

# 2019

## Pollution Incident Response Management Plan

**Company Name:**

Hydromet Corporation Pty Limited

**Facility Address:**

201 Five Islands Road, Unanderra NSW 2526

**Last Updated:**

16/08/2019

**Version No.:**

7.0

Document History			
Version No.	Date	Author	Comments
1.0	22/04/2015	JP	New document drafted.
2.0	11/07/2016	JP	Updated Chemical Register and storage locations.
3.0	31/07/2017	JP	Updated Chemical Register and storage locations.
4.0	16/03/2018	JP	Updated Site Plan, Chemical Register and storage locations.
5.0	17/09/2018	CB	Updated by Advitech per EPA audit report (Aug. 2018) findings.
6.0	02/10/2018	JP	Updated per EPA emailed comments dated 26/09/2018.
7.0	16/08/2019	KM	Updated organization structure, chemical register, equipment and adding online location of PIRMP.

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## 1.0 OVERVIEW

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This Pollution Incident Response Management Plan ('PIRMP' or 'Plan') has been written to comply with the legislative requirements under the Protection of the Environment Operations Act 1997 (POEO Act) and the Protection of the Environment Operations (General) Regulation 2009.

This Plan covers Hydromet Corporation's Unanderra facility located at 201 Five Islands Road, Unanderra NSW 2526. The facility operates under an Environment Protection License (EPL 5874) administered by the NSW Environment Protection Authority ('EPA').

Under the legislation referred above, the EPL requires a PIRMP to clearly document pollution risks, communication procedures to authorities and community regarding pollution incidents and testing and training for pollution response. The legislation requires Hydromet Corporation to implement the Plan if there is a pollution incident involving material harm or threatened material harm to human health or the environment.

The PIRMP contains the following sections as required by the regulation:

1. Background: describes the main features of the regulation.
2. Hazard, probability and pre-emptive actions to prevent pollution incident risks: describes type of pollution incidents that may be possible and lists procedures that are already in place to minimize and manage pollution. Ranking of risks is included in appendices.
3. Maps: locality map to show location of potentially affected neighbors and environmentally sensitive areas.
4. Emergency incident response procedures: what to do in case of material harm.
5. Early warnings and communication to neighbors: when to contact neighbors in case of pollution incidents and information required for website.
6. Training: information to be passed on to staff and contractors.
7. Updating of plan: frequency of updates.
8. Testing: frequency of drills to test effectiveness of PIRMP.
9. Implementing of plan: reference to legislation requirement to carry out aspects of the plan during a pollution incident.

### Introduction

The Unanderra facility is owned and operated by Hydromet Corporation Pty Limited ('Hydromet Corporation'). The facility is licensed for the following scheduled activities:

- a. resource recovery;
- b. hazardous, restricted and general solid waste storage;
- c. hazardous liquid waste storage.

### Purpose

This PIRMP is to improve the way pollution incidents are reported, managed and communicated to the general community.

The purpose of this Plan is to:

- A. Ensure comprehensive and timely communication about a pollution incident to staff at the premises, the Environment Protection Authority (EPA), other relevant authorities specified in the Act (such as local councils, NSW Ministry of Health, SafeWork NSW and Emergency Services) and people outside the facility who may be affected by the impacts of the pollution incident.
- B. Minimise and control the risk of a pollution incident at the facility by requiring identification of risks and the development of planned actions to minimise and manage those risks.
- C. Ensure that the Plan is properly implemented by trained staff, identifying persons responsible for

implementing it and ensuring that the Plan is regularly tested for accuracy, currency and suitability.

The PIRMP will be activated only if material harm to human health or the environment occurs or threatens to occur.

The principal activities undertaken at the Unanderra facility are (a.) used lead acid battery recycling and (b.) wastewater treatment. Environmental management at the facility is subject to continuous improvement in operations, processes and practices. To accommodate these ongoing changes and to accommodate increases in facility specific environmental assessment and management, the Plan will be progressively reviewed.

This Plan is to clearly define the requirements of staff to report and respond to pollution incidents in accordance with the 2011 and 2012 changes to the POEO Act and the POEO (General) Regulation 2009.

### **Documentation**

Hydromet Corporation has implemented a structured Environmental Management System ('EMS') (HMC.EMS.18.001.01) to achieve a consistently high standard of performance. The EMS will strive to ensure Hydromet Corporation meets the obligations of its internal Environmental Policy and relevant legislation/standards.

The CHSE Master Register is used to keep record and monitor all compliance, health & safety and environmental incidents within the organisation. The register will assist with record keeping, reporting and determining improvements to incident response and review of the Plan.

## **2.0 PLAN COMPLIANCE**

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This Pollution Incident Response Management Plan complies with the requirements under the:

- Part 5.7A of the POEO Act
- Part 3A of POEO (General) Regulation 2009

The requirements under the legislation are supported by the *Environmental Guidelines: Preparation of Pollution Incident Response Management Plans*, which provides additional advice from the EPA on plan preparation.

