UP Building and Construction Pty Ltd
10 High Street
PERTH WA 6000
T: (+61) 8 9200 1234
F (+61) 8 9200 1235

Works Approval Application
Foam Products Manufacturing Premises
25 Helensvale road Baldivis WA

SAMPLE

Prepared For:	Tiger Pty Ltd
Address :	100 St Georges Terrace Perth WA 6000
Report Number:	AP2016/232
Report Version:	V1
Report Date:	17 March 2017

DISCLAIMER

This document has been produced in accordance with and subject to an agreement between UP Building and Construction Pty Ltd **("UP")** and the client for whom it has been prepared **("Client")**. It is restricted to those issues that have been raised by the Client in its engagement of UP and prepared using the standard of skill and care ordinarily exercised by Environmental / Occupational Health and Safety consultants in the preparation of such documents.

Any person or organisation that relies on or uses the document for purposes or reasons other than those agreed by UP and the Client without first obtaining the prior written consent of UP, does so entirely at their own risk and should not alter their position or refrain from doing so in reliance of this document. UP denies all liability in tort, contract or otherwise for any loss, damage or injury of any kind whatsoever (whether in negligence or otherwise) that may be suffered as a consequence of relying on this document for any purpose other than that agreed by UP.

QUALITY ASSURANCE

UP has implemented a comprehensive range of quality control measures on all aspects of the company's operation.

An internal quality review process has been applied to each project task undertaken by us. Each document is carefully reviewed and signed off by senior members of the consultancy team prior to issue to the client.

SAMPLE

Document No: TBS2016-001_GEN_001_CD_V1

Report No: AP2016/232

Author:	Jane Citizen Project Environmental Scientist		17 March 2017
		Signature	Date
Reviewed by:	Joe Harris Principal		17 March 2017
		Signature	Date

DISTRIBUTION

NO. OF COPIES	REPORT FILE NAME	REPORT STATUS	DATE	PREPARED FOR	INITIALS
1	TBS2016-001_GEN_CD_V1	Final	17 March 2016	Tiger Pty Ltd	JC

SAMPLE

TABLE OF CONTENTS

SAMPLE

SAMPLE

TABLES IN TEXT

SAMPLE

ATTACHMENTS

LIST OF FIGURES

LIST OF APPENDICES

SAMPLE

LIST OF ABBREVIATIONS

AHD	Australian Height Datum
BOM	Bureau of Meteorology
°C	Degrees celsius
dB	Decibels
dB(A)	Decibels (weighted for human hearing)
DER	Department of Environment Regulation
DoW	Department of Water
km	kilometre
m	metre
MDI	Methylene diphenyl diisocyanate
mm	millimetre
m^2	Square meter
OH	Hydroxyl
PIR	polyisocyanurate
PM_{10}	Dust particles / particulate matter with an equivalent aerodynamic diameter of up to 10 micrometres.
PUR	polyurethane
t	tonnes

SAMPLE

1 INTRODUCTION

1.1 BACKGROUND

UP was commissioned by Tiger Pty Ltd (Tiger) to prepare a Works Approval Application to construct and operate a foam products manufacturing premises at 25 Helensvale road Baldivis WA, within the City of Baldivis, approximately 44 kilometres (km) south east of Perth, Western Australia (Figure 1,2).

1.2 PURPOSE

The purpose of this works approval application is to request approval to construct and operate a foam products manufacturing premises (Prescribed Premise Category 51), as required under Section 53 of the *Environmental Protection Act 1986*.

1.3 LICENSEE AND OPERATOR OF PREMISES

The licensee and operator is Tiger Profiles and Insulation LLC, a subsidiary of Tiger Pty Ltd. Tiger Profiles and Insulation LLC is a roof and cladding company with headquarters in Dubai, United Arab Emirates (UAE). Established in the UAE in 1993, Tiger Profiles and Insulation LLC has evolved over the past two decades to become the premier roofing, cladding and insulation proactive partner of choice; offering design, engineering, manufacturing and supply and installation services. Tiger Profiles and Insulation LLC are one of the largest producers and manufacturers of Z and C Purlins and polyurethane (PUR)/polyisocyanurate (PIR)/Mineral wool insulated panels, producing in excess of 2,600,000 m and 4,000,000 m^2 of these respectively. Products produced include roof and wall profiles, floor deck panels, sandwich panels, concealed fix wall panels, cold store panels, T-Seam® standing seam systems and cold formed sections. Further company information is available on the Tiger website http://www.tiger.com/.

Site address:

25 Helensvale road Baldivis WA

Licensee and Operator Postal Address:

Tiger Pty Ltd
100 St Georges Terrace
Perth WA 6000

Licensee and Operator Representative:

Mr Harry McMurphy
+61 404 123 456
harry.mcmurphy@gmail.com

1.4 LOCATION, TENURE, ZONING AND LAND USE

The premises will be located on 25 Helensvale road Baldivis WA (Lot 9500 on Deposited Plan 54135), a 33.0075 hectare site, in the suburb of Baldivis, within the City of Rockingham. Tiger will lease part of 25 Helensvale road (the site) as shown on Figure 2, from the owners (Spark Pty Ltd). The certificate

SAMPLE

of title for the site is provided in Appendix 1. The portion of the site that Tiger plans to lease is referred to in this document as the 'Tiger lease area'.

Boral Resources also lease part of the site, as shown in Figure 2 and in the lease area sketch provided in Appendix 1. The term of the Boral lease is 10 years commencing on 1 December 2008 with two consecutive five year options to renew. The Boral lease is for an office, workshop and transport depot and associated uses.

The site is zoned as 'Industrial' under the Metropolitan Regional Scheme and 'General Industry' under the City of Rockingham Local Planning Scheme No 2 (gazetted on 19 November 2004).

The previous land use is industrial with a building, offices, and hardstand existing within the Tiger lease area.

1.5 LOCAL GOVERNMENT AUTHORITY

The site is located within the City of Rockingham. Tiger will be submitting a development application in the near future.

SAMPLE

2 PROPOSAL DESCRIPTION

2.1 BACKGROUND

2.1.1 Prescribed Premises and Applicable Regulations

Tiger propose to establish a foam products manufacturing premises, which under Section 53 of the Western Australian *Environmental Protection Act 1986* is categorised as a 'Prescribed premises' as it may c*ause an emission, or alter the nature or volume of the waste, noise or odour or electromagnetic radiation emitted from the prescribed premises'* (Section 53(1)).

Under Schedule 1 of the *Environmental Protection Regulations 1987* a foam products manufacturing premises is categorised as 'Foam products manufacturing: premises on which resin is used to prepare or manufacture plastic foam or plastic foam products using MDI (diphenylmethane di-iso-cyanate) or TDI (toluene-2, 4-di-iso-cyanate)(prescribed premises 51).

Tiger is obliged to comply with the following legislation:

- *Environmental Protection (Unauthorised Discharges) Regulations 2004*, which pertain to management of stormwater.
- *Environmental Protection (Controlled Waste) Regulations 2004*, which pertain to management of controlled waste.
- *Environmental Protection (Noise) Regulations 1997*, which specify requirements for noise levels.

Relevant Dangerous Good Code and legislation

2.1.2 Environmental Standards

The DER currently has no Environmental Standards for the operation of foam products manufacturing, and best practice guide in the Australian industry is currently available.

At the time of preparing this document, the DER had released the following Environmental Standards in draft form, which may be relevant to the proposal and therefore have been considered during the preparation of this document:

- *Environmental Siting* (DER, 2016a)
- *Separation Distances* (draft) (DER, 2015)
- *Risk Assessment* (DER, 2016b)
- *Draft Guideline on Environmental Noise for Prescribed Premises* (DER, 2016c)

2.2 EXISTING INFRASTRUCTURE AND UTILITIES

No sewer connection to the site, Tiger Resources will install a suitable Aerobic Treatment Unity (ATU) to handle on-site effluent requirements from kitchen, messing and ablution facilities.

2.3 CONSTRUCTION ACTIVITIES

The existing building will be extended as shown in Figure 2 to provide and enclosed structure capable of enclosing the production line liquids stores and product warehouses.

SAMPLE

The existing hardstand area will be extend to cover all trafficked areas.

The extended building will match of the existing structure and consist of tilt-up slab/colourbond type wall and roof on an impermeable concrete floor.

The fabrication line will be delivered to the site in a pre-fabricated form and assembled within the building (See Figure 3).

2.4 OPERATIONAL ACTIVITIES

2.4.1 The Manufacturing Process

The facility is highly automated with all key items of infrastructure installed within a single long building (Tilt up slab and colourbond).

The key raw materials are:

- Steel sheeting of various gauges received in rolls/coils
- Pentane; (used as the blowing agent)
- Polyester and Polyether Polyol (Polyol); and
- Methylene diphenyl diisocyanate (MDI)?
- (Any stabilisers or Colourants?) 2 or 3 reacting additives (catalysts) and colour

The facility incorporates storage facilities for the raw materials. The steel plate is stored in a warehouse (See Figure 4). The pentane is delivered by bulk tanker and stored in a 30kL below ground double-walled storage tank. The Polyol and TDI are delivered in 1 kL Intermediate Bulk Containers (IBCs). These are stored in a bunded storage area adjacent to the production line (See Figure 4).

Four 1600L day tanks are sited in the bunded area as well and are feeding the reactants to the production line for foam manufacture.

The IBCs are stored in an overstock area to buffer sufficient material for a continuous production. From the overstock area the IBC are moved to the discharge platforms using a forklift or crane and placed onto IBC grid frames with spill collector bins. The IBC are individually connected with cut-off valves to a common pipeline separated for each component and the feedstocks are transferred to the day tanks using totally sealed piping systems. The MDI Day tank incorporates carbon filters on the vent to capture any TDI fumes displaced during the filling process. A recycling system is used when changing to a different Polyol to avoid any disposal or material waste.

The process commences at the western end of the building when twin rolls of steel are fed into the automated production line. The lower roll is formed to provide the top and bottom edges for the panel and then fed into an enclosed and ventilated cabinet where the foam is introduced.

The foam is manufactured by drawing the Polyol and TDI from the 1600L stainless steel day tanks. These are metered and mixed together with reactants at a carefully controlled rate and ratio to produce an optimised foam formulation. The reactants are metered into a delivery pipe and associated heat exchanger which is used to achieve the optimum reaction temperature. The pentane blowing agent is introduced into the polyol blend in the pipe system just before the mix head and

SAMPLE

then mixed together via mixing nozzles in an impingement mix head to form polyurethane foam which is then discharged on the lower metal panel to form an even and expanding layer of foam. The upper steel panel is joined with the lower panel and the complete panel is formed by bonding the upper panel to the lower with the expanding foam. The expanding foam is encapsulated between the top and bottom layer of steel and side sealing tapes to cover the foam on each left and right side. When entering the double belt the sides are kept in place against the expanding foam with side plastic chains.

The complete foam mixing and laydown is enclosed in a ventilated area categorized as safety zone. (See Figure 5 for the arrangement of this ventilated foam cabinet). The ventilation rate for the foam cabinet is 5700 m3/hr. The ventilation rate is determined in order to ensure that the pentane concentration (Pentane is the reactant released in the greatest concentration during the reaction) is kept well below the Lower Explosive Limit (LEL) of 1.4% V/V. The required ventilation rate to ensure that the LEL is never reached in the cabinet is 1621 M3/hr. The dilution volume is set at approximately 3.5 times that required to provide a good factor of safety. MDI is released at far lower concentrations than Pentane as it almost entirely consumed in the foam making reaction. At 5700 m3/hr the MDI concentration in the discharge air should not exceed the STEL value of 0.07 mg/m^3.

The completed panel exits the double belt conveyor after the foam is hard and cured and is then cut or formed to length to meet the client specifications.

The foam manufacturing reaction occurs rapidly and in a completely enclosed environment maintained under negative pressure. The negative pressure in the cabinet is maintained by an induction fan located adjacent to the discharge stack. The raw materials are introduced in carefully controlled ratios with the aim of ensuring total consumption of all the raw materials (particularly the TDI which is very toxic). Notwithstanding the careful formulation and control of the process, there is inevitably some small amount of TDI released from the foam while it is setting. It is for this reason that the deposition of the foam occurs in a controlled and ventilated environment so that the small quantity of unreacted TDI is heavily diluted to a low concentration before it is discharged to atmosphere from a 15 m high stack located adjacent the building and extending at least 2.5 metres above the highest point on the rood. This approach to controlling exposure TDI is accepted industry best practice and approved by various inspection agencies such as TÜV Germany.

The manufactured panel products is directed to a packaging facility and then taken to a warehouse storage facility.

2.4.2 Chemical Inputs

The three key ingredients are:

- Aromatic polyester polyols provide insulation, improved flammability and structure performance to the panels.
- The isocyanate to be used is RUBINATE®1850 isocyanate a hazardous chemical, which is comprised of Methylene diphenyl diisocyanate (MDI) (the safety data sheet is provided in Appendix X). MDI is used in rigid foam applications.

SAMPLE

- The blowing agent to be used is n-pentane. N-pentane produces low density foams with low thermal conductivity but is a flammable chemical. N-pentane is persistent in air, soil and water and is highly mobile.

Tiger will use three typical formulations to make foam products. The chemical makeups of these typical formulations are listed in Table A.

TABLE A: TYPICAL FORMULATIONS

Chemical	Standard Hydroxyl (OH) Polyol		Low OH Polyol		Low OH Polyol with high FR	
	PHP	**% Total**	**PHP**	**% Total**	**PHP**	**% Total**
Aromatic Polyester Polyol -Std OH of 240 - Low OH of 208	100	30.50	 100	 33.18	 100	 32.4
Tris (1-chloro-2-propyl) phosphate	10	3.05	9.2	3.05	15	4.9
K-octoate (15% K)	6	1.83	5.5	1.83	5.66	1.83
K-acetate (10%K)	1	0.30	0.92	0.30	0.94	0.30
JEFFCAT®PMDETA catalyst	0.2	0.06	0.18	0.06	0.19	0.06
Silicone surfactant	2	0.61	1.84	0.61	1.88	0.61
Iso-and/or n-pentane	22	6.71	20.22	6.71	20.72	6.71
Water	0.4	0.12	0.37	0.12	0.38	0.12
Total Polyol Side	141.6	43.19	138.25	45.87	144.76	46.90
RUBINATE®1850 isocyanate	186.2	56.81	163.2	54.13	163.9	53.10

SAMPLE

Therefore Tiger will store significant quantities of chemicals at the premises to make foam products. The average quantities of RUBINATE®1850 isocyanate and pentane will be > 200 tonne per year.

Other chemicals listed in Table A will be stored in IBCs inside the warehouse. A maximum of 500 IBCs will be present.

2.4.3 Final Products

The foam produced will have the % weight of chemicals listed in Table B, depending on the formulation used.

TABLE B: FOAM PRODUCTS CHEMICAL COMPOSITION

Chemical	Standard OH Polyol (% total)	Low OH Polyol (% total)	Low OH Polyol with high FR (% total)
Isocyanate Index	260	260	260
Aromatic in foam (wt%)	37.6	36.6	35.9
Isocyanurate in foam (wt%)	10.7	10.2	10.0
Nitrogen in foam (wt%)	5.8	5.5	5.4
Chlorine in foam (wt%)	1.0	1.0	1.6
Phosphorus in foam (wt%)	0.3	0.3	0.5
Non-reactive/mono-functional in polymer in foam (wt%)	8.1	8.4	10.2

SAMPLE

3 EXISTING ENVIRONMENT

3.1 CLIMATE

The Rockingham area is described as having a Mediterranean climate, characterised by hot dry summers and mild wet winters. Climate data has been sourced from the Bureau of Meteorology averages for Medina Research Centre Weather Station for the period 1983 to 2016 (BOM, 2016).

Rainfall in the Rockingham area is seasonal and is generally confined to the winter months (June to August). Mean monthly rainfall is highest in July at 144.6 mm, with an average of 15.2 rain days. The lowest mean monthly rainfall is 11.6 mm in December, with an average of 2.2 rain days. The average annual rainfall is 745.9 mm, with an average of 89.1 rain days per year.

The mean annual maximum and minimum temperatures for the Medina Research Centre Weather Station are 24.5°C and 12.3°C, respectively. The highest temperatures are usually experienced in February, when the mean monthly maximum temperature is 31.5°C and the mean monthly minimum temperature is 17.6°C. Minimum temperatures occur in July and August, when the mean monthly maximum and minimum temperatures are 18.3 °C and 18.9°C (maximum) and 8.2°C (minimum) respectively.

Winds in the Rockingham area during the warmer months are typically characterised by offshore (easterly) breezes during the morning followed by corresponding onshore breezes (from the southwest) as the land cools during the afternoon/evening. This sea breeze/land breeze cycle is typical of WA coastal environments, particularly in spring and summer. During the cooler months (May to August) winds are typically from the northeast during the morning, swinging to the west in the afternoon. Wind roses contained in Appendix 2 show the wind directions for February (representing the months from September to April), June (representing the months from May to August) and annually.

3.2 TOPOGRAPHY

The site surface is highly modified, characterised by concrete and asphalt hardstand. As such the site is relatively flat with an average elevation of approximately 5m Australian Height Datum (AHD).

3.3 GEOLOGY AND SOILS

The Rockingham 1:50,000 Environmental Geology map (Trendall, 1985) indicates that the sub-surface conditions generally comprise Safety Bay Sands (S_{13}): calcareous sand white, medium-grained, rounded quartz and shell debris, of eolian origin. Safety Bay Sands overlie limestone (LS_1). Limestone (LS_1) is described as pale yellowish brown, fine to coarse-grained, sub-angular to well-rounded quartz, trace of feldspar, shell debris, variably lithified, surface kankar, of eolian origin.

