; and
  - Products stored in each bunded area.

6.1 ENVIRONMENTAL MANAGEMENT PROCEDURES

The following environmental management safeguards would be in use on site. Some of the procedures also achieve safety objectives:

- Spill Control Procedure;
- Use of Chemical Spill Kits;
- Personnel Entering Hazardous Area Zones;
- Site Isolation from Stormwater;
- Ventilation of Work Areas;
- Reporting Environmental Incident;
- Preventative Maintenance on Environmental Management Equipment;
- Fire Management;
- Emergency Response Procedure;
- Emergency Evacuation Procedure;
- Environmental housekeeping; and
- Training of a first response fire crew.

As part of these procedures, the essential hardware would be provided on-site in close proximity to the appropriate areas.

7 CONCLUDING COMMENTS

This risk assessment evaluation has found that the operation of the proposed development meets the criteria provided in the SEPP 33 Screening Thresholds, and would not cause any risk, significant or minor, to the community. Furthermore, the site's proposed operations are not an offensive or hazardous industry based on the applicable Department of Planning guidelines.

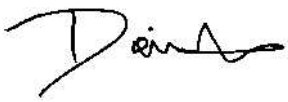
The subject site is located within the Erskine Park Employment Area. The proponent would be the pioneer printing industry within the existing Industrial Area and would build and operate a world class facility. Due to the nature of the operations on the subject site, it is expected that there would be no increase in hazardous risks to the existing or future occupants of the industrial area.

We recommend that the assembly point during the case of emergency needs to be located in front of the site at Lenore Drive, outside the warehouse area.

It is the conclusion of this assessment that the proposed site and its operations would meet all the safety requirements stipulated by the Department of Planning. Hence, this facility would not be considered to be an offensive or hazardous development.

This concludes the risk assessment evaluation.

Prepared by:



Duke Ismael
Environmental Engineer

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Environmental Engineer

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Principal Consultant

8 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.

REFERENCES

AS/NZS 2430:2004 – "Classification of Hazardous Areas" series of standards

AS/NZS 60079:2005 – "Electrical Apparatus for Explosive Gas Atmospheres" series of standards

AS/NZS 1596:2008 – "The Storage and Handling of LPG Gas"

AS/NZS 60079.10:2004 – Electrical apparatus for explosive gas atmospheres – Classification of hazardous areas

AS/NZS 60079.20:2000 – Electrical apparatus for explosive gas atmospheres – Data for flammable gases and vapours, relating to the use of electrical apparatus

Department of Planning 2002
Hazardous Industry Planning Advisory Paper No. 4 (HIPAP No.4) – Risk Criteria for Land Use Safety Planning

Department of Planning 1992
Hazardous Industry Planning Advisory Paper No 6 (HIPAP No. 6) – Guidelines for Hazard Analysis

Department of Urban Affairs and Planning, 1997
Multi-Level Risk Assessment, September 1997

SEPP 33, 1994
State Environmental Planning Policy No. 33 (SEPP 33), November 1994

ATTACHMENTS

DAY

VARN A230 WASH

Hazard Alert Code: MODERATE

Chemwatch Material Safety Data Sheet *Revision No: 4* *Chemwatch 8530-05*

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 9706 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.
S45	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.

VARN NATURAL WASH

Hazard Alert Code: MODERATE

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 9796 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.
S45	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.

VARN PROWEB PLATINUM

Hazard Alert Code: MODERATE

Chemwatch Material Safety Data Sheet (REVIEW) *Revision No: 4* *Chemwatch 4676-00*

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

VARN WEBSPEED AC

Hazard Alert Code: MODERATE

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.*

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Mark Georgiadis – Roberts Weaver
Projects Director

mark.georgiadis@robertsweaver.com

Our reference
PBL Media, Sydney NSW Australia
New Printing Facility

February 13, 2009

Dear Mark,

Further to our meeting and subsequent provision of the project proposals I have prepared our summary and first draft fire protection specifications in the following pages.