Plan preparation is a requirement for holders of EPLs. The Unanderra facility operates under EPL 5874 and is therefore required to prepare a PIRMP and implement the PIRMP if and when an incident occurs.

## **3.0 HAZARD, PROBABILITY & PRE-EMPTIVE ACTIONS TO PREVENT POLLUTION INCIDENT RISKS**

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### **3.1 Overview**

This chapter deals with the POEO (General) Regulation 2009's Sections 98C(a) to 98C(f). These sections deal with the hazard, probability and pre-emptive actions which are similar processes to undertaking a risk assessment and providing appropriate control measures to minimise those risks.

### **3.2 Species or Substances Having Potential Human Health Impacts**

The species or substances currently processed or generated on site with potential to adversely impact human health include:

- **Lead**  
Evidence shows that lead is a multi-targeted toxicant, causing effects in the gastrointestinal tract,

hematopoietic system, cardiovascular system, central and peripheral nervous systems, kidneys, immune system, and reproductive system.

- **Cadmium**

Exposure to cadmium may cause gastrointestinal irritation, vomiting, abdominal pain, and diarrhoea. Longer term exposure to cadmium primarily affects the kidneys, resulting in tubular proteinosis although other conditions such as "itai-itai" disease may involve the skeletal system. Inhalation exposure to cadmium and cadmium compounds may result in effects including headache, chest pain, muscular weakness, pulmonary edema, and even death. An 8-hour TWA (time-weighted-average) exposure level of 5 mg/m<sup>3</sup> has been estimated for lethal effects of inhalation exposure to cadmium, and exposure to 1 mg/m<sup>3</sup> is considered to be immediately dangerous to human health.

- **Zinc**

Gastrointestinal distress is a common symptom of acute oral exposure to zinc compounds. Symptoms develop within 24 hours and include nausea, vomiting, diarrhoea, and abdominal cramps. High doses may result in gastrointestinal bleeding and subsequent hematological signs of anemia.

- **Sulphuric Acid Mist**

Sulphuric acid mists have long been recognised as having the potential to cause short-term irritation of eyes and skin, etching of teeth, irritation of the lungs (chemical pneumonitis) and upper respiratory tract and nasal problems. In 1992 IARC classified strong acid mists containing sulphuric acid as a group 1 carcinogen.

- **Strong Alkali Solutions**

Strong alkali solutions are irritating and corrosive. They can cause severe burns and permanent damage to any tissue that it comes in contact with. The extent of damage to the gastrointestinal tract may not be clear until several hours after ingestion. Inhaled alkali salts can cause swelling of the larynx and an accumulation of fluid in the lungs. For example, contact with 25-50% sodium hydroxide solutions produces immediate irritation, while after contact with sodium hydroxide solutions of 4% or less, irritation may not develop for several hours.

More detailed toxicological information with respect to each of these substances is included in Appendix A.

### **3.3 Events or Scenarios Creating Increased Risk - Human Health Impacts**

All personnel, visitors and contractors are required to comply with the PPE requirements for the various operational areas of the site. In normal operational circumstances, the PPE specified will offer sufficient protection to ensure there are no adverse health impacts through undertaking work activities or visiting the site.

Provided PPE and general safety requirements are observed, there are no likely scenarios that would result in increased risk to human health. Only highly improbable events/scenarios such as willful acts, terrorist attack or impact by an aircraft could introduce increased human health risks.

### **3.4 Events or Scenarios Creating Increased Risk – Environmental Impacts**

#### **Liquids**

In normal circumstances, the site first flush system acts as a secondary 'bund' to all operational activities. The key features of the site first flush system include:

1. Collection of all liquids at the lowest point on the site  
Located adjacent to the south-eastern corner at the lowest elevation of the site, the first flush pit is the natural collection point for all liquids, stormwater, etc arising and most particularly those arising in operational areas.
2. Capacity to hold 165m<sup>3</sup>  
The first flush system has an operating capacity of 165m<sup>3</sup>. This is sufficient to retain the first 10mm of stormwater runoff from the operational footprint of the site or equivalent. In the event of a spill or loss of containment event, there will be no off-site impacts where all liquids are intercepted.
3. Emptying of first flush pit to storage tank is automated  
The first flush pit is fitted with level sensors that automatically stop and start the first flush pit pumps. These pumps transport any captured liquids to storage tanks. The total storage tank volume typically available is 100m<sup>3</sup>. Typically, collected site stormwater will be harvested in this manner. Irrespective of the storage requirements for harvested stormwater, Hydromet will ensure the first flush system is always kept empty to cater for an unexpected onsite emergency.

Given the operation of the site first flush system as described above, the events potentially leading to increased environmental risk from the existing site operations would include:

- Power supply failure to the first flush pit pumps with a secondary storm event (assumes first flush pit is already full) coincident with a major loss of containment event involving the breach of another bund on-site. It is considered the coincidence of all these events to be most unlikely.
- Loss of containment from a reagent delivery tanker on-site but outside the catchment area of the first flush system.