3.4 ACID SULFATE SOILS

Acid Sulfate Soils (ASS) is the common name given to soils and sediments containing iron sulfides. When exposed to air due to drainage or disturbance, these soils produce sulfuric acid, often releasing toxic quantities of iron, aluminium and heavy metals (DEC, 2013).

A search of the WA Atlas (Landgate, 2016) was undertaken to determine the risk of ASS. The site is not located in an area of ASS risk.

SAMPLE

3.5 HYDROLOGY AND WETLANDS

No watercourses or wetlands occur on the site and the surface water runoff is collected in stormwater drains.

A conservation category wetland is located to the east (>280m) of the site (Figure 3), within the Leda and Adjacent Bushland (Bush Forever Site 349). Lake Cooloongup (Bush Forever Site 356 and conservation category wetland), is a shallow saline lake, located approximately 1.8 km to the south of the site (Figure 3). Lake Cooloongup is also protected under the *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992*.

Cockburn Sound is located 3.1 km to the northwest of the site (Figure 3).

3.6 HYDROGEOLOGY

The site is characterised by surficial sediments with three aquifers underlying the site: the Superficial Swan, the Leederville and the Yarragadee North (DoW, 2016a). The online Perth Groundwater Map (https://maps.water.wa.gov.au/#/webmap/gwm) indicates that the estimated groundwater level is approximately 2mAHD (approximately 1m below ground level) (DoW, 2016b). Groundwater salinity is estimated between 1500 – 3000mg/L and is unsuitable for garden bores. The site does not lie within a Public Drinking Water Source Area (DoW, 2016b).

3.7 HERITAGE

A search of the Department of Aboriginal Affairs' Aboriginal Heritage Inquiry System was undertaken on the 21 December 2016 (Appendix 3). No registered sites were identified on the site, or adjacent to the site.

The site contains 'Bell Cottage (ruin)' a registered heritage place on the State Register of Heritage Places (Appendix 4). Bell Cottage is located in the northern section of the site, and will not be impacted by the Tiger lease area.

3.8 FLORA AND VEGETATION

No flora or vegetation is present on developed portions of the site associated with the Boral lease or proposed Tiger lease areas. Remnant trees are located in paddocks in the northern section of the site near the historical Bell Cottage ruin and in the southeast corner of the site.

3.9 FAUNA

The site is unlikely to provide any significant habitat for fauna as remnant vegetation appears to be in a degraded condition.

3.10 SURROUNDING LAND USE

The immediate surrounding land use is industrial and bushland (Figure 6). Within 250m to the south and west of the Tiger lease area is zoned industrial but is undeveloped and consists of remnant bushland, not protected under legislation and two roads; Mandurah Road and Day Road.

The Boral lease area is within 250m to the north of the Tiger lease area.

SAMPLE

The land uses to the east are:

- Between the lease boundary and 100m to the east is 'Parks and Recreation' comprising remnant bushland, not protected under legislation.
- Between 100m and 140m is a railway easement.
- Between 140m and 250m is protected bushland (Leda and Adjacent Bushland – Bush Forever Site 349).

The residential suburb of Hillman is approximately 1.6 km to the southwest of the Tiger lease area. The residential suburb of Leda is approximately 1.9 km to the east of the Tiger lease area (Figure 7).

The draft DER *Guidance Statement: Separation Distances* (DER, 2015a) and EPA (2005) guidance requires a foam products manufacturing premises to be 500m away from sensitive land uses. The siting of the foam products manufacturing premises meets this requirement.

3.11 SPECIFIED ECOSYSTEMS AND DESIGNATED AREAS

The premise is proposed to be located adjacent to Specified Ecosystems and within a Designated Area, as defined by *Environmental Siting* DER (2016), which are:

- Geomorphic wetlands Swan Coastal Plan (conservation category wetland) – located >280m from the Tiger lease area (Figure 3).
- Bush Forever Site 349 – Leda and Adjacent Bushland – located 140m from the Tiger lease area (Figure 3).
- The site is located in the Cockburn Groundwater Area, a proclaimed groundwater area under the *Rights in Water and Irrigation Act 1914* (Figure 3). A licence will be required for abstracting water or constructing bores on the site.

SAMPLE

4 STAKEHOLDER CONSULTATION

In view of the limited impact of this facility, consultation has only been undertaken with regulatory authorities.

SAMPLE

5 ENVIRONMENTAL RISK ASSESSMENT

5.1 RISK ASSESSMENT

5.1.1 Identification of Emissions and Risk Events

Emissions and risk events were identified by Tiger (Table C) based on previous working knowledge of operating foam product manufacturing operations overseas.

5.1.2 Risk Analysis / Rating Process

A risk analysis/rating process has been undertaken for all emissions and risk events associated with the construction and operation of the foam product manufacturing premises, in general accordance with the procedures outlined in the *Australian and New Zealand Standards AS/NZS ISO 31000:2009 Risk Management–Principles and Guidelines* and *HB 203:2012 (Managing Environment-Related Risk)*. In completing the risk rating process, Aurora has considered the following DER guidance:

- *Risk Assessment* (DER, 2016b)
- *Environmental Siting* (DER, 2016a)
- *Separation Distances* (draft) (DER, 2015)
- *Draft Guideline on Environmental Noise for Prescribed Premises* (DER, 2016c)

The risk rating process was undertaken assuming the proponent controls were in place (Table C). The consequence and likelihood descriptors used in Table C are the same as those presented in *Table 1 – Risk Criteria Table* in DER (2016b) guidance. Aurora has determined the risk rating based on the consequence and likelihood of the risk event/emission occurring.

5.1.3 Risk Evaluation / Rating Determination

Risks were then evaluated in accordance with *Table 2 – Risk Rating Matrix* (DER, 2016b). The risk evaluation identified all risk events as low.

5.1.4 Risk Treatment / Acceptability of Risk Event

Risks were then treated in accordance with *Table 3 – Risk Treatment Table* (DER, 2016b). The risk treatment identified all risk events as acceptable.

SAMPLE

TABLE C: EMISSIONS AND DISCHARGES RISK ASSESSMENT

SOURCES OF EMISSION AND DISCHARGE		PATHWAY	RECEPTOR	CONTROLS	CONSEQUENCE	LIKELIHOOD	RISK RATING
Emission (type and quantity	**Emission event (normal/upset)**						
Dust emissions during construction phase.	<u>Normal</u> Modifications to warehouse. Excavation of asphalt and soil to install infrastructure. On-site traffic movement as trucks deliver materials. <u>Upset</u> None.	Air	The residential suburb of Hillman is approximately 1.6 km to the southwest of the Tiger lease area. Adjacent Boral premises.	• All internal roads will be sealed and repairs to the road and hardstand will be made during the construction phase. • All hardstand and roads on the premises will be regularly checked and maintained to avoid any build-up of dust. • Exposed soil will be wetted down during construction activities. • If soil is required to be stockpiled, it will be wetted and placed inside the warehouse. Stockpiles will be temporary only and backfilled as soon as possible. • In the event significant dust is generated, construction activities will cease until additional controls can be implemented or any unusual weather conditions abate.	Slight	Rare	Low
Noise emissions during construction phase.	<u>Normal</u> Modifications to the warehouse. Excavate asphalt and soil to install infrastructure When trucks arrive to deliver building materials. <u>Upset</u> None	Air	The residential suburb of Hillman is approximately 1.6 km to the southwest of the Tiger lease area. Adjacent Boral premises.	• Construction completed between 7:00am and 5:00pm on weekdays and between 7:00am and 2:30pm on Saturdays only. • Modern well-maintained equipment used.	Slight	Rare	Low
Noise emissions during operations phase.	Noise emissions will be generated from noise sources operating together at any given time. Note: Activities are segregated by the noise periods defined in *Environmental Protection (Noise) Regulations 1997* which are: Day period – 0700 to 1900 Evening period – 1900 to 2200 Night Period – 2200 to 0700 <u>Normal - weekday</u> <u>Upset - weekday</u> <u>Normal - Saturday/Sunday</u> <u>Upset - Saturday/Sunday</u>	Air	The residential suburb of Hillman is approximately 1.6 km to the southwest of the Tiger lease area. Adjacent Boral premises.	• All installed equipment is new and specified for low noise emission to comply with occupational health requirements. Given the nature of the surrounding area and the operating hours no exceedances of the Environmental Protection Nosie Regulations are anticipated.	Slight	Rare	Low
Gaseous emissions during operations phase.	<u>Normal</u> • Foaming operations involving the formation of gases or a blowing agent. This can enhance the release of isocyanate vapour or aerosols. • Heating isocyanates before mixing with resins. This can increase the volatility of isocyanates. • Inhaling isocyanates during storage of product while they are still curing. There may be unreacted isocyanates which can evaporate creating an unsafe atmosphere. • Hot wire-cutting of polyurethane foams. In this situation isocyanate vapours can be released.	Air	The residential suburb of Hillman is approximately 1.6 km to the southwest of the Tiger lease area. Adjacent Boral premises.	• The only gaseous emission under normal operating conditions are the emission from the stack. The concentration of MDI in the stack gases is limited by: - Foam reaction occurs within a completely enclosed environment; - Careful control of the reactants to ensure only minor quantiles of MDI remain unreacted. - The large volume of ventilation air introduced to the ventilation cabinet ensures that concentrations released to atmosphere are low; - The stack discharge height is at least 2.5 metres above the highest point on the roof to minimise the possibility of wake effects bringing the plume to ground level. • MDI, Pentane and Polyols are stored and handled in sealed containers and pipework to prevent fugitive emissions.	Slight	Rare	Low

SAMPLE

SOURCES OF EMISSION AND DISCHARGE		PATHWAY	RECEPTOR	CONTROLS	CONSEQUENCE	LIKELIHOOD	RISK RATING
Emission (type and quantity	**Emission event (normal/upset)**						
	Upset • Failure of extraction equipment. • Incorrect storage or transportation e.g. where water entry is allowed or where spillages occur and control measures are not in place to eliminate or minimise the risk of exposure. • Storage of newly made polyurethane products while they are still curing and emitting isocyanate fumes.			• Newly made panels are heat cured to push reactions to completion and minimise release of volatiles in the panel warehouse at the eastern end of the plant.			
Liquid Emissions During Operations	Normal • Liquids may be released from containers during transfer from trucks or when the liquids are being transferred to day tanks • Pipework failures may result in release of liquids into the factory Upset • In the event of fire liquids could be released from containers	Surface or groundwater	The residential suburb of Hillman is approximately 1.6 km to the southwest of the Tiger lease area. Adjacent Boral premises. Groundwater beneath the factory.	• All liquid feedstocks are handled in dangerous goods rated containers • Feedstock Containers are stored in bunded storage areas meeting AS1940-2004 or Dangerous Goods rated below ground storage tanks. • All liquid feedstocks are handled on hardstand areas within the building. • The floor of the factory are is impermeable concrete and graded to internal sumps to contain spills • Spill kits are provided in key areas of the factory to contain and collect any spillages	Slight	Rare	Low

SAMPLE

5.2 DUST EMISSIONS DURING CONSTRUCTION PHASE

5.2.1 Emission/Risk Event, Pathway and Receptor

Dust may be generated during construction of buildings.

Dust particles are dispersed in air. Human health effects of dust tend to be associated with particles with an aerodynamic diameter of 10um or less ($\leq PM_{10}$). These particles tend to remain suspended in the air for longer periods and can penetrate into the lungs (DEC, 2011).

The nearest sensitive receptor to dust emissions is the residential suburb of Hillman, 1.6km south-west of the site. The adjacent industrial premises are also considered to be receptors.

Therefore the risk event is dust emissions impacting human health of residential and industrial receptors.

5.2.2 Controls

Dust will be managed through the implementation of the following controls:

- All internal roads will be sealed and any repairs to the road and hardstand will be made during the construction phase.
- All hardstand and roads on the premises will be regularly checked and maintained to avoid any build-up of dust.
- Exposed soil will be wetted down as required to control dust during construction activities. The area of exposed soil will be minimal given the nature of construction works.
- In the event significant dust is generated, construction activities will cease until additional controls can be implemented or any unusual weather conditions abate.

5.2.3 Risk Rating Determination

The likelihood of dust emissions impacting residential receptors is ‘Rare’ given the residential receptors are greater than 1.6km away from the source and over this distance $\leq PM_{10}$ particulate concentrations are unlikely to be distinguishable from background concentrations in Hillman.

Similarly the limited scale of construction operations and the proposed controls will limit dust generation, therefore the likelihood of dust emissions impacting adjacent industrial premise is ‘Rare’.

The dust is unlikely to move offsite, will have minimal on-site impact, and minimal impacts to amenity, therefore the consequence is considered to be ‘slight’.

The risk rating is assessed as ‘Low’.

5.2.4 Acceptability of Risk Event

The risk event of dust emissions impacting human health of residential and industrial receptors is considered ‘Acceptable’.

SAMPLE

5.3 NOISE EMISSIONS DURING CONSTRUCTION PHASE

5.3.1 Emission/Risk Event, Pathway and Receptor

Noise will be generated when during normal Woking hours during construction of the building and installation of equipment.

Noise is a 'vibration of any frequency, whether transmitted through air or any other physical medium'. It is commonly recognised as an emission of sound but may also include ground or structure-borne vibration (DER, 2016c). Noise emissions can affect amenity, and in extreme cases human health through damage or injury to ears / hearing ability or permanent deafness. Most commonly noise affects amenity, especially if the noise contains tonal or annoying characteristics.

The nearest sensitive receptor to noise emissions is the residential suburb of Hillman, 1.6km south-west of the site. The adjacent industrial premises are also considered to be receptors.

Therefore the risk event is noise emissions impacting amenity of residential and industrial receptors.

5.3.2 Controls

Noise will be managed through the implementation of the following controls:

- Construction completed between 7:00am and 5:00pm on weekdays and between 7:00am and 2:30pm on Saturdays only.
- Modern well–maintained equipment used.

5.3.3 Risk Rating Determination

Construction noise is expected to be intermittent within a three month period, however the likelihood of noise emissions impacting residential receptors is 'Rare' given the residential receptors are greater than 1.6km away from source and noise emissions will also be generated by normal operations of the industry area, and Roe Highway which are located between the site and Wattle Grove.

Similarly the limited scale of construction operations and the proposed controls will reduce the likelihood of noise emissions impacting adjacent industrial premise and is therefore considered to be 'Rare'.

The noise emissions will have a 'Minor' consequence as the sound onsite will be low levels, minimal offsite impacts and low level impacts to amenity.

The risk rating is assessed as 'Low'.

5.3.4 Acceptability of Risk Event

The risk event of noise emissions impacting amenity of residential and industrial receptors is considered 'Acceptable'.

SAMPLE

5.4 NOISE EMISSIONS DURING OPERATIONS PHASE

5.4.1 Emission/Risk Event, Pathway and Receptor

Noise emissions will be generated from the operation of the production line and also from vehicles delivering feed stocks and removing completed panels. Noise sources during normal operations and 'Upset' conditions are listed below. An 'Upset' condition is where the generator will be used to power the compactor, and therefore will add an additional noise source to the operating environment. Note: Activities are segregated by the noise periods defined in *Environmental Protection (Noise) Regulations 1997* which are:

Day period – 0700 to 1900

Evening period – 1900 to 2200

Night Period – 2200 to 0700

The nearest sensitive receptor to noise emissions is the residential suburb of Hillman, 1.6km southeast of the site.

Therefore the risk event is noise emissions impacting amenity of residential receptors.

5.4.2 Controls

Noise will be managed through the implementation of the following controls:

- All operations other transport of material will occur inside the factory building.
- There are no significant sources of noise in the process as the panels are assembled in continuous assembly line operating low speed. (No high speed pumps or fans)
- All equipment will be purchased new an specified to meet relevant occupational health noise limits
- Factory doors will be closed when not being accessed by vehicles
- All equipment and vehicles will be well maintained.

5.4.3 Risk Rating Determination

The likelihood of noise emissions impacting residential receptors is 'Rare' given the residential receptors are greater than 1.6km away from the source. It is not considered that noise modelling is required given the nature of the process and the buffering to surrounding areas.

The risk rating is assessed as 'Low'.

5.4.4 Acceptability of Risk Event

The risk event of noise emissions impacting amenity of residential and industrial receptors is considered 'Acceptable'.

SAMPLE

5.5 GASOUS EMISSIONS DURING OPERATIONS PHASE

5.5.1 Emission/Risk Event, Pathway and Receptor

Under normal operating conditions, the reactants are handled in stored containers and pipework so there is no opportunity for fugitive emission retains to atmosphere prior to them being utilised to produce foam.

The key reactants are blended under computer controls in enclosed pipework and then thoroughly mixed in the reaction nozzle within a ventilated and controlled environment before being laid on the steel panel. The quantities of each reactant are carefully controlled to ensure that minimal MDI is released into the ventilation air.

The ventilation air is drawn in the reaction cabinet under negative pressure to ensure that any minor points of leakage in the chamber walls will draw external air into the chamber.

The volume of ventilation air ensures that concentrations of MDI released through the stack are less at all times less than the Occupational Health and Safety Short-term exposure limit of 0.07 mg/m^3. The concentration of MDI will reduce by at least an order of magnitude within 10 metres of the stack and as result concentrations at ground level cannot exceed with the Short Term Exposure Limit (STEL) standard or the 8 hour TWA average standard of 0.02 $mg/m^{3.}$

There is a risk of local release of vapor in the event of a spillage during handling of containers.