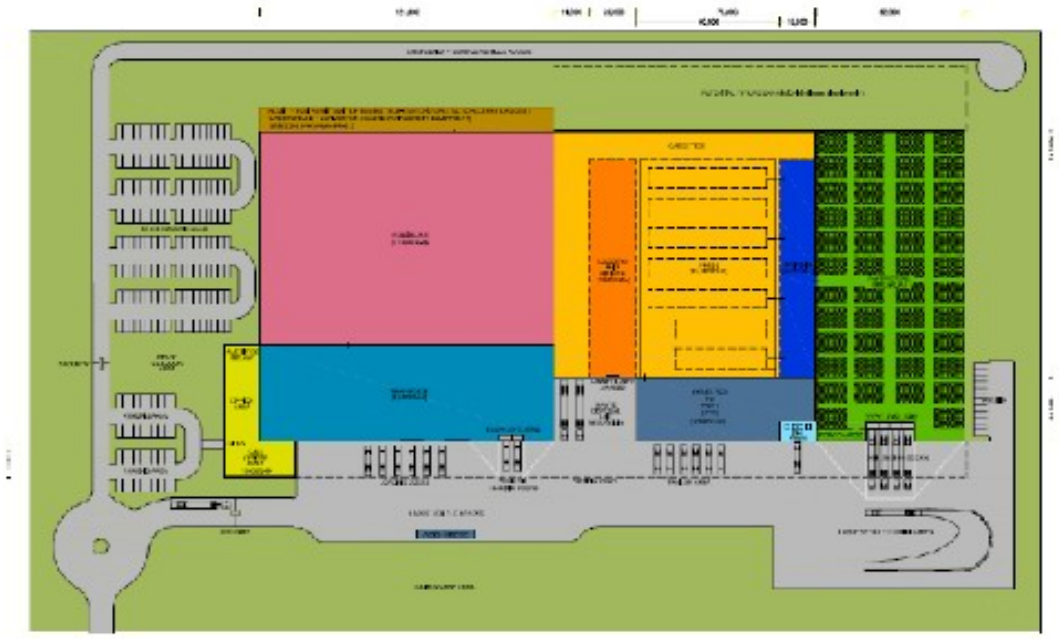
If you have any questions or comments please don't hesitate to contact me.

Yours sincerely
GAP SERVICES

Rick Lascelles
Technical Advisor – Asia Pacific

PROJECT SUMMARY

This is a proposed new purpose built printing facility to conduct all ACP printing requirements. It will be located in the western suburbs of Sydney. Operations will include web off set printing presses (5 large + 2small) within acoustic enclosures, Finishing, binding and stitching operations. Current plans are to lease the building and possibly the equipment. Total Insured Value for the project is expected to exceed $500 million. Conceptual layout is shown below.



Approximate building allocation is as follows:

- Publishing 11,200 m²
- Press 9,100 m²
- Loggers & Winding 1,400 m²
- Strip and Splice 800 m²
- Intermediate Store 2,000 m²
- Office and Production Support Facilities 1200 m²
- Paper Storage 8,000 m²
- Computer to Press 1,200 m²
- Computer Room
- Ink farm 80
- Receivables and Dispatch 30 1
- Workshop, Spare Parts & Consumables – 1,000 m²
- Awning space - 3,750 m²

Important design parameters noted are:

- Roof peak to 13m.
- Ridge vents proposed.

- One MSDS was provided. This is for Heat Set Off set Printing Ink. The ink is noted as non water miscible, with Flash point greater than 100C. This is considered a Class IIIB liquid according to NFPA 30 (lowest hazard of all combustible liquids). ***All specifications are made on the assumption that no flammable inks are utilized in the printing process.***

Sydney is an ATC Earthquake zone 3, considered a relatively low risk. Extended freezing conditions are not expected.

Associated Hazards and Utilities

- Roll paper Storage, Intermediate storage area, Finished product storage
- Hydraulic systems?
- Condensing system – trim extraction – 350mm ducts, Dust control system – bag filters
- Bulk Ink storage – Ink Farm (class IIIB liquids)
- Computer to Press Area (CTP). Computer room with raised floor plus UPS.
- Gas fired dryers, with integral post combustion system. Town gas supply.
- Electrical power supply (10 MVA) – 6 transformers (owned by utility company).
- Compressed air supply
- Print presses *Koenig & Bauer AG* - Water cooled.
- LPG storage (forklifts).
- Diesel generator (8MVA).