### **Gases/Vapours**

There are currently no processing operations that could result in major gas or vapour emissions from the site.

The risk assessment in Appendix B lists the main risk scenarios associated with the current activities being undertaken at the Unanderra facility, with the potential to impact human health or the environment. The risk assessment documents the likelihood of any such hazards occurring and the control measures that have been implemented to mitigate or manage the potential risks arising from those hazards.

### **3.5 Pollutant Types and Quantities**

Refer to the Work Health and Safety Procedures: Hazardous Chemicals Management (HMC.PRO.18.021.01) which lists the substances, quantities and respective storage locations. A copy is attached to Appendix C.

## **4.0 MAPS OF SITE AND SAFETY EQUIPMENT LOCATIONS**

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This section covers the POEO (General) Regulation 2009 Section 98C(k) requirements which are (a.) detailed set of maps showing the location of the premises to which the license relates, (b.) the surrounding area that is likely to be affected by a pollution incident, (c.) the location of potential pollutants on the premise and (d.) the location of any storm water drains on the premises.

### **4.1 Site Geographic Location**

Site identification information is provided in Table 1. A detail map of the site showing location of the premises and neighbors are shown in Figure 1.

**Table 1: Site Identification Summary**

Street Address:	201 Five Islands Road, Unanderra NSW 2526
Lot Title:	Lot 3 in DP 259921
Site Area:	20,000m <sup>2</sup> approx.
Current Land Use Zoning:	IN3 Heavy Industrial
Local Government Area:	Wollongong City Council
Adjoining Land Uses:	<ul style="list-style-type: none"><li>- North: Five Islands Road</li><li>- South: Bisalloy Steel</li><li>- East: M1 Princes Motorway</li><li>- West: BlueScope Steel Welded Products</li></ul>

#### **4.2 Location and Types of Safety Equipment**

The following fire equipment/protocols exist at the site:

- One Fire Brigade Booster Unit (FBBU) (located internally at the entrance to the site;
- Six (6) fire hydrants with 10 L/s @ 250 kPa at the most hydraulically disadvantaged hydrant;
- Three (3) fire hose reels;
- Fifteen (15) dry powder fire extinguishers;
- Six (6) CO2 fire extinguishers;
- Three (3) fire blankets;
- Legislated routine fire equipment servicing;
- Regulatory Fire Safety Statement half yearly;
- Legislated Sydney Water non-return valves checking and certification annually; and
- Fire Warden training.

The following general safety equipment/protocols exist at the site:

- Site first flush system (primarily utilised for stormwater harvesting to minimise site potable water consumption);
- Five general spill kits and a diesel spill kit;
- One fuel specific spill kit located adjacent to the diesel tank;
- One Emergency Services manifest box consistent with the requirements stipulated in the Work Health and Safety Regulation 2017;
- Four first aid kits;
- First Aid training; and
- Emergency exit signage.

#### **Safety Equipment Generally Located Outdoors**

Figure 2 shows the general site layout including the location of fire hydrants, spill kits and the emergency services manifest box close to the site entry point. Most of this equipment is located outside although two spill kits and two single fire hydrants are located indoors.

#### **Safety Equipment Located Indoors**

Appendix D provides emergency evacuation information for each building. Also included in each building diagram is the safety equipment layout within. Each individual building map shows the location of bathroom facilities, fire extinguishers, fire blankets, fire hose reels, first aid kits and emergency exit points.

Additionally, each building is shown in relation to the location of the emergency assembly area(s).



**Figure 1:** Map of Hydromet's Unanderra Facility and Surrounding Businesses



Drawn By: J Perera | Last Updated: 12/07/2019 | Ver: 6.0

## 5.0 EMERGENCY INCIDENT RESPONSE PROCEDURES

### 5.1 Internal Communications

Internal communications procedures are outlined in the Hydromet Emergency Plan.

### 5.2 Organisational Structure and Key Personnel

The Hydromet Corporation's organisational structure is presented in Figure 3.

The most senior operational officer on-site at the time of a pollution incident event or a potential incident event will be responsible for the implementation of this Plan and initiation of the appropriate pollution incident response.

List of key personnel and their contact details:

Employee Name	Position	Contact No.
Heath Pylyp	Site Supervisor - Unanderra Operations NSW	0435 565 343
Keith Mau	General Manager	0423 001 385
BRP Team Leader		0472 868 795
WTP Team Leader		0423 575 872
Jeremy Perera	Executive Director	0412 916 065

### 5.3 Action to be Taken Immediately After a Pollution Incident

This PIRMP must be followed in conjunction with the Hydromet Emergency Plan immediately after a pollution incident occurs.