A further consideration is the possibility of releases during fire.

Therefore the risk event is MDI emissions impacting adjacent industrial receptors.

5.5.2 Controls

Gaseous emissions will be managed through the implementation of the following controls:

- All liquid feedstocks will be stored and handled in sealed containers and pipework.
- All liquid feedstocks will be stored inside the building in dangerous goods related containers.
- The reactants are blended under computer control in carefully controlled amounts to minimise the quantity of MDI released during or after the reaction process.
- The foam reaction occurs in the pipework and reaction nozzle inside a ventilated cabinet maintained under negative pressure to avoid leakages into the factory environment. Ventilation air is released to atmosphere through a stack discharging at least 15 metres above ground level and 2.5 metres above the highest point on the stack.
- The rate of ventilation air is sufficient to ensure that the concentration of MDI is less than the STEL at the point of discharge.
- All MDI day storage tanks have automatic rapid shutoff valves in the event that sensors detect a leakage.
- Full clean-up of daytime delivered waste from the tipping floor at the end of each operational day.

SAMPLE

- All storage containers for the liquid containers comply with relevant dangerous good requirements.
- An accredited Dangerous Goods consultant is reviewing the design of the liquid storage area and fire control systems to ensure they meet relevant codes
- The Building will designed to meet relevant fire control codes and DFES requirements
- Appendix 5 presents the manufacturers Statement of Safety Strategy

5.5.3 Risk Rating Determination

The foam manufacture plant has been designed in accordance with all relevant codes with all hazardous feedstocks material being maintained in enclosed storage tanks and pipework systems until after they are blended and the reaction commences in the reaction nozzles. The foam reaction runs to completion in an enclosed ventilation chamber with the ventilation are released to atmosphere though a stack discharging at least 15 metres above ground level. The concentration of MDI in the air released the environment is less than the STEL limit

Therefore the likelihood of gaseous emissions impacting receptors is 'rare'.

The risk rating of unacceptable gaseous impacts occurring on surrounding industrial land is also assessed as 'slight'.

5.5.4 Acceptability of Risk Event

The risk event of gaseous emissions impacting amenity of residential and industrial receptors is considered 'low'.

5.6 SPILLAGES OF LIQUIDS

5.6.1 Emission/Risk Event, Pathway and Receptor

A number of the liquid feedstocks are hazardous and spillages could potentially create a health or environmental hazard. Spillages may occur in the following circumstances:

- Containers are dropped or ruptured during movement or storage.
- A pipework failure results in the release of liquids within the factory.
- A fire or similar event results in failure of containers.

Therefore the risk event is MDI or other feedstocks entering the groundwater system.

5.6.2 Controls

Controls to be implemented are:

- All storage containers comply with the Australian Dangerous Goods Code 7.4 and AS 4897.
- Individual storage containers will be installed in a bunded store complying with AS1940-2004
- Liquids will be transferred from IBCs inside the building on impermeable concrete floors using sealed pipework.

SAMPLE

- Spill kits will be located in close proximate where all areas where spillages are possible and staff will be trained in the use of the kits
- All spills will be immediately cleaned up and contained in sealed containers.
- The building floor in concrete and graded to blind sumps to retain spillages in the event they are sufficiently large they cannot be controlled with spill kits

5.6.3 Risk Rating Determination

Given the controls that will be implemented the likelihood of the risk event occurring which adversely affects groundwater quality is assessed as 'rare'. If the risk event did occur the result would be 'slight' as the impact would be unlikely to significantly adversely affect the groundwater quality, given the small quantity of leakage and its containment on impermeable concrete surfaces inside a building.

The risk rating is assessed as 'slow'.

5.6.4 Acceptability of Risk Event

The risk event of contaminants generated and transported through the stormwater drainage system causing adverse impacts to water quality of the drainage basin is considered 'Acceptable'.

SAMPLE

6 ENVIRONMENTAL MANAGEMENT, MONITORING AND REPORTING

6.1 ENVIRONMENTAL MANAGEMENT

During operations Tiger Resources will implement the following management plans:

- Spill Management Plan
- Fire and Emergency Response Plan

Both management plans will be prepared prior to commencement of operations. The plans will be confirm with best practice.

6.2 MONITORING

6.2.1 Gaseous Emission Monitoring

During commissioning the concentration of MDI will be measured in the gas discharge stream from the stack. This testing protocol will be repeated quarterly to ensure that MDI concentrations are maintained at safe levels.

Ambient MDI concentrations will also be periodically assessed within the factory building in accordance with Safe Work Australia requirements to ensure that employees are not exposed at above the STEL or TWA standards.

6.3 REPORTING

On completion of construction Tiger will prepare and submit a compliance document to the DER which is signed and certifies that the works were constructed in accordance with the conditions of the Works Approval.

SAMPLE

7 REFERENCES

Bureau of Meteorology (BOM) (2016) *Climate Data Online*, accessed 20 December 2016 at http://www.bom.gov.au/climate/data/index.shtml?bookmark=200

Department of Environment and Conservation (DEC) (2011) *A guideline for managing the impacts of dust and associated containments from land development sites remediation and other related activities.*

Department of Environment Regulation (DER) (2016a) *Environmental Siting.*

Department of Environment Regulation (DER) (2016b) *Risk Assessment.*

Department of Environment Regulation (DER) (2016c) *Guideline on Environmental Noise for Prescribed Premises (Draft).*

Department of Environment Regulation (DER) (2015) *Draft Guidance Statement: Separation Distances (Draft)*.

Department of Water (DoW) (2016a) *Water Register* http://atlases.water.wa.gov.au/ags/waterregister/

Department of Water (DoW) (2016b) *Perth Groundwater Map.* Available at https://maps.water.wa.gov.au/#/webmap/gwm

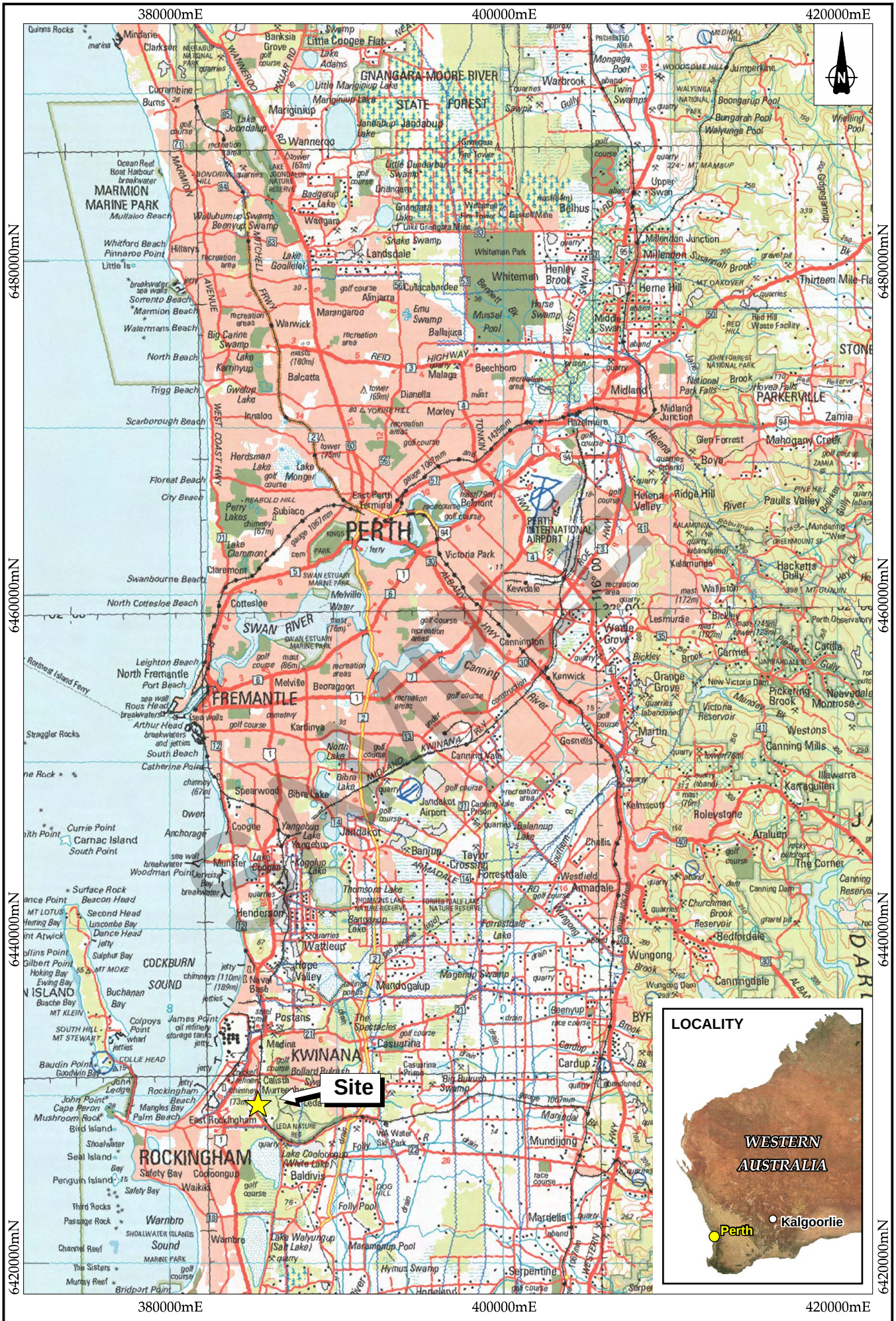
Geological Survey of Western Australia (GSWA) (1985) *Rockingham. Sheet 2033 11 and 111*. Perth Metropolitan Region Environmental Geology Series, Geological Survey of Western Australia.

Landgate (2016) *SLIP Enabler WA Atlas*. Available at: https://www2.landgate.wa.gov.au/bmvf/app/waatlas/#, accessed on: 20 December 2016.

SAMPLE

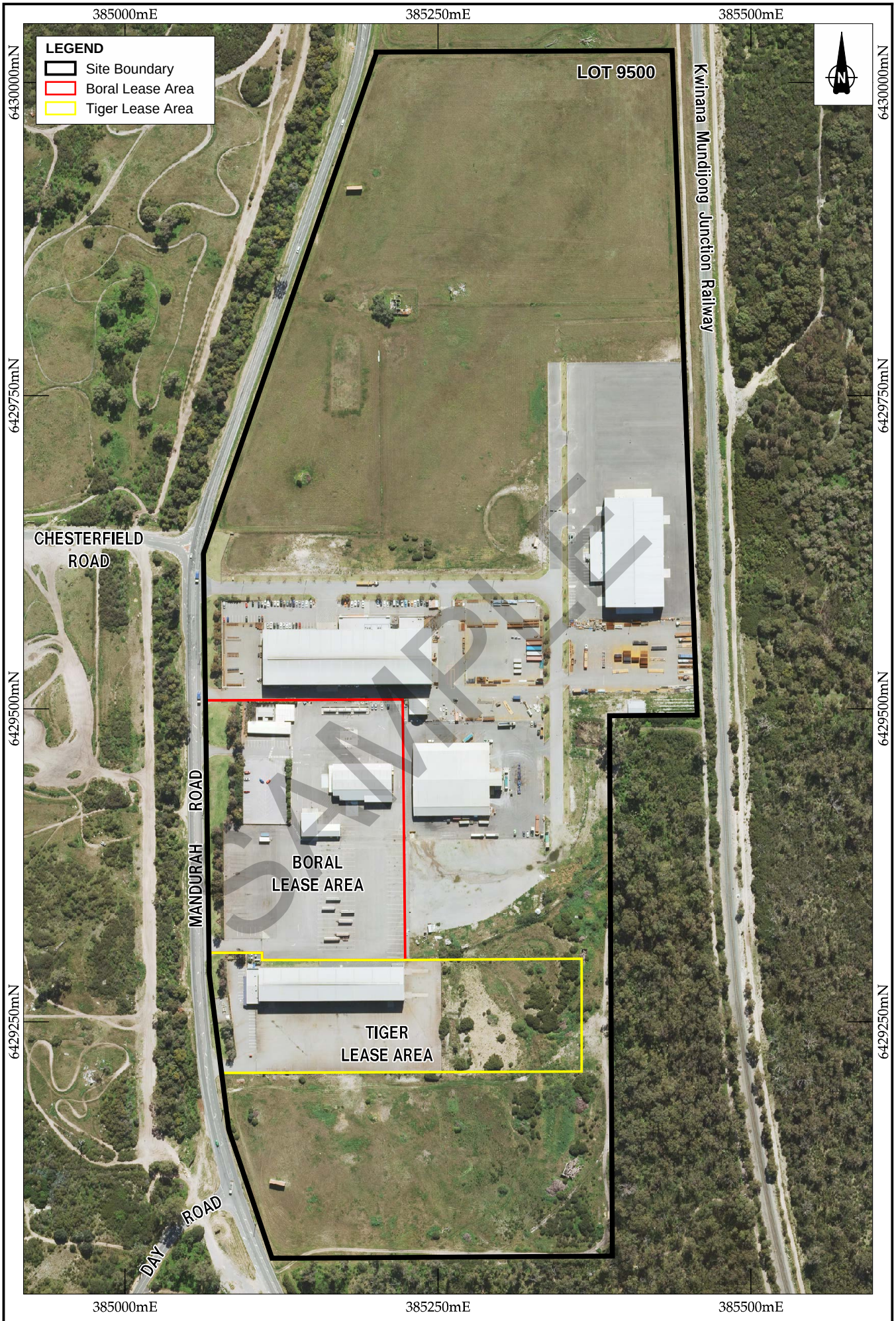
FIGURES

SAMPLE



DRAFT

0 5km Scale 1:300,000 MGA94 (Zone 50)		**Foam Products Manufacturing Premises** **Regional Location** **Works Approval Application**	Figure: **1**
CAD Ref: g2485_F001.dgn	Author: C Dorrington | AE Ref: TBS2016-001		
Date: December 2016 | Rev: A | **A4**	Drawn: CAD Resources ~ www.cadresources.com.au Tel: (08) 9246 3242 ~ Fax: (08) 9246 3202		



Aerial Photography: Landgate (August 2016), Cadastral: Landgate

0 100m

Scale 1:4,000
MGA94 (Zone 50)

CAD Ref: g2485_F002.dgn

Date: December 2016 | Rev: A | A4

Author: C Dorrington | AE Ref: TBS2016-001

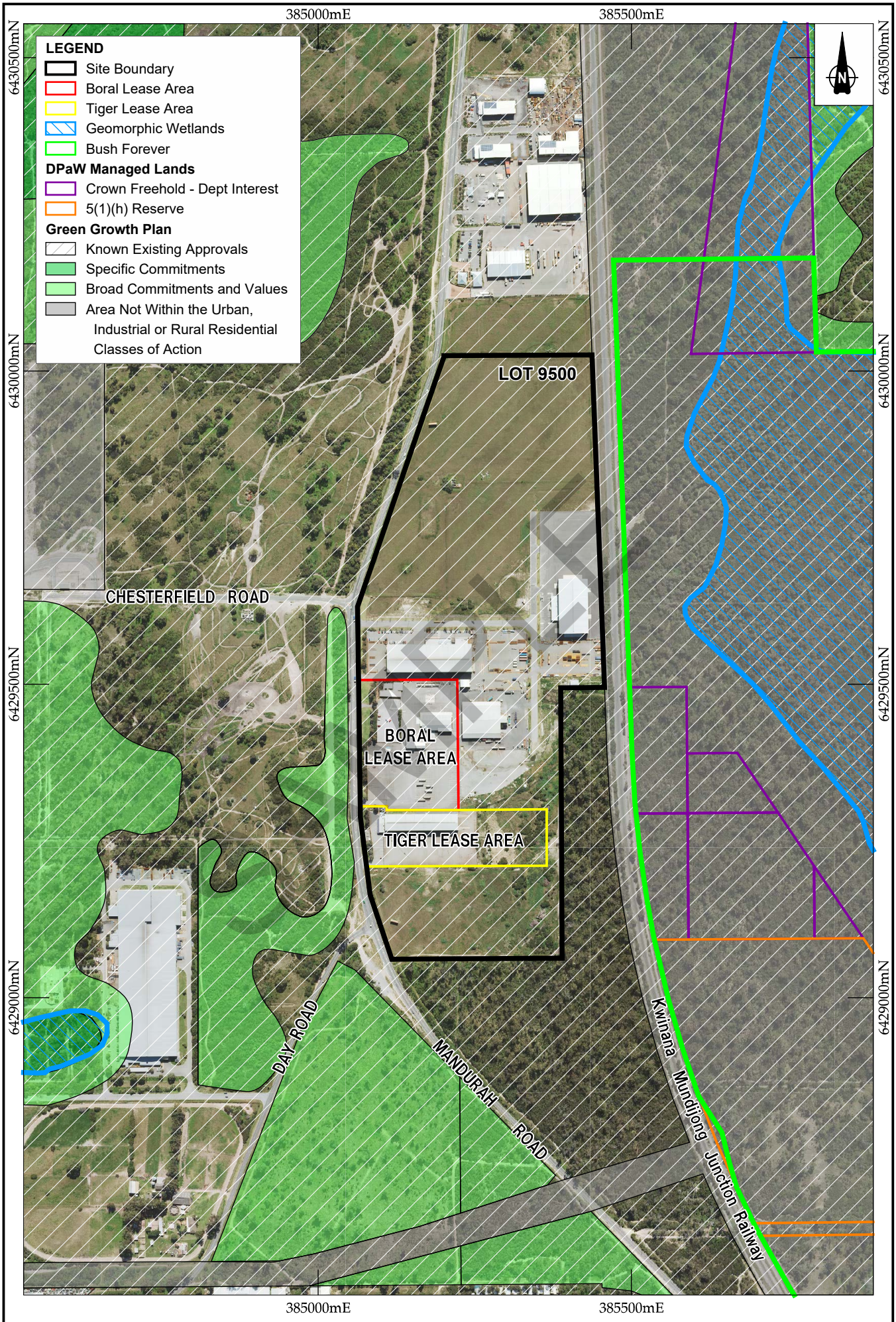
Drawn: CAD Resources ~ www.cadresources.com.au
Tel: (08) 9246 3242 ~ Fax: (08) 9246 3202