Proposed Protection (Per Design Brief)

- ESFR sprinklers are noted for most areas.
- ESFR sprinklers to paper store (10m high roll paper, 13m ceiling).
- ESFR sprinklers in main manufacturing area, where storage is anticipated.
- Computer room - Gaseous protection and 2 hour fire separation. Remote environmental monitoring and alarms.
- Access control, 2m high chain link fence, CCTV coverage.
- Fire alarm system

SPECIFICATIONS SUMMARY

The following provides a summary of the loss prevention and protection recommendations. The Appendix provides further detailed requirements based on NFPA.

1. Specify in all fire protection contracts that working plans (shop drawings), relevant calculations and detailed equipment specifications be subject to acceptance by GAPS, prior to commencing work.

2. Automatic sprinklers: Full coverage should be provided in all buildings and covered areas including the following (areas sometimes overlooked)

    - Under all external awnings.
    - In all in plant offices.

- Under all mezzanines, floors or similar obstructions wider than 1.2m.
- The fire pump room.
- In the computer and satellite rooms (sprinklers always recommended even if gaseous protection is installed)

3. ESFR sprinklers are intended for use in storage occupancies. Their use in manufacturing and other non storage areas should be avoided, particularly where the following are present:

   - Large equipment that may obstruct water spray.
   - Anywhere that combustible liquids may be present (inks, oils etc).

   ESFR sprinklers are therefore not suitable for protection of the manufacturing equipment or for the storage of inks.

4. ESFR SPRINKLERS FOR STORAGE AREAS: There are a number of critical factors in determining whether ESFR sprinklers are suitable, as well as in determining the design requirements. The following is a list of critical issues which require confirmation before proceeding.

Subject	Recommendation	Comments from Project Management
Slope of roof	Must not exceed 10.7% (0.5 °), rise of 2 units in a run of 12.	Slope will be less than 0.5 degrees.
Type of commodity Stored	ESFR sprinklers are not recommended where flammable or combustible liquids are stored.	Storage areas will contain only paper type materials
Open top containers	ESFR sprinklers are not recommended where open top combustible containers (such as tote bins) are stored in racks.	No open topped containers planned.
Obstructions to sprinklers	Evaluate the proposed roof structure and bracing. In some cases, ESFR is not a practical option due to the extent of obstructions at the roof.	To be confirmed
Ceiling Height/storage height	Submit to GAPS the storage area ceiling height, and stack height. This is required to confirm the ESFR hydraulic design specification.	Maximum roof height is reported to be 13m. The following recommendations will be based on this height.
Storage rack shelves	Use open shelves only. Solid shelves are not allowed	To be confirmed
Rack storage flue spaces	Maintain flue space between pallet loads and in the longitudinal flue (75 – 150mm).	To be confirmed
Sprinkler head Obstructions	All potential obstructions to sprinkler heads must be addressed in the design sprinkler system review (see summary sketch below).	To be confirmed
Smoke exhaust	Automatic smoke exhaust is not allowed.	To be confirmed
Building Ventilation	Air movement can delay the operation of ESFR sprinklers. Locate sprinklers where air velocity does not exceed 1.52 m/s.	To be confirmed
Ridge Vents (also called gravity vents)	Ridge vents should be avoided if ESFR sprinklers are propoced. If planned, submit detail drawings showing the ridge vents arrangement. The only practical way to protect ridge vents and other similar vents that remain open to the atmosphere is by providing sprinklers beneath them at roof level or if vents are wider than 4.5 ft (1.37 m), installing a sub ceiling with sprinklers installed below.	Ridge Vents are planned. Details to be confirmed
Adjacent sprinkler systems	If an ESFR system is located beside an ordinary sprinkler system, a wall or draft curtain is required between the two systems. If a draft curtain is used, their must be a clear space (kept free of storage) of 1.5m on either side of the draft curtain.	To be confirmed

5. Roll Paper Storage: FM data sheets do not offer a protection scheme for the proposed ceiling height of 13m. The maximum allowable ceiling height is 12.2m. NFPA 13 however offers protection schemes using ESFR K-322, and K-363 (K-22, K-25) sprinklers, with limitations as follows:

   - For all ESFR designs the maximum storage height is 9.1m.
   - For ceilings > 12.2m up to 13.7m: Only heavyweight paper can be protected (i.e base weight > 20 lb/1,000 ft². *(Mediumweight paper can be considered heavyweight if wrapped completely on the sides and both ends, or where wrapped on the sides only with steel bands, in either a single layer of heavyweight paper with a basis weight of 40 lb/1,000 ft² or two layers of heavyweight paper with a basis weight of less than 40 lb/1,000 ft².*
   - For ceiling < 12.2m: Mediumweight paper can be protected for storage up to 9.1m high.

6. Sprinkler System Hydraulic Design Basis: Based on the information provided the following summarizes the hydraulic design requirements for the sprinkler systems:

	Hydraulic Design			Sprinkler head		Installation Requirements	
	Density (L/min/m²)	Operating Area (m²)	Hose stream (lpm)	K factor (lpm-bar)	Temp Rating (C)	Max. area per head (m²)	Head spacing
Office Areas / Canteen,	5	280	1,000	80	68 - 74	12.1	2.4 – 4.6
Computer rooms	5	280	1,000	80	68 - 74	12.1	2.4 – 4.6
Production areas, awnings, under mezzanines etc	6.0	280	1,000	80 or 115	68 - 74	12.1	2.4 – 4.6
Storage Areas	ESFR, 12" heads (4heads on 3 branch lines) at 3.45 bar pressure*		950	363	68 - 74	9.3	2.4 – 3.1
Roll paper Storage**	**						

* *If there are obstructions requiring additional sprinklers (such as under ducts or cable trays) hydraulic design may require up to 14 sprinklers operating*

** Protection of roll paper area is subject to further evaluation per above discussion

7. Provide a 3 hour fire rated wall between the paper store and the production area. Protect all openings with automatic closing 3 hour rated fire doors. *I understand the team would prefer to not provide a fire rated wall but this is considered important with the high risk and values at stake.*

8. Fire Pumps and Tanks: Provide the following:

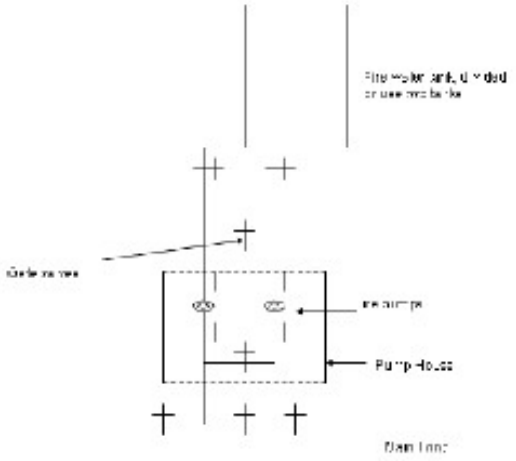
   - Two aboveground firewater tanks (steel or concrete) and an aboveground fire pump house (non combustible building).
   - Two UL/FM listed fire pump installations in accordance with NFPA 20, driven by diesel engine drivers.

- Pumps should be sized to meet the maximum sprinkler system and hose stream requirement for the required duration. The following pump/tank specifications are based on K-363 ESFR sprinklers, with operating pressure of 3.45 bar.

	Estimated Sprinkler demand (lpm)	Hose streams (lpm)	Total Demand (lpm)	**NFPA 20 pump flow (lpm/bar)**	Storage tank capacity
K-25 ESFR	8820	950	9770	**9462/8.6**	600,000L X 2

- Discharge Piping: Provide two connections from the fire pump house to the looped mains. Provide sectional control valves on the loop mains between the two connections and on either side.
- Suction Piping: Provide independent suction pipes from each tank to each fire pump and a valved cross connection between the two lines.

TYPICAL ARRANGEMENT – MAIN PIPING



9. Fire water mains: Provide underground looped mains to supply hydrants and sprinkler systems. Mains should be run around the perimeter of the building, with the following specifications:

   - The use of locally approved Blu Brut or equivalent.
   - 250mm diameter mains.
   - Fire Hydrants: Provide external fire hydrants spaced at 91m around the loop. Hydrants should be at least 12.2m from building walls.
   - Install hose reels in the all parts of the building as required by local codes. In warehouse areas provide sufficient hose reels so that each pipe is accessible by two hose streams.