#### Procedures to be followed by the responsible person notifying the pollution:

<b>Worker</b> <ol style="list-style-type: none"><li>1. Report incidents immediately to the Team Leader;</li><li>2. Assist with implementing controls in the event of a pollution incident;</li><li>3. Provide information as required.</li></ol>
<b>Team Leader</b> <ol style="list-style-type: none"><li>1. Notify Management</li><li>2. Ensure the PIRMP and Hydromet Emergency Plan is made available to staff and authorised offices;</li><li>3. Provide advice on controls and containment measures;</li><li>4. Assistance with implementation of response actions to pollution incidents;</li><li>5. Obtain information from workers and witnesses.</li></ol>
<b>Manager/Supervisor</b> <ol style="list-style-type: none"><li>1. Implement response actions to pollution incidents;</li><li>2. Obtain information required to adequately notify the EPA of an environmental emergency;</li><li>3. Contact all the regulatory authorities;</li><li>4. Communicate to neighbours and the local community;</li><li>5. Notify the General Manager.</li></ol>
<b>General Manager</b> <ol style="list-style-type: none"><li>1. Launch an incident investigation and draft report;</li><li>2. Submit report to Directors and authorities.</li></ol>

### **5.3 Procedure to be Followed for Combating the Pollution Caused by a Spill Incident**

As discussed in Section 3.4, the combination of the site first flush system, the available tank capacity and the continuous ability to pump liquids from the 165m<sup>3</sup> first flush system will serve to prevent pollution incidents occurring (particularly with respect to off-site impacts) due to spillage and/or loss of containment events.

Minor spill events will likely be managed using the available spill kits on site.

In any significant spill or loss of containment event on site, all site personnel are trained to ensure the first flush system is fully functional as the primary pollution preventative measure. The precise procedures, checks and actions required to ensure satisfactory operation of the first flush system are covered under the Hydromet Emergency Plan.

For incidents involving material harm, the fire brigade or Hazmat would combat the pollution caused by a spill incident and become the emergency controller.

#### **Pollution Incidents – Spills**

A spill can be the release of any chemical or substance that may potentially enter stormwater, creeks, rivers, ground water or contaminate soil.

#### **Clean-Up Action**

All spillage and loss of containment incidents are required to be acted upon immediately. This is a separate action to that of notification. Clean-up actions/operations involve the cleaning/washing/hosing down of the site to ensure that all spilt substances have been consolidated to the first flush pit and transported to the appropriate storage tank(s).

Where possible, clean-up actions and notification actions should be undertaken concurrently.

### **5.3 Procedure to be Followed Following an Air Incident**

An air emission can include smoke, dust, odour or emission of a chemical or air impurity. There are no current processing operations likely to result in major gas or vapour emissions from the site leading to human health or environmental impacts.

### **5.4 External Communications – Government Agencies and Other Parties**

POEO Act Section 153C states in relation to the contents of a PIRMP:

*(c.) the procedures to be followed for coordinating, with the authorities or persons that have been notified, any action taken in combating the pollution caused by the incident and, in particular, the persons through whom all communications are to be made.*