Foam Products Manufacturing Premises

Site Layout

Works Approval Application

Figure: **2**



0 200m

Scale 1:8,000
MGA94 (Zone 50)

CAD Ref: g2485_F003.dgn

Date: December 2016 | Rev: A | A4

Author: C Dorrington | AE Ref: TBS2016-001

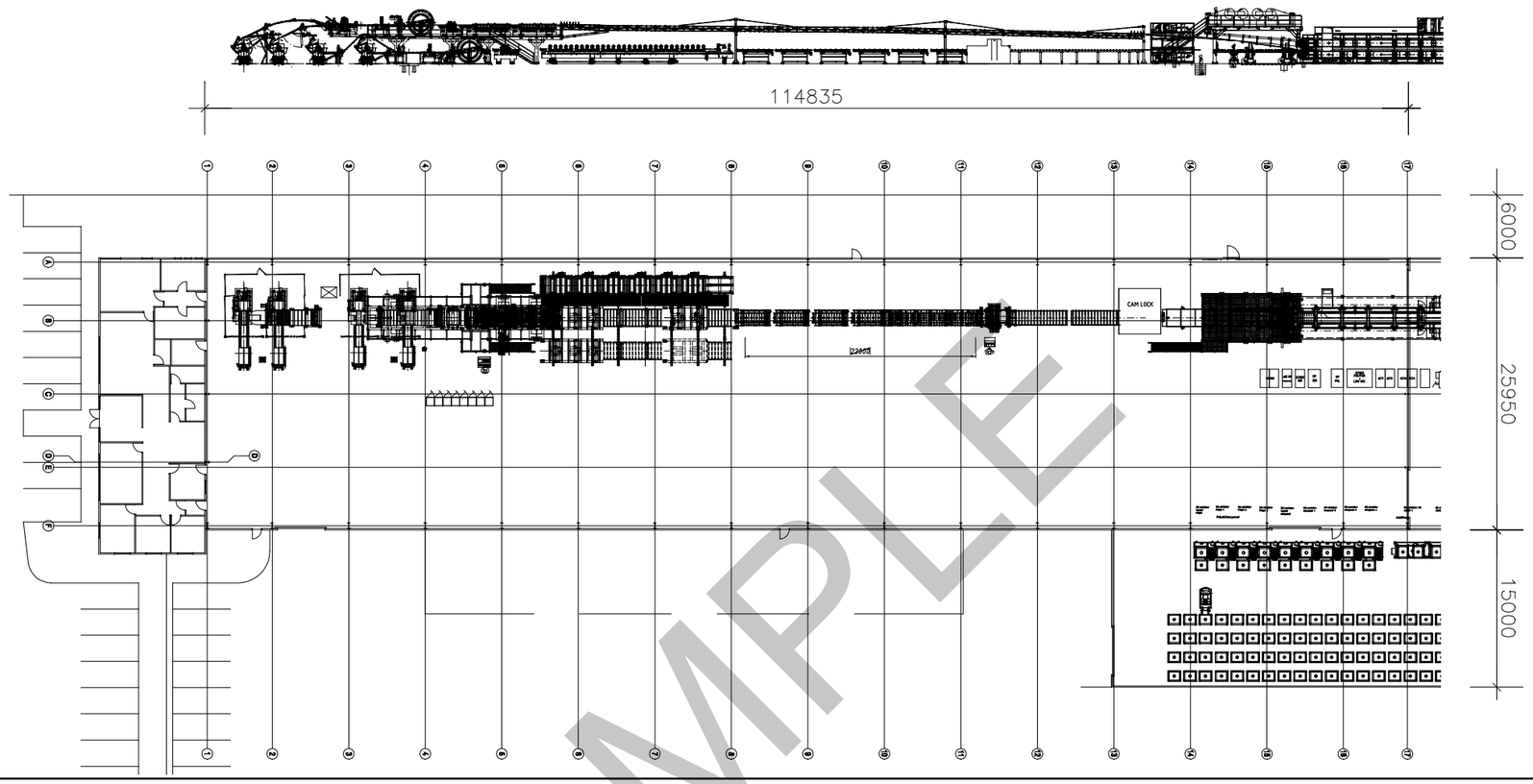
Drawn: CAD Resources ~ www.cadresources.com.au
Tel: (08) 9246 3242 ~ Fax: (08) 9246 3202

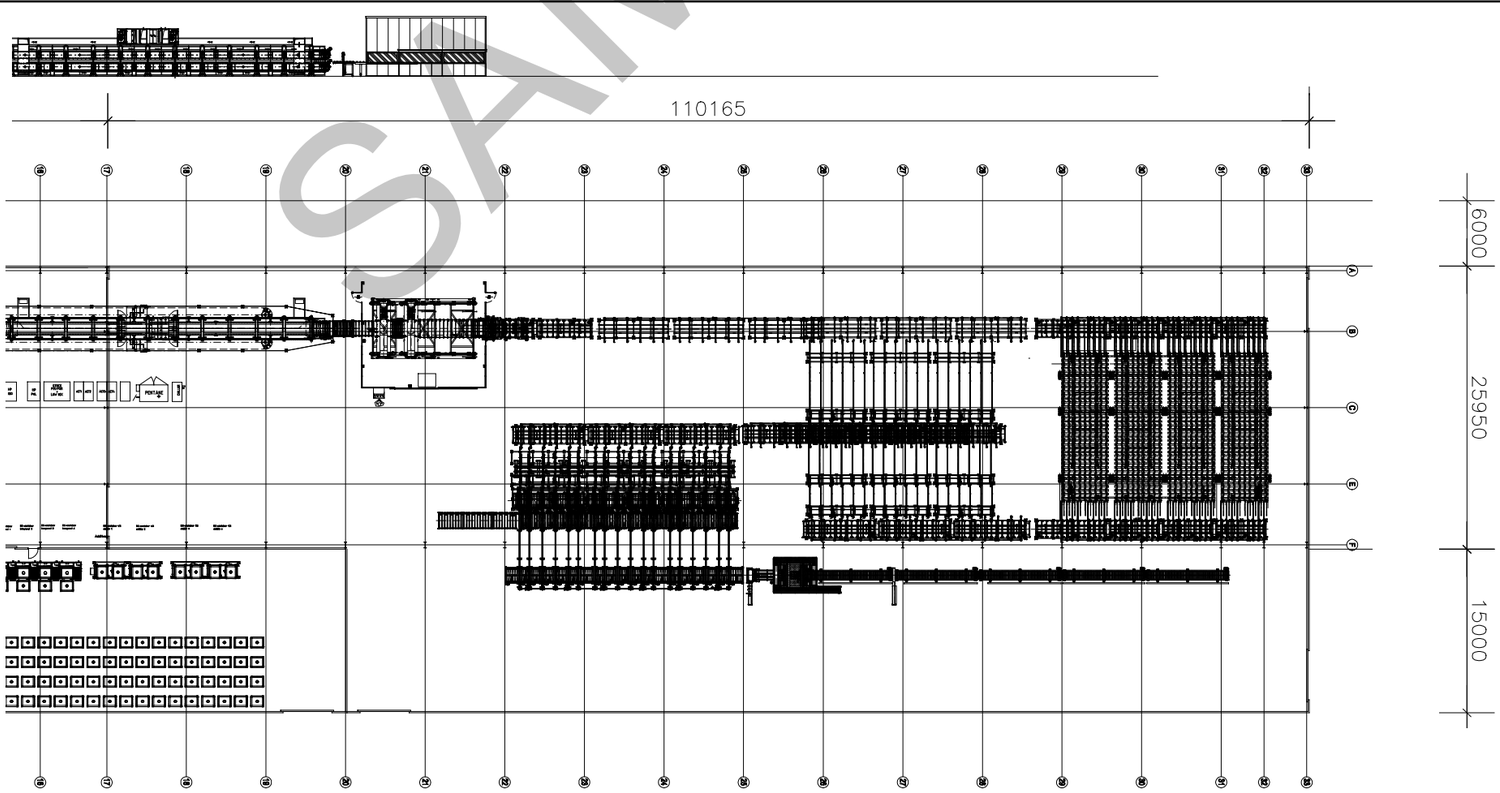
Foam Products Manufacturing Premises

Specified Ecosystems and Designated Areas

Works Approval Application

Figure: **3**





SAMPLE

Notes:
.

CAD Ref: g2485_F004.dgn		Author: N. Davies	AU Ref: TBS/2016/001
Date: Jun 2017	Rev: A A3	Drawn: CAD Resources ~ www.cadresources.com.au Tel: (08) 9246 3242 ~ Fax: (08) 9246 3202	

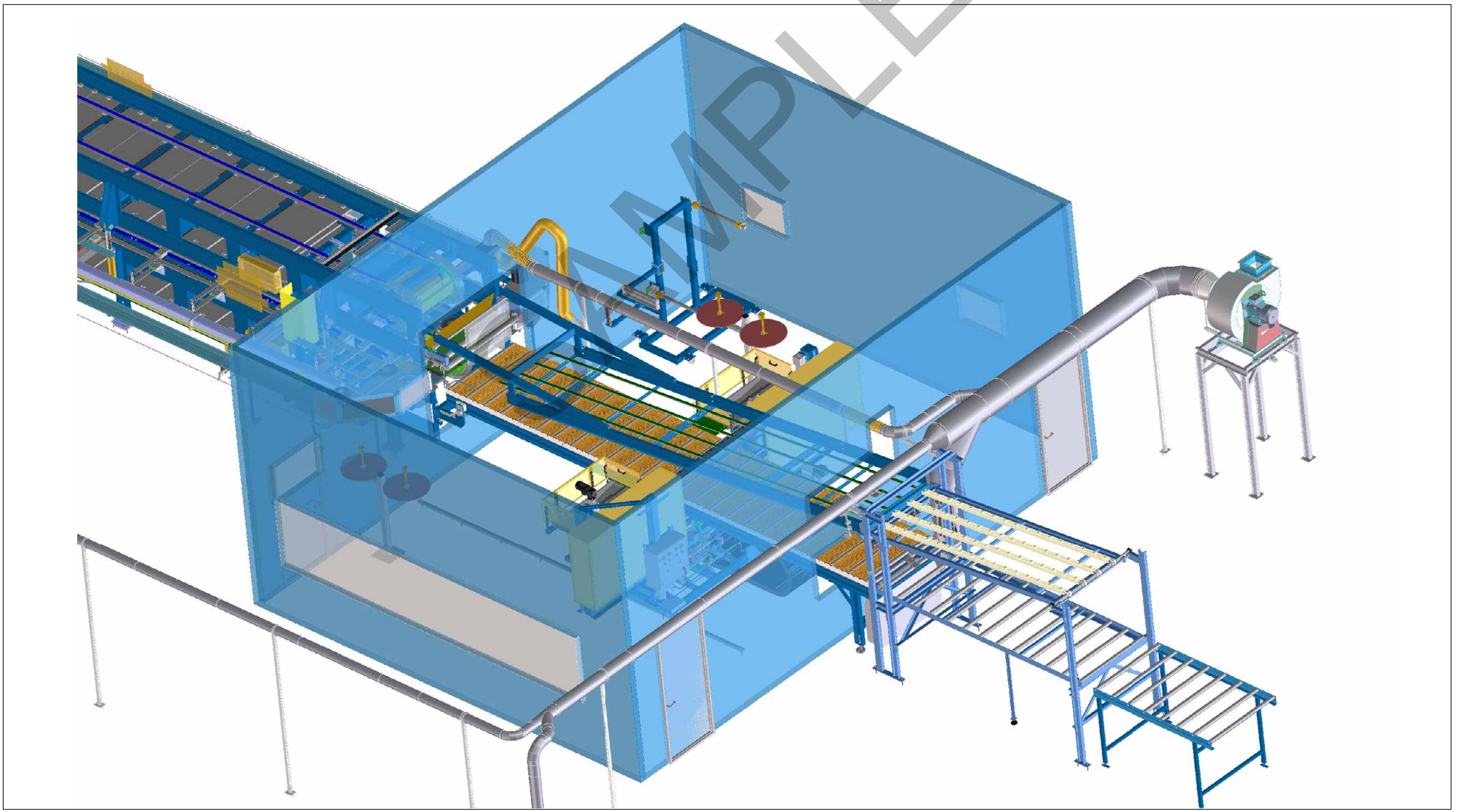
Foam Products Manufacturing Premises

Building and Plant Detail

Works Approval Application

Figure: **4**

SAMPLE



Notes:
.

CAD Ref: g2485_F005
Date: Jun 2017 | Rev: A | A4

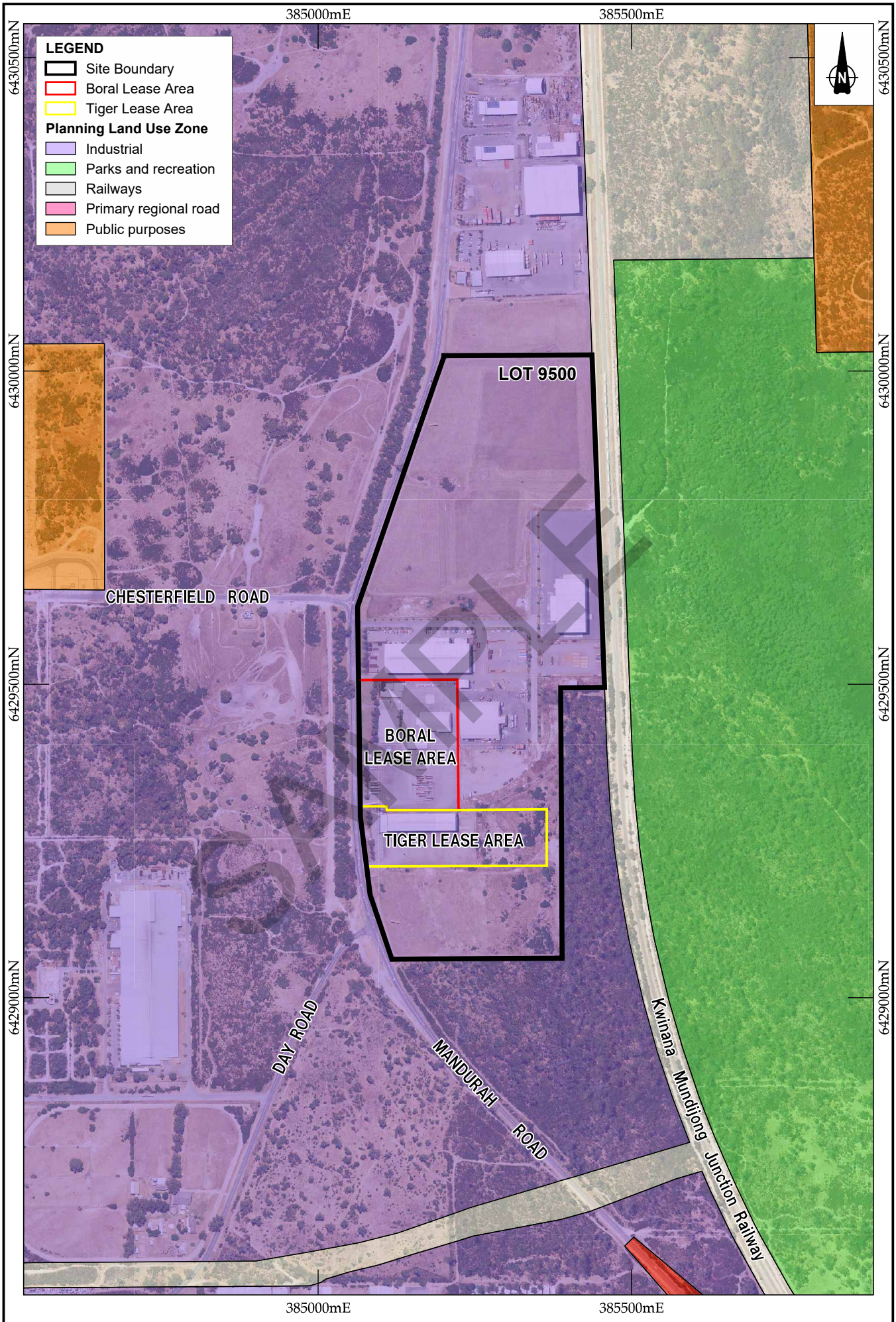
Author: N. Davies | AU Ref: TBS/2016/001
Drawn: CAD Resources ~ www.cadresources.com.au
Tel: (08) 9246 3242 ~ Fax: (08) 9246 3202

Foam Products Manufacturing Premises

Foam Cabinet detail

Works Approval Application

Figure: **5**



Aerial Photography: Landgate (Feb 2017), Cadastral: Landgate, Planning Land Use Zones: Department of Planning (WA)