- Feeds from the loop to sprinklers systems should be one feed line per sprinkler system riser. (Note: NFPA requires one sprinkler for every 3,720 m² of storage area and 4,830 m² of non storage areas.
- Install post indicator gate valves on the loop and sprinkler system feeds. Provide enough valves so that no more than five items (sprinkler system or hydrant) are located between any two valves.

10. All fire alarms should be connected to a locally approved fire alarm panel with alarms transmitted to a constantly attended location.

11. All key equipment (fire pumps, diesel engine drive, controller, fire protection valves, fire alarm equipment, sprinkler heads, etc) are required to be UL listed or FM approved.

12. Please provide more information on the CTP area. It is not clear what this is.

13. If there are any significant hydraulic systems we will need to know the details to allow development of specifications.

14. The condensing system will likely have a bag filter house associated with it. It appears this will be a critical system with for a damaging fire. Sprinkler protection inside such bag filter houses is recommended.

15. Submit details of the bulk Ink storage area (Ink Farm) (class IIIB liquids) when known. Ordinary sprinkler protection will likely be required (no ESFR sprinklers as specified in the design brief).

16. Protect the computer room as proposed but the following additional requirements:

    - Provide sprinkler protection in the room regardless of whether gaseous protection is installed.
    - Use a clean agent gaseous protection system designed in accordance with NFPA 2001.

17. Install combustion safeguards on the gas fired dryers, in accordance with NFPA 86. Key features are:

    - Double safety shut off valves.
    - High/Low pressure switches
    - Flame detection

18. Protect the diesel generator with automatic sprinklers and 2 hour fire rated separation.

19. Kitchen cooking equipment: Confirm details. May require protection of cooking areas and ducts.

20. Cooling towers: If important cooling towers with combustible fill are proposed. Submit details for review. These may require special protection.

21. Building design need only comply with the latest Australian Standards requirements. This includes windstorm design uplift pressure.

22. Flood Exposure: Provide the following information regarding the flood risk of the site:

    - Confirm there will be no critical equipment located below.
    - Confirm the elevation of the first floor.
    - Confirm historical flood levels for the proposed site

23. Materials of construction. All building construction materials used should be non combustible/non plastic. Refer any proposed use of plastics in construction to GAPS for review. Consider such things as:

    - Building insulation
    - Pipe and duct insulations
    - Press acoustic enclosures

24. Outside Exposures Provide details of the expected exposures from surrounding facilities.

25. Roof drainage Design the drainage system to handle the worst case rain storm. Include emergency provisions should the roof drains become blocked.

26. Lighting: If High Intensity Discharge (HID) lighting is proposed, avoid Metal Halide type. If Metal Halide lights are used, specify a type with a secondary containment barrier (borosilicate or tempered glass) to capture hot glass fragments.

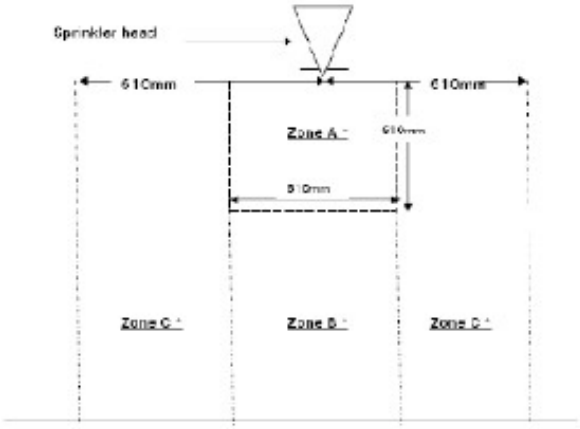
27. Specify HVAC systems as follows:

    - Use only non-combustible materials. Materials include: steel, aluminum or Class 0 or Class 1 equipment as tested by or under the "Standard for Factory Made Air Duct Materials and Air Duct Connectors", (UL-181).
    - Use materials with a flame spread rating not over 25 without evidence of continued progressive combustion and fuel contributed with smoke developed ratings not over 50 when tested by air under the "Method of Test of Surface Burning Characteristics of Building Materials" (ASTM E-84, UL-733, NFPA-255).
    - Specify Class 1 type, when tested by or under the "Standard for Air Filters Units", (UL-900).
    - Make the connection ahead of normal disconnects that may be exercised during normal fire department operations.