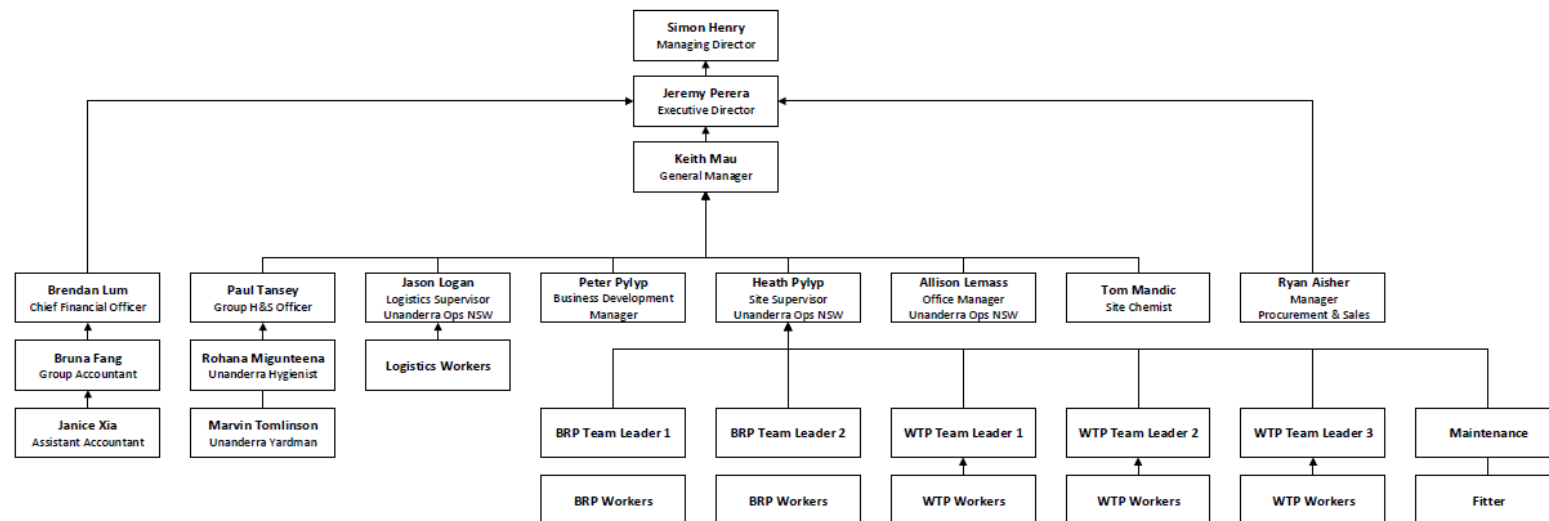
#### **Evacuation**

Major incidents such as bush fires or flooding, the Facility Controller may consider evacuation of staff to appropriate distances away from the incident. Evacuation information for each building is presented in Appendix D. Also follow Hydromet Emergency Plan.

### **5.5 Procedures for Notifying Pollution Incident to the EPA or Local Council**

This is covered under Section 6.2 and in the Hydromet Emergency Plan.

### Hydromet Group Organisation Chart Unanderra Operations NSW



Author: J Perera | Date: 16/08/2019 | Ver. 3.1

**Figure 3:** Hydromet Organisational Chart

## 6.0 EARLY WARNINGS AND COMMUNICATIONS TO NEIGHBOURS

### 6.1 Community Communication and Consultation

Hydromet Corporation had and would continue to undertake community and stakeholder consultation where necessary.

Hydromet Corporation will continue to update the community where required.

Refer below table for contact details of neighboring businesses.

Company Name	Site Address	Contact No.
BlueScope Steel Welded Products	203 Five Islands Road, Unanderra	4272 2544
Bisalloy Steels	18 Resolution Drive, Unanderra	4272 0444
Morrow Equipment Company	25 Resolution Drive, Unanderra	4272 2044
McKeon Swim Centre	1 Marley Place, Unanderra	4272 7272
D&D Traffic Management	6 Marley Place, Unanderra	4272 7133
Premium Tyre Service	2/6 Marley Place, Unanderra	4276 4090
Prokote	6 Marley Place, Unanderra	4272 3411

### 6.2 Website Information

This PIRMP has been written to comply with the legislative requirements under the Protection of the Environment Operations Act 1997 and the Protection of the Environment Operations (General) Regulations 2009 Section 98D:

*(2) A plan is also to be made publicly available in the following manner within 14 days after it is prepared:*

- (a.) in a prominent position on a publicly accessible website of the person who is required to prepare the plan,*
- (b.) if the person does not have such a website, by providing a copy of the plan, without charge, to any person who makes a written request for a copy.*

*(3) Subclause (2) applies only in relation to that part of a plan that includes the information required under:*

- (a.) Section 153C(a) of the Act, and*
- (b.) clause 98C(1) (h) and (i) or (2) (b) and (c) (as the case requires).*

A copy of the PIRMP is accessible on the front page of the Hydromet website.

### Emergency Incident Response Procedures

Under Part 5.7 of the POEO Act, there is a duty to notify each relevant authority (identified below) of a pollution incident, where material harm to the environment is caused or threatened. Material harm includes actual or potential harm to the health or safety of human beings or to ecosystems that is not trivial or that results in actual or potential loss (refer definitions) or property damage of an amount over \$10,000.

For the above pollution incidents, Hydromet Management will be responsible for reporting to the authorities below without delay.

**If there is an immediate threat to human health or the environment, call Emergency Services First on 000.**

NSW EPA	131 555
The Ministry of Health (Wollongong Hospital) ➔ask for Public Health Officer on call	(02) 4222 5000
SafeWork NSW	131 050
Wollongong City Council	(02) 4227 7111

Early warnings for affected or potentially affected community members for any pollution incident are to be communicated to those members via a door knock process. The Plant Supervisor or nominated person will be responsible for coordinating the door knock.

For air pollution incidents that may affect neighbours, those neighbours will be asked to close their doors and windows and stay indoors until further notice.

For water pollution incidents that may affect neighbours who could access the contaminated water, those neighbours will be asked to avoid use of the water until further notice.

Regular updates of any pollution incidents will be via a letterbox drop to the local community, notices in local papers or via a door knocks as required.

### **6.3 Availability and Location of this Plan**

The POEO (General) Regulation 2009 Section 98D(1) states:

*(1) A plan is to be made readily available:*

*(a.) to an authorised officer on request, and*

*(b.) at the premises to which the relevant licence relates, or where the relevant activity takes place, to any person who is responsible for implementing the plan.*

Hard copies of the PIRMP are kept in the following buildings:

- Admin Building – Meeting Room
- Site Office – Logistics Office
- Battery Recycling Plant – Control Room
- Liquid Treatment Plant – Control Room

Electronic copy of the PIRMP is available on Hydromet's SharePoint server and on the Hydromet website.