0 200m

Scale 1:8,000
MGA94 (Zone 50)

CAD Ref: g2485_F006.dgn

Date: December 2016 | Rev: A | A4

Author: C Dorrington | AE Ref: TBS2016-001

Drawn: CAD Resources ~ www.cadresources.com.au
Tel: (08) 9246 3242 ~ Fax: (08) 9246 3202

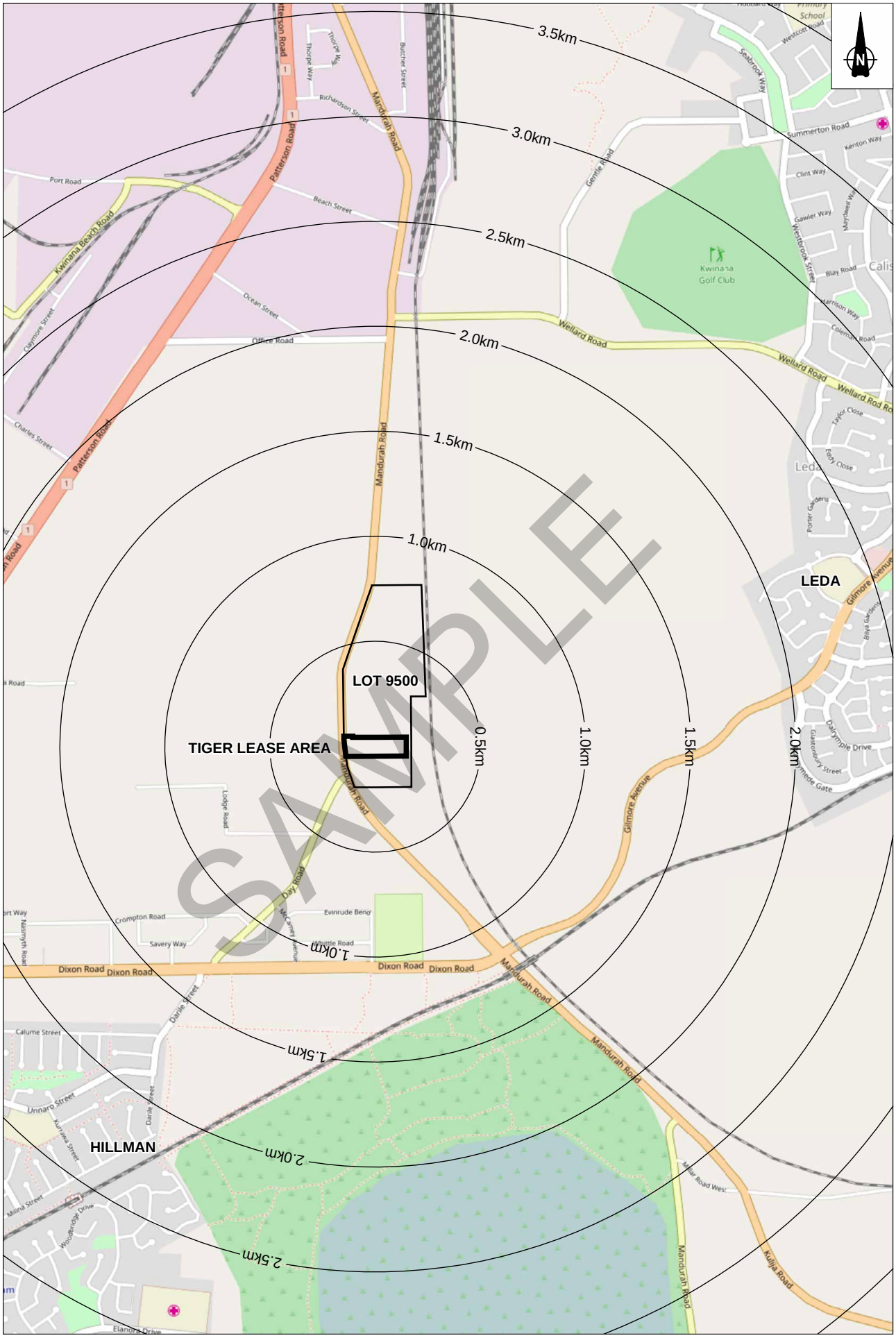
Foam Products Manufacturing Premises

Surrounding Land Use

Works Approval Application

Figure: **6**

Topo: Open Street Map



0 600m Scale 1:25,000 MGA94 (Zone 50) CAD Ref: g2485_F007.dgn Date: December 2016 | Rev: A | A4	Author: C Dorrington | AE Ref: TBS2016-001 Drawn: CAD Resources ~ www.cadresources.com.au Tel: (08) 9246 3242 ~ Fax: (08) 9246 3202	**Foam Products Manufacturing Premises** **Sensitive Receptors** **Works Approval Application**	Figure: **7**

APPENDIX 1

Certificate of Title

SAMPLE

WESTERN AUSTRALIA

REGISTER NUMBER	
9500/DP123456	
DUPLICATE EDITION	DATE DUPLICATE ISSUED
2	10/8/2009

RECORD OF CERTIFICATE OF TITLE

UNDER THE TRANSFER OF LAND ACT 1893

VOLUME 2678 FOLIO 388

The person described in the first schedule is the registered proprietor of an estate in fee simple in the land described below subject to the reservations, conditions and depth limit contained in the original grant (if a grant issued) and to the limitations, interests, encumbrances and notifications shown in the second schedule.

REGISTRAR OF TITLES

LAND DESCRIPTION:

LOT 9500 ON DEPOSITED PLAN 54135

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)

TRECAP PTY LTD OF 756 CANNING HIGHWAY, APPLECROSS
(AF K398212) REGISTERED 24 DECEMBER 2007

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. A362372 EASEMENT TO AMPOL EXPLORATION LTD., SHELL DEVELOPMENT (AUSTRALIA) PTY. LTD., TEXACO OVERSEAS PETROLEUM CO. AND CALIFORNIA ASIATIC OIL CO. SEE SKETCH ON DEPOSITED PLAN 54135 REGISTERED 12.1.1971.
   *K395712 NOTIFICATION. THE GRANTEES OF EASEMENT A362372 ARE NOW APT PARMELIA PTY LTD PURSUANT TO SECTION 20(5) OF THE PETROLEUM PIPELINES ACT 1969. REGISTERED 31.10.2007.
2. C028670 EASEMENT TO ALCOA OF AUSTRALIA LTD. SEE SKETCH DEPOSITED PLAN 54135 REGISTERED 18.11.1980.
3. *I120918 MEMORIAL. HERITAGE OF WESTERN AUSTRALIA ACT 1990. AS TO PORTION ONLY. LODGED 29.5.2002.
4. K967211 LEASE TO BORAL RESOURCES (WA) LTD OF 63-69 ABERNETHY ROAD, BELMONT EXPIRES: SEE LEASE. AS TO PORTION ONLY REGISTERED 9.6.2009.
5. *M751811 MORTGAGE TO AUSTRALIA & NEW ZEALAND BANKING GROUP LTD REGISTERED 28.8.2014.

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required.
* Any entries preceded by an asterisk may not appear on the current edition of the duplicate certificate of title.
Lot as described in the land description may be a lot or location.

----------END OF CERTIFICATE OF TITLE----------

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND: DP54135.
PREVIOUS TITLE: 2106-447, 1712-793, 1298-807.

END OF PAGE 1 - CONTINUED OVER

SAMPLE

LANDGATE COPY OF ORIGINAL NOT TO SCALE Mon Aug 22 12:07:27 2016 JOB 51754449

Landgate
www.landgate.wa.gov.au

INSTRUCTIONS

1. If insufficient space in any section, Additional Sheet, Form B1 should be used with appropriate headings. The boxed sections should only contain the words "see page..."
2. Additional Sheets shall be numbered consecutively and bound to this document by staples along the left margin prior to execution by the parties.
3. No alteration should be made by erasure. The words rejected should be scored through and those substituted typed or written above them, the alteration being initialled by the persons signing this document and their witnesses.
4. Where issued, the Duplicate Certificate of Title is required to be produced or if held by another party then arrangements must be made for its production.

NOTES

1. **DESCRIPTION OF LAND**
   Lot and Diagram/Plan/Strata/Survey-Strata Plan number or Location name and number to be stated.
   Extent - Whole, part or balance of the land comprised in the Certificate of Title to be stated. If part, define by recital and/or sketch.
   The Volume and Folio number to be stated.
2. **LIMITATIONS, INTERESTS, ENCUMBRANCES and NOTIFICATIONS**
   In this panel show (subject to the next paragraph) those limitations, interests, encumbrances and notifications affecting the land being leased that are recorded on the certificate(s) of title:
   a) In the Second Schedule;
   b) If no Second Schedule, that are encumbrances.
   (Unless to be removed by action or document before registration hereof)

   Do not show any:
   (a) Easement Benefits or Restrictive/Covenant Benefits; or
   (b) Subsidiary interests or changes affecting a limitation, etc, that is to be entered in the panel (eg. if a mortgage is shown, do not show any partial discharges or any document affecting either).
   The documents shown are to be identified by nature and number. The plan/diagram encumbrances shown are to be identified by nature and relevant plan/diagram. Strata/survey-strata plan encumbrances are to be described as "Interests on strata/survey-strata plan".
   If none show "nil".
3. **LESSOR**
   State the full name of the Lessor/Lessors (REGISTERED PROPRIETOR) as shown in certificate of title and the address/addresses to which future notices can be sent.
4. **LESSEE**
   State full name of the Lessee/Lessees and the address/addresses to which future notices can be sent. If two or more state tenancy e.g. Joint Tenants, Tenants in Common. If Tenants in Common specify shares.
5. **TERM OF LEASE**
   Must exceed 3 years.
   Term to be stated in years, months and days or as the case may be. Commencement date to be stated. Options to renew to be shown.
6. **RECITE ANY EASEMENTS TO BE CREATED**
   Here set forth any Easements to be created as appurtenant to the lease commencing with the words "together with" and/or any Reservations hereby created encumbering the lease commencing with the words "reserving to".
7. State amount of yearly rental in figures.
8. State term of payment.
9. Insert any Covenants required.
10. **LESSOR/LESSEE EXECUTION**
    A separate attestation is required for every person signing this document. Each signature should be separately witnessed by an Adult Person. The full name, address and occupation of the witness must be stated.

EXAMINED

K967211 L
09 Jun 2009 11:35:16 Perth

REG $ 105.00
PROD $ 52.50
FEES $ 157.50

LEASE

LODGED BY HARTFIELD CONVEYANCING

ADDRESS PO BOX 1063
CANNING BRIDGE WA 6153

PHONE No. 9316 3544

FAX No. 9316 3511

REFERENCE No. Don

ISSUING BOX No. 353N

PREPARED BY EASTCOURT PROPERTY GROUP

ADDRESS SUITE 2, 16 MOREAU MEWS
APPLECROSS

PHONE No. 9316 1000 FAX No. 9316 0999

INSTRUCT IF ANY DOCUMENTS ARE TO ISSUE TO OTHER THAN LODGING PARTY

(803330)
DUPLICATE PRODUCED
16A - NAR

TITLES, LEASES, DECLARATIONS ETC LODGED HEREWITH

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

Received Items
Nos.

Receiving Clerk

Registered pursuant to the provisions of the *TRANSFER OF LAND ACT 1893* as amended on the day and time shown above and particulars entered in the Register.

Landgate

REGISTRAR OF TITLES WESTERN AUSTRALIA

THE GOVERNMENT OF WESTERN AUSTRALIA

SAMPLE

LANDGATE COPY OF ORIGINAL NOT TO SCALE Wed Aug 24 18:46:26 2016 JOB 51783744

Landgate
www.landgate.wa.gov.au

ATTESTATION SHEET

Dated this	28th	day of	May	Year	2008

LESSOR/S SIGN HERE (Note 10)

Signed SEE PAGE 49	Signed
In the presence of	In the presence of

LESSEE/S SIGN HERE (Note 10)

Signed SEE PAGE 49	Signed
In the presence of	In the presence of

SAMPLE

LANDGATE COPY OF ORIGINAL NOT TO SCALE Wed Aug 24 18:46:26 2016 JOB 51783744

Landgate
www.landgate.wa.gov.au

LEASE OVER LOT 9500 ON DP 54135

THE PIPELINE EASEMENT DIMENSIONS AND POSITIONS ON THIS PLAN ARE INTERPRETATIONS ONLY. SEE ORIGINAL DOCUMENTS C28670 & A362372.

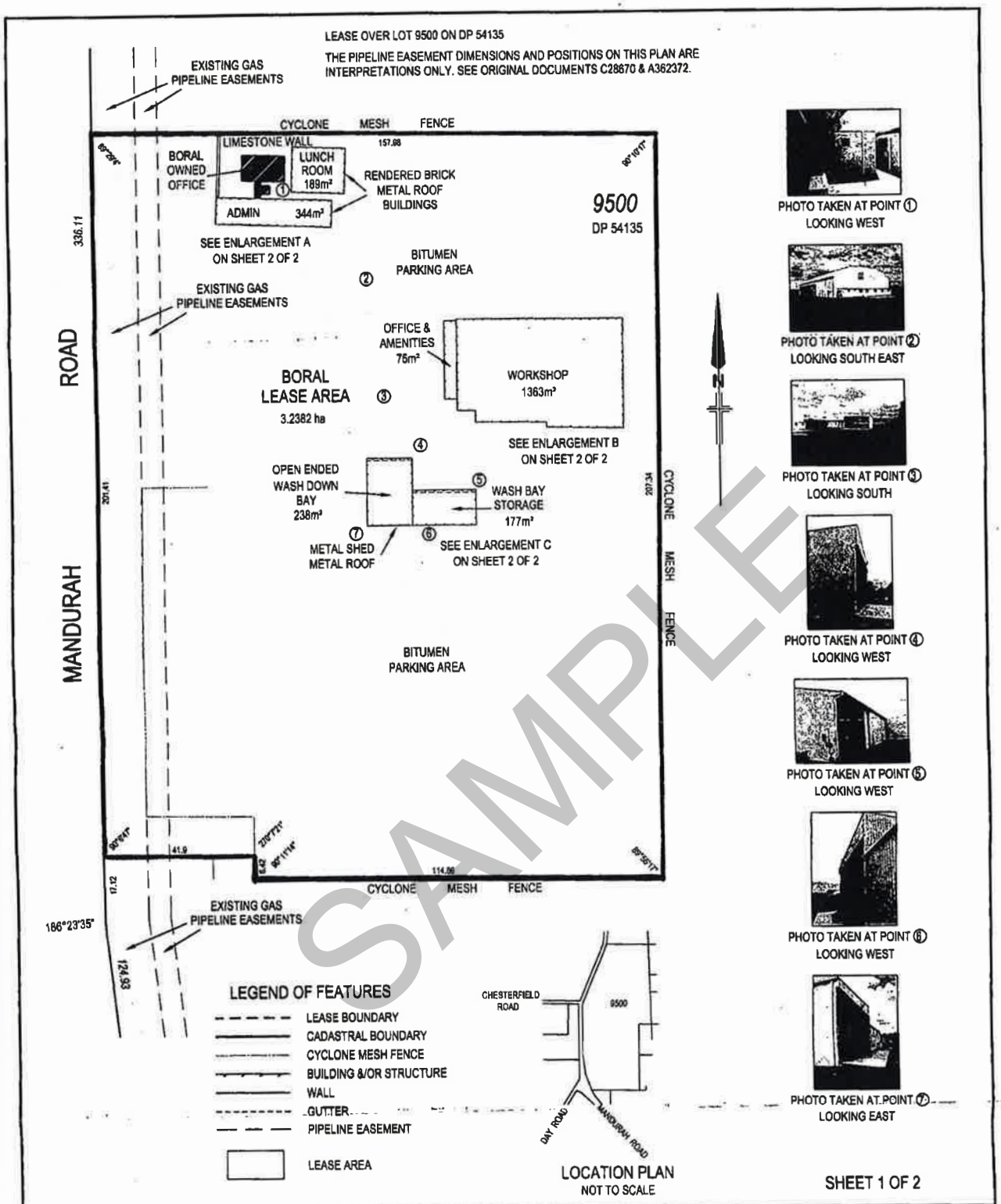


PHOTO TAKEN AT POINT ① LOOKING WEST

PHOTO TAKEN AT POINT ② LOOKING SOUTH EAST

PHOTO TAKEN AT POINT ③ LOOKING SOUTH

PHOTO TAKEN AT POINT ④ LOOKING WEST

PHOTO TAKEN AT POINT ⑤ LOOKING WEST

PHOTO TAKEN AT POINT ⑥ LOOKING WEST

PHOTO TAKEN AT POINT ⑦ LOOKING EAST

LEGEND OF FEATURES

- LEASE BOUNDARY
- CADASTRAL BOUNDARY
- CYCLONE MESH FENCE
- BUILDING &/OR STRUCTURE
- WALL
- GUTTER
- PIPELINE EASEMENT
- LEASE AREA

LOCATION PLAN
NOT TO SCALE

SHEET 1 OF 2

SAMPLE

Brown McAllister Surveyors
Licensed Surveyors | Land Development & Strata Consultants | Engineering Surveyors
Email : mail@brownmcallister.com.au Tel: (08) 9386 9688
43 Broadway, Nedlands, Western Australia, 6009 Fax: (08) 9386 9677

SCALE 1 : 1000

0 10 20 30 40 50

All distances in metres unless stated otherwise

THE BOUNDARIES WERE NOT RE-ESTABLISHED AS PART OF THIS SURVEY THEREFORE THIS PLAN DOES NOT GUARANTEE THEIR ACCURACY

FIELD INSPECTION IS RECOMMENDED FOR LOCATION OF SERVICES PRIOR TO ANY EXCAVATION

EXISTING BOUNDARY DIMENSIONS AND LOT AREAS TAKEN FROM LANDGATE RECORD DP54135

ALL AREAS AND DIMENSIONS ARE SUBJECT TO SURVEY AND EXAMINATION

LEASE AREA SKETCH OF THE BORAL SITE MANDURAH ROAD, EAST ROCKINGHAM

Client: TRECAP PTY LTD

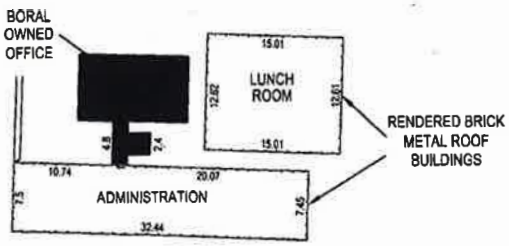
DATUM
HORIZONTAL - ASSUMED
VERTICAL - ASSUMED

SHEET	A3
SURVEYED	D.S. - 13/1/2009
FIELD NOTES	
DRAWN	T. PIZZI - 06/03/2009
CHECKED	
REFERENCE	08380-1L_rev3_SHEET1

COPYRIGHT OF ALL THIS PLAN IS RESERVED BY BROWN McALLISTER SURVEYORS AND REMAINS THE PROPERTY OF THE AFOREMENTIONED AND SHALL BE RETURNED UPON REQUEST. USE OF ALL OR PART OF THIS PLAN IS RESTRICTED WITHOUT PRIOR WRITTEN PERMISSION.