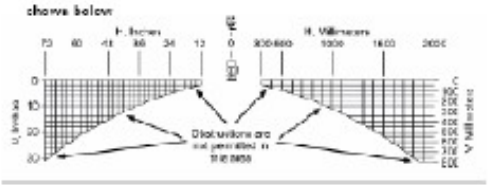
APPENDIX – NFPA Standard requirements

ESFR Obstruction Rules Summary

OBSTRUCTION RULES FOR PENDENT ESFR SPRINKLERS



- Zone A No obstructions are allowed (see also diagram below for beams etc).
- Zone B: Continuous obstructions no more than 50mm wide only.
- Zone C: Continuous obstructions no more than 300mm wide only, or two continuous (lights) no more than 610mm.
- Outside of Zone A, B,C: Obstructions no more than 610mm wide are allowed. Wider obstructions require sprinklers underneath.
- No solid obstructions such as beams are allowed within the white zone shown below



Sprinkler Systems:

Subject	Recommendation
Type of sprinkler heads	Do not use conventional ("old style") sprinklers.
Sprinkler System arrangement	Each sprinkler system should be supplied by an alarm check valve, equipped with an outside water motor gong and a connection to the fire alarm system.
Protection area per sprinkler riser.	Provide one alarm check valve for each 4,830* m² of floor area on the same building level. (3,720 m² for warehouse and high hazard areas).
Sprinkler System Calculations	Each sprinkler system must be designed using hydraulic calculations using the methods outlined in NFPA 13.
Sprinkler Pipe Specification	Use schedule 40 pipe if pipe is to be joined by threaded type or cut grooves.
Pipe joining	• Do not use screwed/threaded unions for pipe > 50mm. • Do not weld insider the building. • Shop welding should be conducted by a qualified person meeting all requirements of NFPA 13.

Pipe Fittings	Use a one-piece reducing fitting should wherever a change is made in the size of the pipe.
Sprinkler Head Obstructions	Sprinkler layout must consider obstructions as follows: • In the early stages of design, coordinate the branch line layout with beams, purlins etc. to avoid obstruction to sprinkler heads. • Locate sprinklers to avoid obstructions from beams, lighting or other fixtures. • Extend sprinklers below any duct, platform or other continuous obstruction > 1.2m wide. • Upright heads on branch lines more than DN80 require sprigs. • Sprinklers on armovers must be located to avoid the obstruction caused by the branch line.
Sprinkler head position	Location heads with respect to the ceiling: • Standard spray sprinklers, 25 - 305mm. • ESFR K-14, 17, 150 – 356mm • ESFR K-22, 25 – 152 – 457mm
System pressure relief.	If gridded type piping system is used, install a 6.4mm relief valve on the system.
Flushing connections	Provide flushing connections for each system as outlined in NFPA 13.
End of line test drain	Install a 25mm end of line drain on the remote branch line of each sprinkler system. This should be fitted with a 15mm nominal orifice outlet (open sprinkler head)
Pipe support hangers spacing	Spacing between pipe support hangers per NFPA13 (3.7m up to DN32 and 4.6m for larger pipe)
Final Testing	On completion, all piping must be hydrostatically tested at 14 bars, for 2 hours per NFPA 13. Contractors test certificates for aboveground and belowground piping should be completed.