## **7.0 TRAINING**

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Necessary environmental management competencies have been determined for each of the broad positions within the organisation including:

- Managers
- All other employees

Training of prospect staff falls into several categories:

- Formal internal and external training

- Project/Facility Training Information provided on facility such as inductions and toolbox meetings

Details of the training records will be kept on Hydromet's SharePoint server under Employee Training, Certification & Competency (ETCC) Register.

The below information will also be included to comply with PIRMP training requirements:

- Awareness of the PIRMP
- Where this Plan can be accessed
- Pollution incident classification and reporting under this Plan
- Spill response actions under this Plan
- Other incident response actions under this Plan
- Early warnings internally and to neighbours where appropriate
- Specific procedures in dealing with potential pollution incidents e.g. spill response procedure

## 8.0 UPDATING OF PLAN

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This Plan was first created on 22.04.2015. Updates to this Plan are recorded on the table titled 'Document History'.

This Plan will be reviewed and updated according to the following:

- 12 months from the last update
- Within 1 month of a Category 1 incident
- As identified after testing of the Plan (refer Section 9)
- Following an EPA audit of Hydromet's Environmental Management Systems and/or PIRMP.

## 9.0 TESTING OF PLAN

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The POEO (General) Regulation 2009 Section 98E states for testing of the Plan:

- (1) *The testing of a plan is to be carried out in such a manner as to ensure that the information included in the plan is accurate and up to date and the plan is capable of being implemented in a workable and effective manner.*
- (2) *Any such test is to be carried out:*
  - (a.) *regularly at least once every 12 months, and*
  - (b.) *within 1 month of any pollution incident occurring in the course of an activity to which the license relates so as to assess, in the light of that incident, whether the information included in the plan is accurate and up to date and the plan is still capable of being implemented in a workable and effective manner*

Testing of the Plan will be integrated into other emergency and incident testing and training programs where possible.

Initial testing of the Plan will be undertaken within 6 months of the acceptance of the PIRMP. Design of the testing will be undertaken 1 month before the testing is conducted.

Records of the testing will be kept with the PIRMP.

### **Testing Dates**

This Plan will be tested according to the following:

- 12 months from the last test, or;
- Design of the testing method will be 1 month before the initial date;
- Or before one month after a reportable incident (Category 1).

### **Recording of Testing**

A detailed record of the testing of the Plan will be prepared after each testing of the Plan is undertaken. If the test identifies any shortcomings in the Plan, especially the implementation of the spill response procedures, the Plan will be corrected or appropriate non-conformance actions will be undertaken.

The PIRMP was last scheduled for testing on 19 August 2019 by Keith Mau.

## **10.0 IMPLEMENTATION OF THE PLAN**

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The POEO Act Section 153F requires the Plan to be implemented if a pollution incident occurs. A maximum fine of \$2million apply for failing to implement the Plan.

Hence if a pollution incident occurs:

- It must be responded to according to this Plan and its reference documents;
- An incident investigation report must be completed.

### Lead<sup>1</sup>

The systemic toxic effects of lead in humans have been well-documented by the EPA (EPA, 1986a-e, 1989a, 1990) and ATSDR (1993), who extensively reviewed and evaluated data reported in the literature up to 1991. The evidence shows that lead is a multi-targeted toxicant, causing effects in the gastrointestinal tract, hematopoietic system, cardiovascular system, central and peripheral nervous systems, kidneys, immune system, and reproductive system.

The target blood lead level for general population in Australia has dropped from 10 µg/dL to 5 µg/dL. Slightly higher levels are tolerated for workers in lead processing industries. Given the potential impacts upon infants and children, care should be exercised before risking the potential exposure of women of child bearing age.

#### TARGET ORGANS/CRITICAL EFFECTS

##### Primary Target(s)

The effects of exposure to lead have been characterized much better in humans than in laboratory animals; the following targets have been identified in humans.

Central nervous system: neurobehavioral deficits in children and adults. Effects occur at lower blood levels in children.

Cardiovascular system: increased blood pressure in adults.

Red blood cells: interference with hemoglobin synthesis and erythropoiesis

Kidney: nephropathy is a characteristic manifestation of lead toxicity; may be related to cardiovascular effects.

##### Other Target(s)

1. Immune system: equivocal evidence of immunosuppression in humans

Liver: serum enzyme levels reduced

Gastrointestinal tract: symptoms of colic occur in both adults and children

##### Carcinogenicity

The results of documented studies do not provide evidence for a casual association between exposure to lead and mortality due to cancer at any specific sites. Elevated death rates for stomach and lung cancer were observed in some studies, but the analyses were based on small numbers of deaths, and exposures to other metals confounded interpretation of the results.