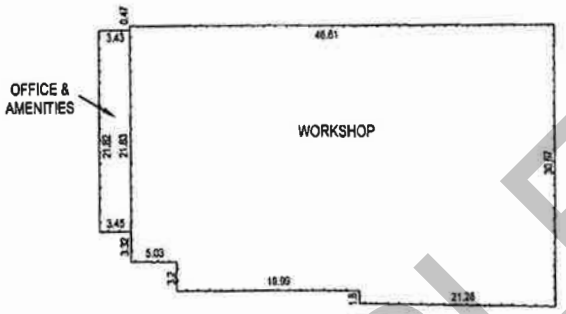
LANDGATE COPY OF ORIGINAL NOT TO SCALE Wed Aug 24 18:46:26 2016 JOB 51783744

Landgate
www.landgate.wa.gov.au



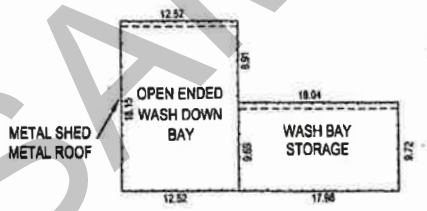
OFFICE & ADMINISTRATION BUILDING AREA = 344m²
LUNCH ROOM BUILDING AREA = 189m²
TOTAL BUILDING BLOCK AREA = 533m²

ENLARGEMENT A
NOT TO SCALE



OFFICE BUILDING AREA = 75m²
MAINTENANCE COMPOUND BUILDING AREA = 1363m²
TOTAL BUILDING BLOCK AREA = 1438m²

ENLARGEMENT B
NOT TO SCALE



OPEN WASH DOWN BUILDING AREA = 238m²
STORAGE BUILDING AREA (TO OUTER EDGE OF GUTTER) = 177m²
TOTAL BUILDING BLOCK AREA = 415m²

ENLARGEMENT C
NOT TO SCALE

LEGEND OF FEATURES
- BUILDING &/OR STRUCTURE
- WALL
- GUTTER

SHEET 2 OF 2

PLEASE NOTE : ALL AREAS CALCULATED FROM OUTSIDE FACE OF BUILDING / STRUCTURES

SAMPLE

Brown McAllister Surveyors
Licensed Surveyors | Land Development & Strata Consultants | Engineering Surveyors
Email : mail@brownmcallister.com.au Tel: (08) 9386 9688
43 Broadway, Nedlands, Western Australia, 6009 Fax: (08) 9386 9677

SCALE 1 : 1000
0 10 20 30 40 50
All distances in metres unless stated otherwise

THE BOUNDARIES WERE NOT RE-ESTABLISHED AS PART OF THIS SURVEY THEREFORE THIS PLAN DOES NOT GUARANTEE THEIR ACCURACY

FIELD INSPECTION IS RECOMMENDED FOR LOCATION OF SERVICES PRIOR TO ANY EXCAVATION

EXISTING BOUNDARY DIMENSIONS AND LOT AREAS TAKEN FROM LANDGATE RECORD DP54135

ALL AREAS AND DIMENSIONS ARE SUBJECT TO SURVEY AND EXAMINATION

LEASE AREA SKETCH OF THE BORAL SITE MANDURAH ROAD, EAST ROCKINGHAM

Client | TRECAP PTY LTD

DATUM
HORIZONTAL - ASSUMED
VERTICAL - ASSUMED

COPYRIGHT OF ALL THIS PLAN IS RESERVED BY BROWN McALLISTER SURVEYORS AND REMAINS THE PROPERTY OF THE AFOREMENTIONED AND SHALL BE RETURNED UPON REQUEST. USE OF ALL OR PART OF THIS PLAN IS RESTRICTED WITHOUT PRIOR WRITTEN PERMISSION.

SHEET	A3
SURVEYED	D.S. - 13/1/2009
FIELD NOTES	
DRAWN	T. PIZZI - 06/03/2009
CHECKED	
REFERENCE	08380-1L_rev3_SHEET2

LANDGATE COPY OF ORIGINAL NOT TO SCALE Wed Aug 24 18:46:26 2016 JOB 51783744
Landgate
www.landgate.wa.gov.au

APPENDIX 2

Wind Roses

SAMPLE

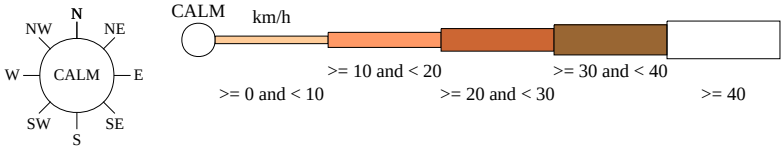
Rose of Wind direction versus Wind speed in km/h (01 Apr 1983 to 24 Sep 2013)

Custom times selected, refer to attached note for details

MEDINA RESEARCH CENTRE

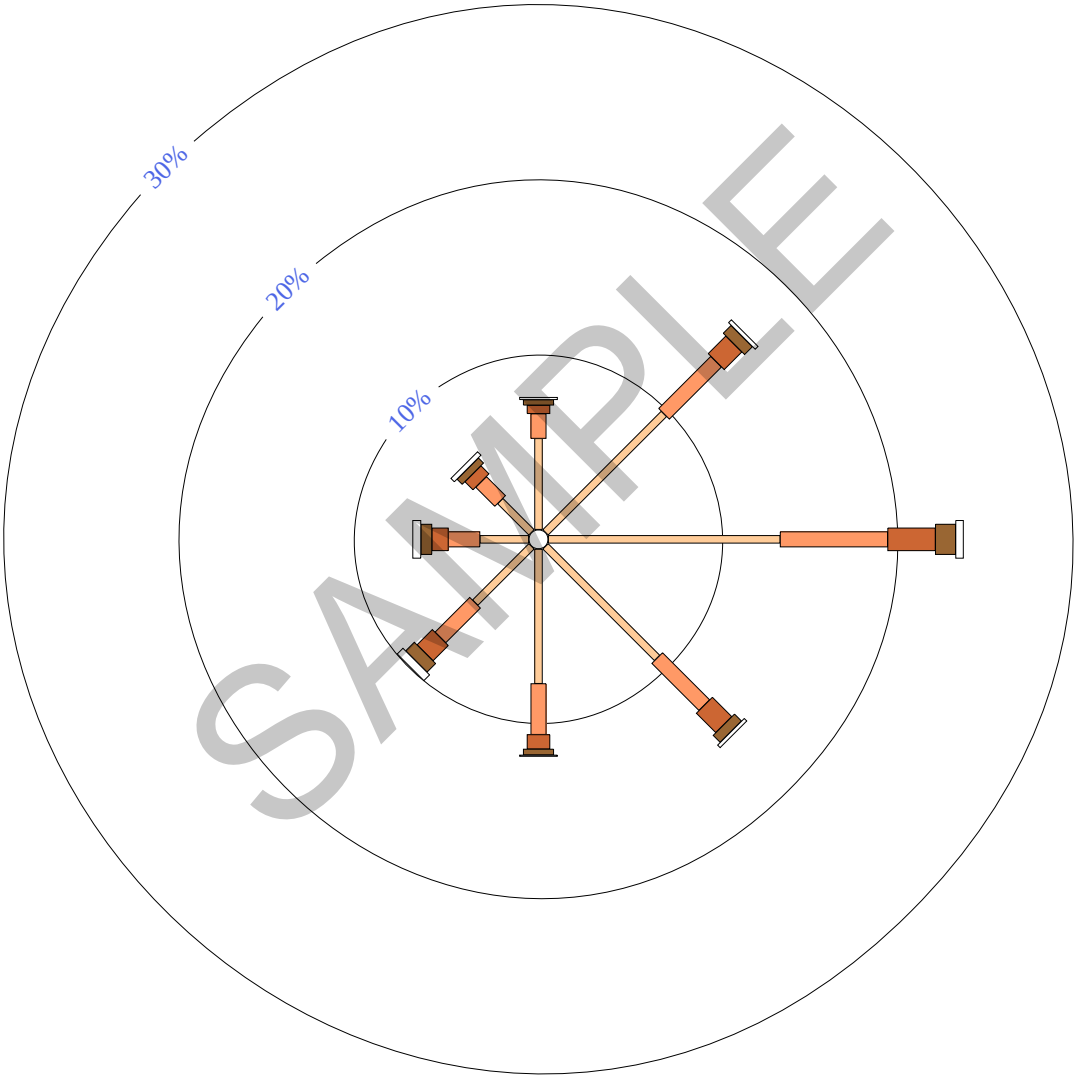
Site No: 009194 • Opened Apr 1983 • Still Open • Latitude: -32.2208° • Longitude: 115.8075° • Elevation 14m

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



9 am
9727 Total Observations

Calm 3%



Australian Government
Bureau of Meteorology

Copyright © *Commonwealth of Australia 2016 . Prepared on 20 Jul 2016*
Prepared by the Bureau of Meteorology.
Contact us by phone on (03) 9669 4082, by fax on (03) 9669 4515, or by email on climatedata@bom.gov.au
We have taken all due care but cannot provide any warranty nor accept any liability for this information.

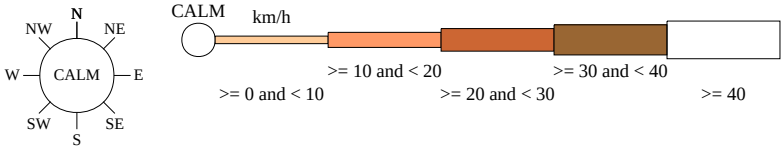
Rose of Wind direction versus Wind speed in km/h (01 Apr 1983 to 24 Sep 2013)

Custom times selected, refer to attached note for details

MEDINA RESEARCH CENTRE

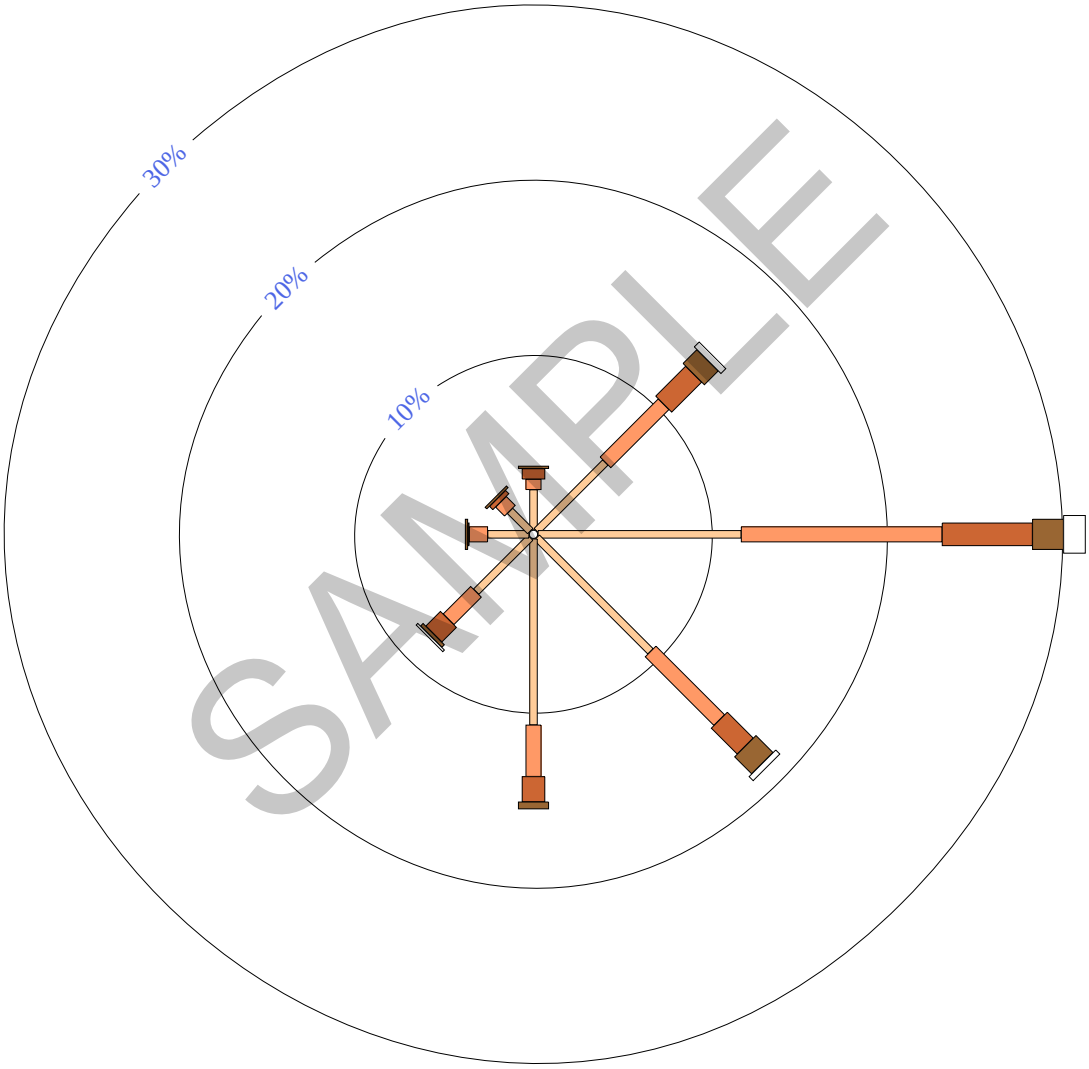
Site No: 009194 • Opened Apr 1983 • Still Open • Latitude: -32.2208° • Longitude: 115.8075° • Elevation 14m

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



9 am Feb
755 Total Observations

Calm 1%



Australian Government
Bureau of Meteorology

Copyright © *Commonwealth of Australia 2016 . Prepared on 22 Jul 2016*
Prepared by the Bureau of Meteorology.
Contact us by phone on (03) 9669 4082, by fax on (03) 9669 4515, or by email on climatedata@bom.gov.au
We have taken all due care but cannot provide any warranty nor accept any liability for this information.