Fire Pumps:

Subject	Recommendation
Pump house location	The pump house (and tank) should be detached, non-combustible and aboveground.
Required Pump characteristic curve	Select a pump with a maximum generated pressure (churn) that does not exceed the working pressure of the system components (1,206 kPa).
Jockey pump	Provide an 80 lpm rated jockey pump arranged to automatically maintain system pressure between 900 – 1000 kPa (approx)
Fire pump automatic start arrangement.	Arrange the system to start the pumps when mains pressure drops to 800 kPa, 700 kPa. (approx)
Pressure switch sensing lines installation	Install independent pressure sensing lines for each pump (and the jockey pump). Copper, brass or stainless steel. Connection between the pump's discharge check valve and discharge control valve. Refer to NFPA 20 for required arrangement. No shut off valve is allowed. Two check valves 5m apart with 1.5mm hole drilled in each.
Pump house Air supply	Provide adequate air supply to the pump house to meet the running requirements of the diesel engine.
Pipe size	250mm suction and discharge pipes
Suction pipe	• Provide suction piping equipped with an elbow, vortex plate and a flexible connection constructed of stainless steel hose and braid.
Suction Line fittings	• Strainers are NOT Recommended. • Avoid any unnecessary fittings (strainer, elbow, check valve) in the suction pipe. Where required, they should be at least 10 pipe diameters away from the suction flange.
Tank fill lines	Provide a connection to the town main for automatic tank fill. Also provide a larger fast fill connection.
Pump house heating	Heat to maintain above 4°C.
Pump house heating	Provide a water heater that will maintain the diesel engine jacket temperature at 120F (49C).
Pump Alarms	Provide the following alarms with annunciation at a constantly attended location: • DIESEL: Pump running, engine trouble, engine controller in the OFF or MANUAL position, fire pump house low temperature and suction tank low level and low temperature. • ELECTRIC: "Pump running", "power failure", "phase reversal", "pump house low temperature", "suction tank low level", and "suction tank low temperature".
Flow test equipment	Provide a listed flow meter arranged to discharge back over the top into the suction tank or reservoir. Install the meter strictly as required by the manufacturer.
Relief Valve (diesel pump)	Provide a full size pressure relief valve (diesel pump only) • 150mm relief valve • 250mm discharge piping. • Located between the pump and the pump discharge check valve, • Arranged to discharge into an open pipe, cone, or funnel secured to the outlet of the valve. • Set to operate at approximately 12 bars.

	Note: NFPA 20 allows the relief valve to be omitted if the maximum pump pressure (churn) is less than 10 bar.
Diesel Fuel tank	• Provide an indoor, above ground diesel fuel tank with a capacity equal to 4.2 L per engine horsepower. • Provide a curb around the diesel fuel tank.
Diesel fuel piping	Fuel piping should be rigid metal with flexible metal connections for the supply and return lines from the fire pump engine to the fuel tank.
Installation of pump/driver - Alignment	Align the pump and driver on site even if on a common base plate. Mount on a common grouted base plate, attached to a solid foundation. Check the alignment after grouting and periodically thereafter. The base plate should be completely filled with grout. Foundation bolts should not be fully tightened until the grout is hardened.
Final Acceptance Testing	An acceptance test should be conducted by the installing contractor in the presence of a GAPS representative. This test should demonstrate that the pump will perform in accordance with the manufacturer's certified characteristic curve and that the driver, accessories, all alarms and ancillary equipment are correctly arranged and in proper working order. GAPS can provide guidance on the appropriate test procedure if required.

Yard Mains

Subject	Recommendation
Pipe location	If the area is not subject to freezing, aboveground steel pipe or pipe in an open trench may be considered.
Pipe location	No buried piping should be located under a building.
Pipe depth	Buried pipe should be buried a minimum of 0.8m below grade, and 0.0m in trafficable areas.
Thrust blocks	Size and design thrust blocks per NFPA 24, located at each change of direction.
Testing	Fire mains (from the water supply to the system riser) and lead-in connections to system risers should be flushed before connection is made to sprinkler piping. Flush rate should be a velocity of 3.1 m/s.

Gaseous Extinguishing Systems

Subject	Recommendation
Agents used	Approved gases - Inergen (NFPA 2001), FM-200 (NFPA 2001).
Equipment	Use only UL listed or FM approved equipment.
Gas supply	Include a connected reserve supply of gas.
Detection	Activate the system by listed smoke detection (two zone).
Interlocks	Shutdown air conditioning/ventilation prior to gas discharge.
Time Delays	Install as required by the code to allow evacuation of the area before discharge.
Final Testing	Provide a full acceptance test of the completed system, including room integrity test and/or discharge test.

Rick Lascelles
Technical Advisor – Asia Pacific

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