#### REFERENCE DOSE (RfD)

According to the EPA (1994b), the degree of uncertainty regarding the health effects of lead is very low. The critical effects that occur as a result of exposure to lead (changes in levels of certain blood enzymes, elevation of blood pressure, and neurobehavioral deficits in children) occur at exposure levels (measured as blood lead) so low as to be essentially without a threshold. Therefore, the EPA's RfD Work Group considers it inappropriate to develop an RfD for inorganic lead.

The Integrated Exposure Uptake Biokinetic (IEUBK) Model developed by the EPA is a site-specific method for estimating blood lead levels in children 0.5 to 7 years old based on multimedia exposures to lead in air, diet, drinking water, dust, soil, and paint (EPA, 1994c). Children are more sensitive to effects of lead than adults. The source contribution to lead uptake is predicted; mean distribution of lead in blood, bone, liver, and kidney is predicted, and finally, the frequency distribution for lead levels in a population of children is estimated assuming a log-normal distribution and a specified geometric standard deviation, which has a default value of 1.6. This model estimates the risk of blood levels in a child or a population of children exceeding 10 µg/dL, the level of concern. A computer program is used for these calculations. Site-specific concentrations of lead in various media

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<sup>1</sup> The Risk Assessment Information System – RAIS - <https://rais.ornl.gov/tox/profiles/lead.html>

are used when available; otherwise default values are assumed. The EPA has established a screening level of 400 ppm (ug/g) for lead in soil (EPA, 1994a). This is the level above which there may be enough concern to conduct a site-specific study of risk to lead exposure.

### Cadmium<sup>2</sup>

Acute oral exposure to 20-30 g have caused fatalities in humans. Exposure to lower amounts may cause gastrointestinal irritation, vomiting, abdominal pain, and diarrhea (ATSDR, 1989). An asymptomatic period of one-half to one hour may precede the onset of clinical signs. Oral LD<sub>50</sub> values in animals range from 63 to 1125 mg/kg, depending on the cadmium compound (USAF, 1990). Longer term exposure to cadmium primarily affects the kidneys, resulting in tubular proteinosis although other conditions such as "itai-itai" disease may involve the skeletal system. Cadmium involvement in hypertension is not fully understood (Goyer, 1991).

Inhalation exposure to cadmium and cadmium compounds may result in effects including headache, chest pains, muscular weakness, pulmonary edema, and death (USAF, 1990). The 1-minute and 10-minute lethal concentration of cadmium for humans has been estimated to be about 2,500 and 250 mg/m<sup>3</sup>, respectively (Barrett et al., 1947; Beton et al., 1966). An 8-hour TWA (time-weighted-average) exposure level of 5 mg/m<sup>3</sup> has been estimated for lethal effects of inhalation exposure to cadmium, and exposure to 1 mg/m<sup>3</sup> is considered to be immediately dangerous to human health (Friberg, 1950). Renal toxicity (tubular proteinosis) may also result from inhalation exposure to cadmium (Goyer, 1991).

#### TARGET ORGANS/CRITICAL EFFECTS

##### Oral Exposures - Primary Target(s)

1. Kidney: Renal tubular proteinuria is the primary toxic effect of long-term cadmium exposure.
2. Gastrointestinal tract: Acute exposure to high levels of cadmium and cadmium compounds may cause irritation, vomiting, nausea, and diarrhea.

##### Oral Exposures - Other Target(s)

The liver, bones, testes, and cardiovascular system have been shown to be affected to various degrees by cadmium.

##### Inhalation Exposures - Primary Target(s)

1. Kidney: Renal tubular proteinuria may result from chronic exposure to cadmium and cadmium compounds.
2. Lung: Inhalation exposure to cadmium dust, fumes, aerosols, and some cadmium compounds causes irritation of the respiratory tract, emphysema, and death for acute exposure to high cadmium concentrations.

#### Carcinogenicity

Classification-B1: Probable human carcinogen

Basis - Limited evidence from multiple occupational exposure studies showing an association between cadmium exposure and increased incidence of lung cancer. Adequate data are available showing a carcinogenic response to cadmium by rats and mice following inhalation exposure and parenteral administration.

#### REFERENCE DOSE (RfD)

##### Chronic

ORAL RfDc: 5E-4 mg/kg/day (water) (U.S. EPA, 1991) 1E-3 mg/kg/day (food)

UNCERTAINTY FACTOR: 10 (for both food and water)

MODIFYING FACTOR: 1 (for both food and water)

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<sup>2</sup> The Risk Assessment Information System – RAIS - <https://rais.ornl.gov/tox/profiles/cadmium.html>

NOAEL: 0.005 mg/kg/day (water) 0.01 mg/kg/day (food)

LOAEL: Not available

CONFIDENCE: Study: Not applicable Data base: High RfD: High

VERIFICATION DATE: 05/25/88

PRINCIPAL STUDY: The data supporting the RfD have been derived from many animal and human studies that have provided information on cadmium toxicity (renal toxicity using proteinuria as the critical effect) and the calculation of pharmacokinetic parameters regarding calcium absorption, distribution and excretion.