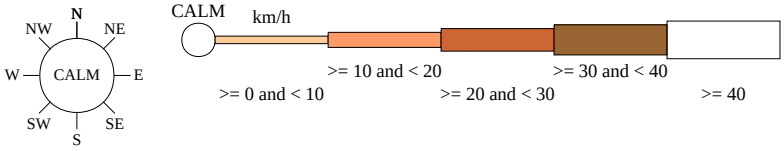
Rose of Wind direction versus Wind speed in km/h (01 Apr 1983 to 24 Sep 2013)

Custom times selected, refer to attached note for details

MEDINA RESEARCH CENTRE

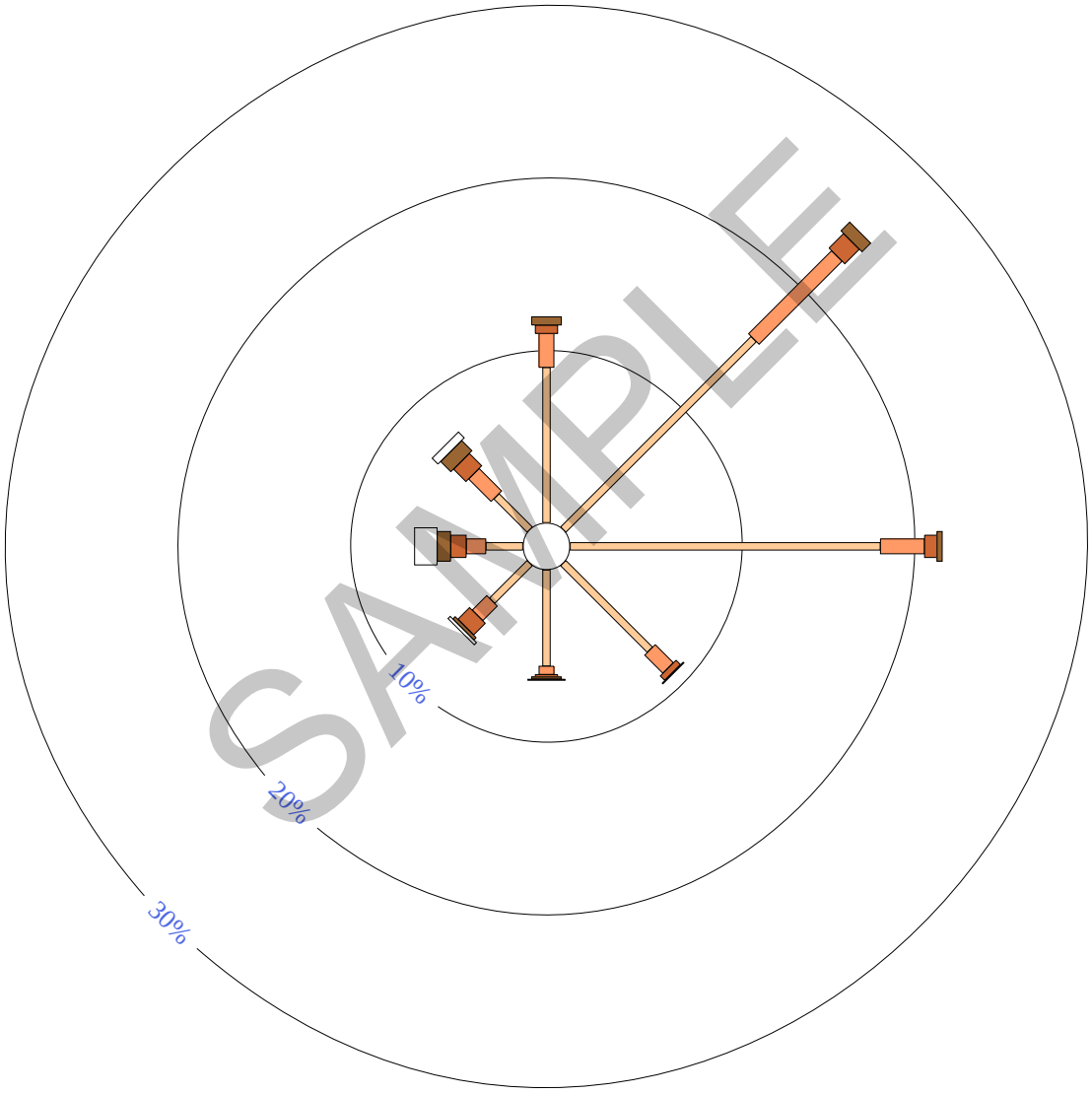
Site No: 009194 • Opened Apr 1983 • Still Open • Latitude: -32.2208° • Longitude: 115.8075° • Elevation 14m

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



9 am Jun
832 Total Observations

Calm 7%



Australian Government
Bureau of Meteorology

Copyright © *Commonwealth of Australia 2016 . Prepared on 22 Jul 2016*
Prepared by the Bureau of Meteorology.
Contact us by phone on (03) 9669 4082, by fax on (03) 9669 4515, or by email on climatedata@bom.gov.au
We have taken all due care but cannot provide any warranty nor accept any liability for this information.

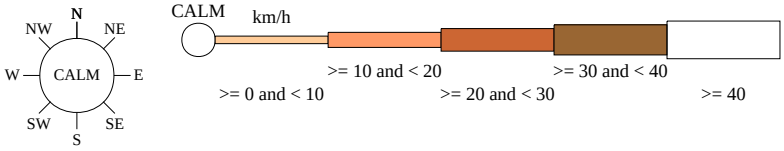
Rose of Wind direction versus Wind speed in km/h (01 Apr 1983 to 24 Sep 2013)

Custom times selected, refer to attached note for details

MEDINA RESEARCH CENTRE

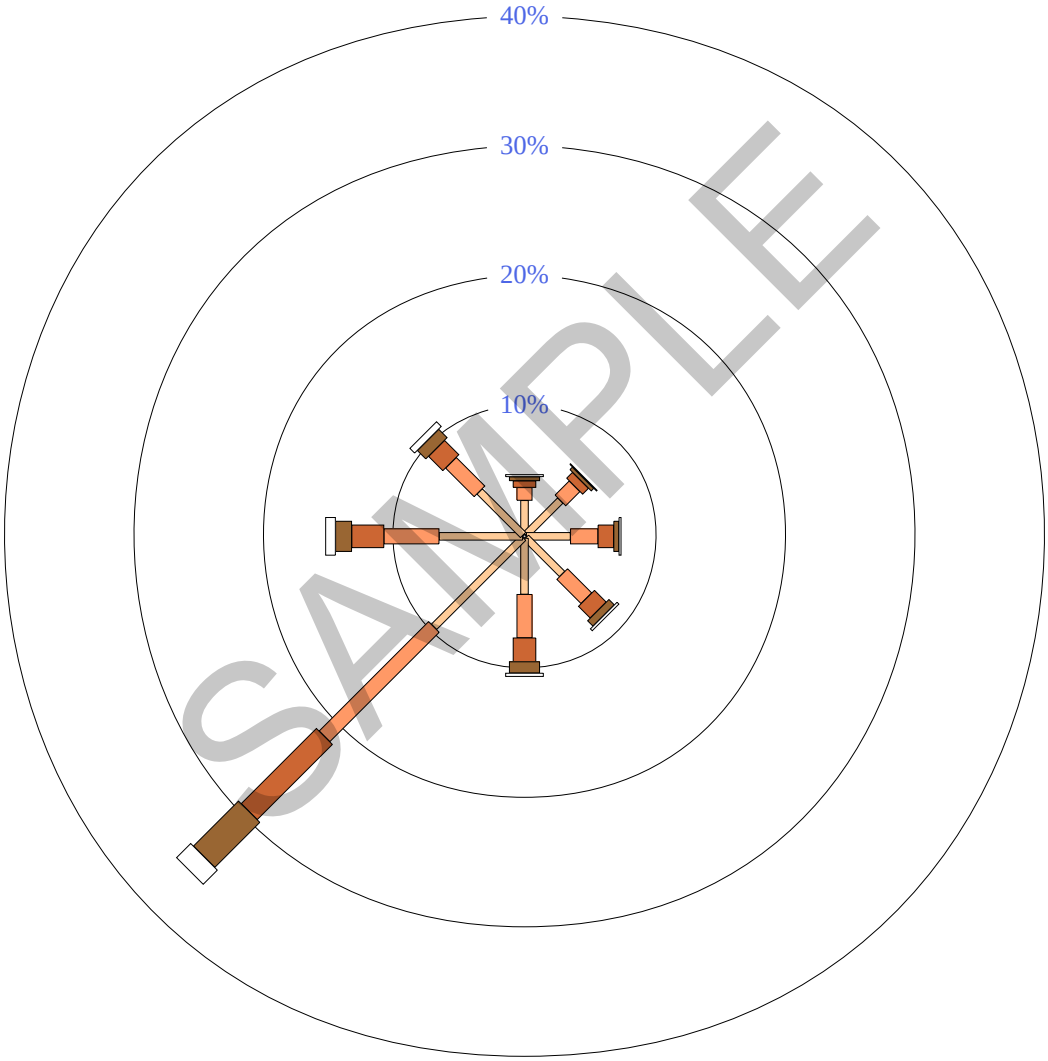
Site No: 009194 • Opened Apr 1983 • Still Open • Latitude: -32.2208° • Longitude: 115.8075° • Elevation 14m

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



3 pm
6544 Total Observations

Calm 1%



Australian Government
Bureau of Meteorology

Copyright © *Commonwealth of Australia 2016 . Prepared on 20 Jul 2016*
Prepared by the Bureau of Meteorology.
Contact us by phone on (03) 9669 4082, by fax on (03) 9669 4515, or by email on climatedata@bom.gov.au
We have taken all due care but cannot provide any warranty nor accept any liability for this information.

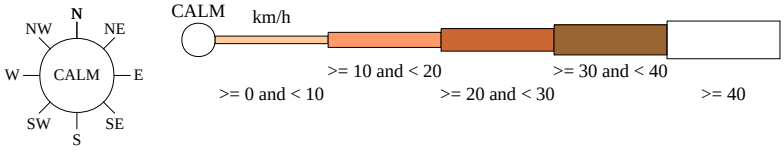
Rose of Wind direction versus Wind speed in km/h (01 Apr 1983 to 24 Sep 2013)

Custom times selected, refer to attached note for details

MEDINA RESEARCH CENTRE

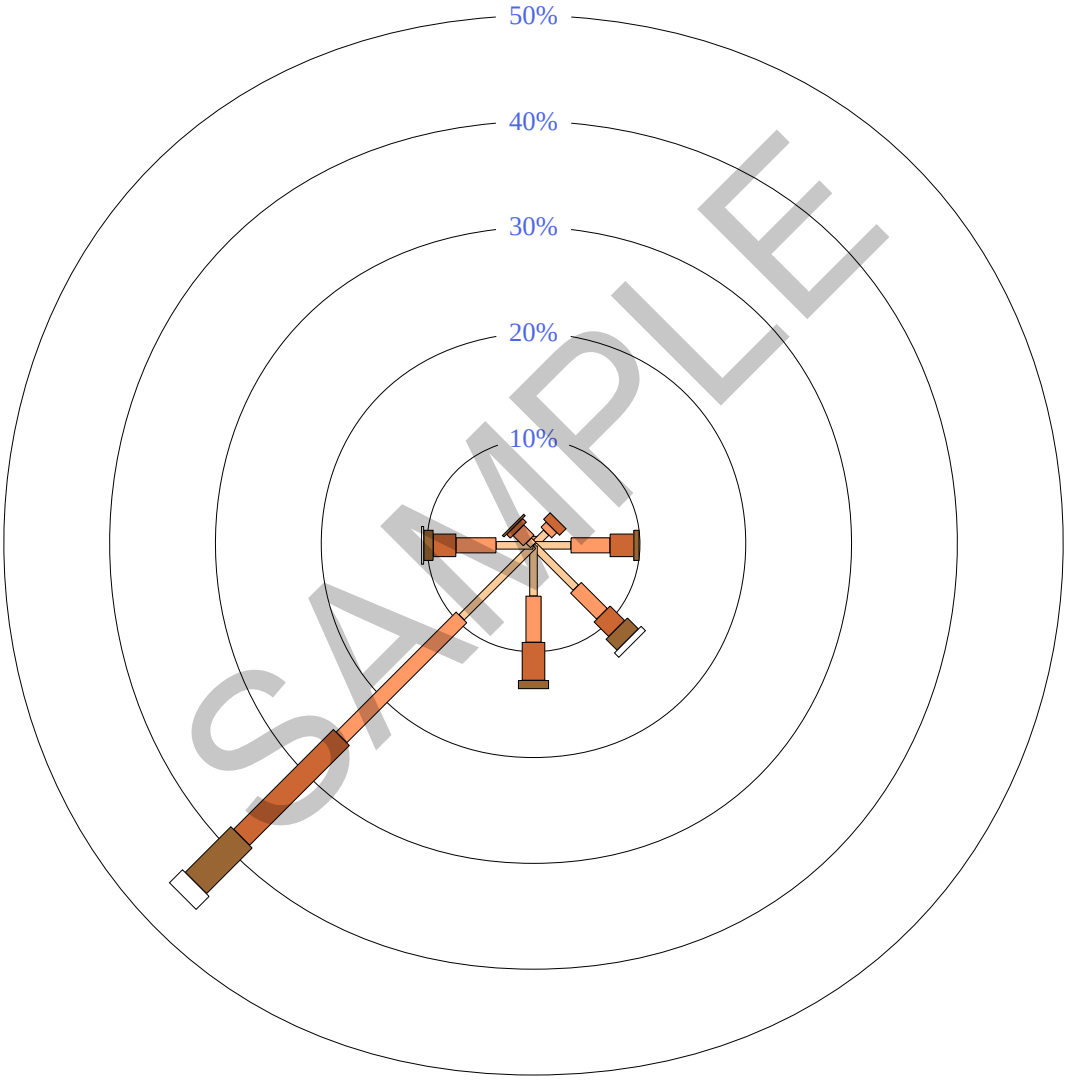
Site No: 009194 • Opened Apr 1983 • Still Open • Latitude: -32.2208° • Longitude: 115.8075° • Elevation 14m

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



3 pm Feb
518 Total Observations

Calm *



Australian Government
Bureau of Meteorology

Copyright © *Commonwealth of Australia 2016 . Prepared on 22 Jul 2016*
Prepared by the Bureau of Meteorology.
Contact us by phone on (03) 9669 4082, by fax on (03) 9669 4515, or by email on climatedata@bom.gov.au
We have taken all due care but cannot provide any warranty nor accept any liability for this information.

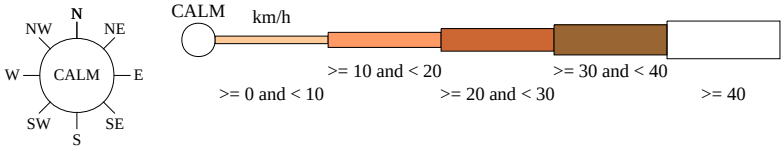
Rose of Wind direction versus Wind speed in km/h (01 Apr 1983 to 24 Sep 2013)

Custom times selected, refer to attached note for details

MEDINA RESEARCH CENTRE

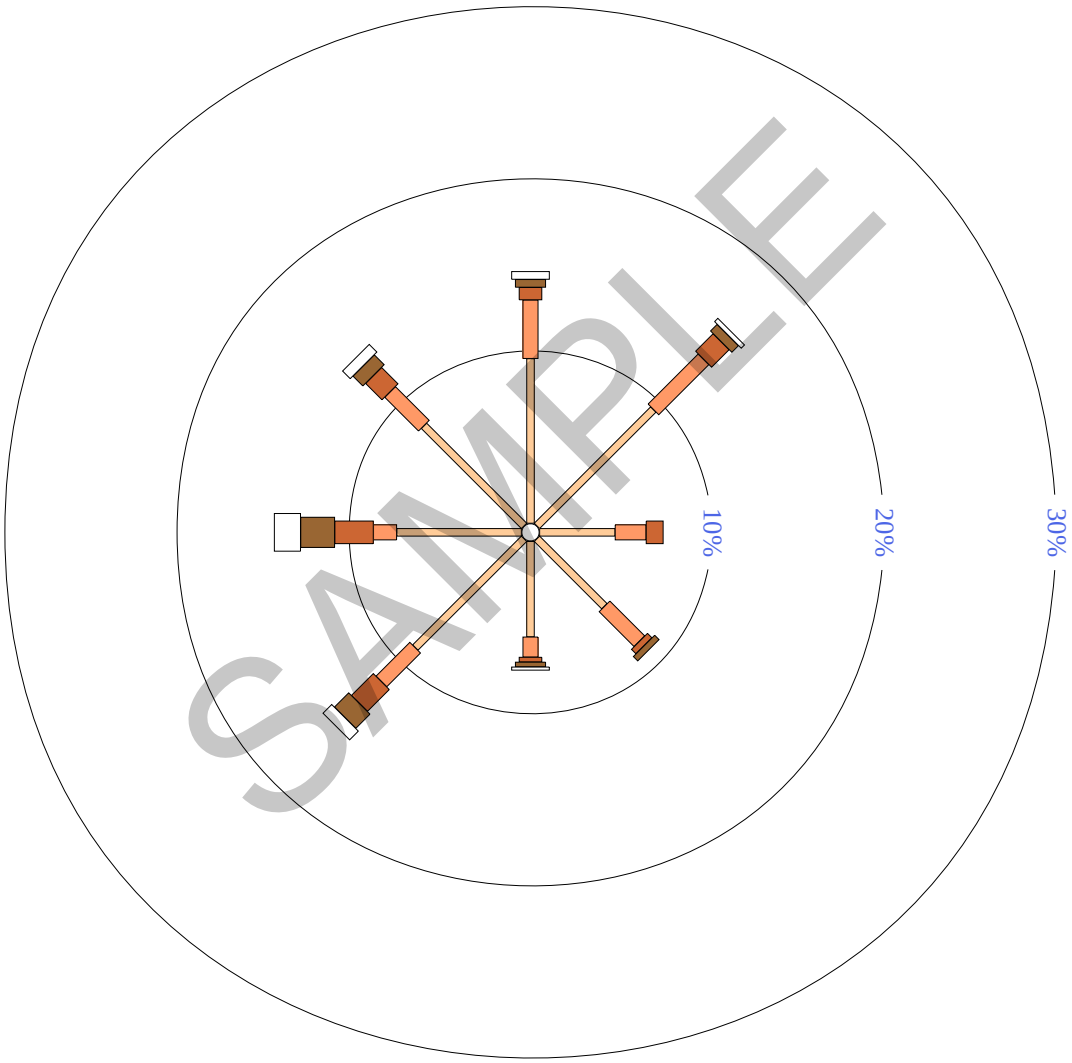
Site No: 009194 • Opened Apr 1983 • Still Open • Latitude: -32.2208° • Longitude: 115.8075° • Elevation 14m

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



3 pm Jun
560 Total Observations

Calm 2%



Australian Government
Bureau of Meteorology

Copyright © *Commonwealth of Australia 2016 . Prepared on 22 Jul 2016*
Prepared by the Bureau of Meteorology.
Contact us by phone on (03) 9669 4082, by fax on (03) 9669 4515, or by email on climatedata@bom.gov.au
We have taken all due care but cannot provide any warranty nor accept any liability for this information.

APPENDIX 3

Aboriginal Heritage Inquiry System Search Results

SAMPLE


Government of Western Australia
Department of Aboriginal Affairs
Aboriginal Heritage Inquiry System
Getting Started
Feedback
DAA Home
What do you want to do?
Zoom to an area
Street Address
Go!
House Number
371
Street Name
Mandurah
Street Type
Town/Suburb
Postcode
Clear
Legend
More Info
Hide
Search Areas
Address - 371 Mandurah
AHIS Map
Locations
Roads
Rivers
Registered Aboriginal Sites
Other Heritage Places
Heritage Survey Areas
Petroleum
Mining Tenements
Native Title
Cadastre
Local Government Areas
Coastline
Topographic Maps
Aerial Photos
Base Maps
Satellite
Hybrid
Road
Topographic
None
City Of Rockingham
City Of Kwinana
Chesterfield Rd
Icon Way
Prospect Way
31742
3689
3690
1743
Map Scale 1 : 11,300
300 Meters

APPENDIX 4

Bell Cottage (ruin)

SAMPLE

HERITAGE COUNCIL OF WESTERN AUSTRALIA

REGISTER OF HERITAGE PLACES

Interim Entry

1. **DATA BASE No.** 2329

2. **NAME**
   OTHER NAME *Bell Cottage (ruin)* (c. 1868)
   Baldivis, WA

3. **LOCATION**

4. **DESCRIPTION OF PLACE INCLUDED IN THIS ENTRY**
   That portions of Cockburn Sound Locations 64 and 224, being part of the land comprised in Certificates of Title Volume 2106 Folio 447 and Volume 1712 Folio 793 respectively as together are defined in Heritage Council of Western Australia survey drawing No. 2329 prepared by Steffanoni Ewing & Cruickshank Pty Ltd.

5. **LOCAL GOVERNMENT AREA** City of Rockingham

6. **OWNER** Trecap Pty Ltd

7. **HERITAGE LISTINGS**

• Register of Heritage Places:	Interim Entry	16/03/2001
• National Trust Classification:	Classified	11/06/1973
• Town Planning Scheme:		----------
• Municipal Inventory:	Adopted	24/10/1995
• Register of the National Estate:		----------

8. **CONSERVATION ORDER**
   ----

9. **HERITAGE AGREEMENT**
   ----

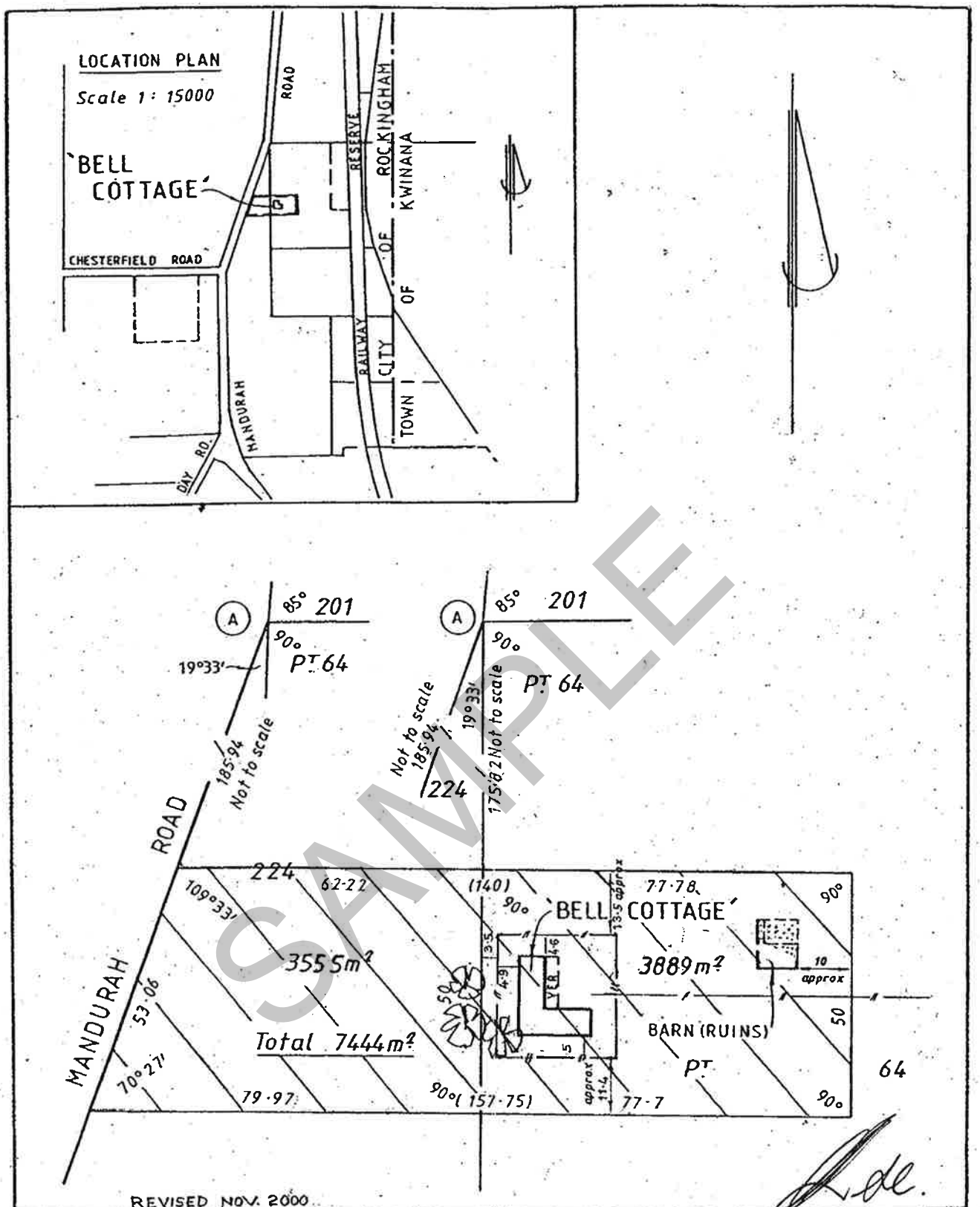
10. **STATEMENT OF SIGNIFICANCE**
    Bell Cottage (ruin), a ruined Victorian Georgian cottage with limestone masonry walls and remnants of a shingle clad roof covered by corrugated iron, together with three peppercorn trees and the ruins of a limestone masonry barn, has cultural heritage significance for the following reasons:

    the place is one of the earliest land grants in the Rockingham region, and the cottage and barn on the property are among the region's oldest built structures;

    the Victorian Georgian elegance of the cottage and its simple vernacular construction have considerable visual appeal, and together with the barn ruin and old peppercorn trees present an aesthetically pleasing composition. The building fabric has acquired, through many

SAMPLE

LANDGATE COPY OF ORIGINAL NOT TO SCALE Wed Aug 24 18:46:24 2016 JOB 51783743
Landgate
www.landgate.wa.gov.au



REVISED NOV. 2000

STEFFANONI EWING & CRUICKSHANK PTY LTD
PERTH 282 Rokeby Rd Subiaco WA 6008
Telephone (08) 9381 8422 Fax (08) 9382 1497
MANDURAH
Telephone (08) 9535 4599 Fax (08) 9581 1894
Licensed Surveyors

Surveyed MAM	Plan 8163 (2)	CLIENT HERITAGE COUNCIL OF WESTERN AUSTRALIA
Drawn BE	Diagram 3/139	
Scale 1 : 1000	Certificate of Title	TITLE PLAN SHOWING BELL COTTAGE, ROCKINGHAM
File 3290/2000	Vol. 2106 Fol. 447 / 1712 793	HCWA DWG N° 2329
Date NOV. 2000	Plan BG 33(5) 4-12	

LANDGATE COPY OF ORIGINAL NOT TO SCALE Wed Aug 24 18:46:24 2016 JOB 51783743

Landgate
www.landgate.wa.gov.au

APPENDIX 5

Manufacturers Statement of Safety Strategy

SAMPLE

Industrie Service

Choose certainty.
Add value.

Statement

about safety strategy related risk of fire and explosion by using inflammable blowing agents at PU- Foaming- Plants

Project:	PU- Foaming plants with inflammable blowing agents Evaluation of safety strategy related risk of fire and explosion
Manufacturer of PU-Plants:	HENNECKE GmbH Birlinghover Straße 30 D-53757 Sankt Augustin
Plants:	PU-Plants for manufacturing of cooling appliances, PU-panels or similar parts
Status of Statement:	Evaluation of safety strategy
Administration No.:	TÜV-No. 2 661 208
Date:	10th, January 2017- Statement
TÜV-Experts:	Dipl.-Ing. K.-J. Richardt – IS-AN1-Ulm Dipl.-Ing. (FH) E. Mack - IS-AN1-Ulm
Coordinator of Hennecke:	Dipl.-Ing. Brian Smith – Director Engi-neering
Distribution of statement:	Hennecke, Mr. Brian Smith @: brian.smith@hennecke.com

Date: January 10, 2017

Our reference:
ID: HENNECKE-Safety Strategy-Contimat-Plants-Statement-01-17

This Document consists of 5 Pages.
Page 1 of 5

Excerpts from this document may only be reproduced and used for advertising purposes with the express written approval of TÜV SÜD Industrie Service GmbH.

The test results refer exclusively to the units under test.

SAMPLE

Industrie Service

1. Preliminary remark

TÜV SÜD Industrie Service – Branch Ulm was involved in development, evaluations and inspections of plants which use inflammable blowing agents for manufacturing of polyurethane foam from the very beginning in 1993 when the first manufacturer of cooling appliances in Germany changed for cfc-free products.

In this time a safety strategy was developed related the risk of fire and explosion by using inflammable blowing agents. This works were carried out in cooperation with the manufacturer of foaming plants like Hennecke, Cannon, OMS, Perros / qs as well as the manufacture of cooling appliances itself like Bosch-Siemens, Bauknecht, AEG, Liebherr, Whirlpool and with TÜV SÜD IS.

After this development TÜV SÜD IS carried out numberless safety inspections at PU-foaming plants all over the world on behalf of organisations like UNDIO, UNDP, World Bank. In other cases TÜV SÜD was ordered by the companies directly.

Parallel to the development and intromission of this new technology the change of refrigerants in the cooling circuits from the cooling appliances for cfc-free but inflammable liquids was made. This development also was carried out similar like the development for PU-plants. TÜV SÜD IS also made in the meantime numberless safety inspection also of this kind of plants around the world.

The development of PU-plants which use inflammable blowing agent at plants for manufacturing of PU- panels was the next step. Also this development resulted in cooperation with manufacturer of such plants and with TÜV SÜD IS.

Also for such panel-plants TÜV IS made many safety inspections.

TÜV also made several investigations of accidents on plants in the beginning of using inflammable blowing agents or inflammable refrigerants.

SAMPLE

2. Reason for this statement

According to the explanation of Hennecke in company Metecno / Australia is just the commissioning of a new Contimat-plant made by Hennecke in process.

Based on the estimation of Hennecke the special safety strategy for PU-plants with inflammable blowing agents are presently not so well-known there. For this reason TÜV SÜD IS should make a statement about this safety strategy.

3. General basic for safety strategy

a. General:

The aim of the safety strategy for PU-plants which use inflammable blowing agents was to find a way between guarantee the safety and look for economical aspects.

For this reason the realization of special safety measures on the plants are defined to avoid the possibility of creation of explosion atmosphere and reduce the dimension of classic explosion danger areas.

b. Principal of safety strategy:

Following points represent the safety measures at PU-foaming plants:

1. Pentane storage:

– The national, respectively the international standards must be considered and realized.

– Requirements for tanks according national standards must be considered and realized.

– Further special request must be considered for following plants and equipments:

- Pentane unloading place
- Pentane-Piping
- Equipment of tank (level-detection, overfill-protection,)
- Pentane-supply- system for supply the pre-mix-plant with pentane
- Emergency equipments can be part of a special risk assessment (e.g. emergency push buttons, gas-sensor, leakage-sensor)
- Fire detection and fire-fighting systems can be part of a special risk assessment.

2. Pentane- metering- unit or polyol-pentane-pre-mix plants (if necessary e.g. for plants of cooling appliances)

– Installation of pentane-metering-unit or of polyol-pentane pre-mix plant in a special room or in an area where the unit is inside a housing.

– Pentane-metering unit or polyol-pentane-pre-mix-unit:

  - The pentane-metering-unit is inside a cabin. Inside this cabin the explosion zone 2 is defined. The technical equipment within this zone must fulfil the standard-request for Ex-zone 2.
  - Unit is equipped with technical ventilation; this ventilation is automatically controlled and connected with a safety control system. In case if the ventilation is disturbed automatic safety function must be trigged by the control system. Details of these functions are defined in the safety map and safety function- matrix of Hennecke.
  - Unit is equipped with a gas-sensor and or with a leakage sensor in the liquid catching basin. In case of a pentane detection of e.g. 20% LEL and 40% LEL automatic safety function must be triggered.

– Pre-mix-tank if necessary for example for plants in refrigerator industry:

  - The inside of tank is inerted by nitrogen. This inertisation is automatically controlled, therefore inside the tank is no explosion zone but inerted zone.
  - In case of a disturbance of this inertisation automatic safety function must be triggered. Details of these functions are defined in safety map and safety function- matrix of Hennecke.
  - Equipment of tank: overfill-protection, pressure control of N_2, redundancy of automatic-valves, tank is placed inside a liquid catching basin

– Equipment within the cabin of pentane-metering unit or of room and area with polyol-pentane pre-mix-plants:

  - Technical ventilation which is defined and calculated in accordance with IEC 60079-10.

SAMPLE

- In case of a disturbance of this ventilation automatic safety function must be triggered. Details of these functions are defined in safety map and safety function- matrix of Hennecke.
- Gas sensor and leakage sensor installed in the surrounding of the polyol-pentane-pre-mix-plant or in the cabin of pentane-metering unit. In case of detection of pentane automatic safety functions must be triggered. Details of these functions are defined in safety map and safety function- matrix of Hennecke.
- The area of pre-mix-plant is defined as NE-zone (former “Alarm-zone) based on IEC 60079-10. The basic of this NE-zone is as follows:
  - All the equipment with polyol-pentane must fulfil the request of the definition “continual technical tight.

    This can be realized with following solutions: use of special gaskets, use of special pipe-connections, use of automatic leakage control systems, use of magnetic-couplings.
  - Reduction of technical equipment which is placed inside this zone for only this equipment which is needed for operation of this plant.
  - Electrical equipment inside this zone must be classified at least for IP 54.
  - The area of this zone is technical ventilated based on the request of IEC 60079-10. The ventilation is automatically controlled and in case of a distribution safety function will be triggered about the pentane-safety control system. Details of these functions are defined in safety map and safety function- matrix of Hennecke. The level of functional safety for this system is also defined.

    The inner side of this ventilation exhaust system is defined as explosion zone 2.
  - The area of this zone is monitored by a gas-detection system. In case of pre-alarm (e.g. 20% LEL) special safety functions will be automatically triggered.
  - In case of pentane-alarm (e.g. 40%LEL) an automatic cut off function of all not explosion proofed equipment will be automatically triggered via the pentane-safety control system. Details of these functions are defined in safety map and safety function- matrix of Hennecke. The level of functional safety for this system is also defined (e.g. PL d).
  - Special pentane emergency push-buttons which triggered the same function like pentane-alarm triggered by gas sensor are installed in the area of pre-mix-plant.
  - All equipment which can´t be automatically cut off in case of pentane- alarm must be explosion proofed for at least explosion zone 2 (e.g. gas-sensors, exhaust-fan, leakage-sensor, emergency-lamps).
  - The floor inside this zone must be electrostatic conductive.
  - Fire detection system or fire fighting systems for this area must be decided based on a risk assessment or based on local standards.

3. <u>Foaming area</u>

– Area of mixing – head:

- Piping of pentane respectively of polyol-pentane must fulfill the requests for “continual technical “. Details related this are described in chapter above.

SAMPLE

- Definition of explosion zones are defined in the Hennecke documentation “Zone classification for Contimat production lines when processing pentane” (inner side of metering unit, surrounding of mixing-head, beside the panel-conveyor-belt after foaming, area inside the heat-tunnel until the PU-polymerization.
- The equipment inside these defined zones must be in accordance with the request for classification for explosion proofed devices.
- The floor in the foaming area must be electrostatic conductive.
- Use of gas sensors and technical ventilation:
  - In the areas of NE-zones (former alarm-zones) the same safety measures as described in the chapter above must be realized.

– Heat tunnel:

- Pentane emission only comes out from the PU-material until the process of polymerisation is finished. According to the description of Hennecke this will be occur at least 1.5m after the entry into the heat tunnel.
- The calculation of the ventilation inside the heat-tunnel must guarantee that never a critical pentane concentration can exist in this ventilation system.
- An automatic function coupling between the ventilation of the heat-tunnel and the PU-foaming must be realized, that means if the ventilation is disturbed the foaming must be blocked.
- Before start of foaming the heat-tunnel must be pre-ventilated for a certain time.

SAMPLE

4. General safety requests:

For such kind of plants independent of the special request for the plants also other safety request related the matter of fire and explosion as well of the matter of general machinery safety must be considered.

Such safety requests for example are as follows:

– Grounding and potential equalization
– Lightning protection
– Illumination of escape ways
– General safety request related machinery safety
– Supply of power for pentane-safety control-panel and other safety systems (emergency illumination) by power emergency generator and UPS
– Training of operators and maintenance staffs
– Safety inspection before first operation of the plant
– Regularly safety checks

The Expert

sign.: Helmut Kohn