COMMENTS: Due to background cadmium in the diet, no sub-chronic RfD was calculated.

### Zinc<sup>3</sup>

Gastrointestinal distress is a common symptom of acute oral exposure to zinc compounds (ATSDR, 1989), particularly when zinc salts of strong mineral acids are ingested (Stokinger, 1981). Accidental poisonings have occurred as a result of the therapeutic use of zinc supplements and from food contamination caused by the use of zinc galvanized containers. Symptoms develop within 24 hr and include nausea, vomiting, diarrhea, and abdominal cramps (Stokinger, 1981; Elinder, 1986). The concentration in drinking water that can cause an emetic effect ranges from 675 to 2,280 ppm (Stokinger, 1981). High doses may result in gastrointestinal bleeding and subsequent hematological signs of anemia as was seen in the case of an individual taking zinc sulfate capsules (6.47 mg/kg/day) for one week (Moore, 1978).

#### Oral Exposures - Primary Target(s)

1. Blood: Copper deficiency and hypochromic microcytic anemia in humans chronically exposed. Anemia in animals.
2. Pancreas: Pancreatitis in humans acutely exposed, and in animals acutely, sub-chronically, or chronically exposed.
3. Gastrointestinal Tract: Vomiting, diarrhea, cramps, and possibly bleeding following acute or sub-chronic exposures in humans and animals.

#### Oral Exposures - Other Target(s)

1. Immune System: Possible impairment in humans following sub-chronic exposures.
2. Kidney: Renal lesions in animals following acute and sub-chronic exposures.
3. Developmental Effects: Reduced foetal growth in animals.
4. Reproductive Effects: Inhibition of reproduction in animals following sub-chronic exposures.
5. Skin: Hair loss in animals following sub-chronic exposure to zinc phosphide.

#### Inhalation Exposures - Primary Target(s)

1. Lung: Pulmonary congestion, leukocytic infiltration (zinc oxide); pneumonitis, ulceration, sub-pleural hemorrhage, and fibrosis (zinc chloride) in occupationally exposed workers most likely from acute exposures.

#### Inhalation Exposures - Other Target(s)

1. Blood: Leukocytosis, hypocalcemia in humans following acute exposures.
2. Gastrointestinal Tract: Possible ulcers in occupationally exposed workers.
3. Liver: Possible changes in hepatic enzymes in occupationally exposed workers.

#### Carcinogenicity

There is some evidence that zinc may act antagonistically towards the carcinogenic effects of other compounds. For example, administration of zinc sulfate in drinking water reduced the incidence of 9,10-dimethyl-1,2-benzanthracene-induced tumors in the cheek pouches of golden hamsters (Poswillo and Cohen, 1971).

An excess rate of gastric cancer was reported for a region of Great Britain having a high zinc to copper ratio in home garden soil (Stocks and Davies, 1964); however, in another study significantly lower gastric cancer rates were reported for areas with a similar zinc-copper soil composition (Phillip et al., 1982).

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<sup>3</sup> The Risk Assessment Information System – RAIS - <https://rais.ornl.gov/tox/profiles/zn.html>

Several epidemiological studies have examined cancer mortality rates in occupationally exposed workers and in residents in areas with potentially high zinc contamination. No association between cancer mortality and zinc exposure could be established for workers employed in electrolytic zinc and copper refining plants; however, analysis of the data was limited by the small number of deaths in workers exposed to zinc (Logue et al., 1982). Lung cancer mortality was reported to be elevated in residents living in an old lead/zinc mining and smelting area, but there was no association with environmental levels of zinc (Neuberger and Hollowell, 1982). Because many confounding factors (i.e., smoking, occupation, and duration of residence) were not considered, it is unlikely that the study could have detected zinc-related effects (ATSDR, 1989).

### **Reference Dose (RfD)**

The generic oral Reference Dose for zinc and zinc compounds is currently under review by EPA (U.S. EPA, 1991a). The sub-chronic and chronic RfDs listed below are those currently used (U.S. EPA, 1992).

#### **Sub-Chronic – Zinc (metallic)**

ORAL RfD: 0.2 mg/kg/day (U.S. EPA, 1992)

UNCERTAINTY FACTOR: 10

LOAEL: 2.14 mg/kg/day.

COMMENT: The same study applies to the sub-chronic and chronic RfD.

#### **Chronic – Zinc (metallic)**

ORAL RfD: 0.2 mg/kg/day (U.S. EPA, 1992)

UNCERTAINTY FACTOR: 10

LOAEL: 2.14 mg/kg/day.

COMMENT: Based on clinical data demonstrating zinc-induced copper deficiency and anemia in patients taking zinc sulfate for the treatment of sickle cell anemia (U.S. EPA, 1992). The Office of Drinking Water also recognizes an oral RfD of 0.2 mg/kg/day (U.S. EPA, 1991b).

## **Sulphuric Acid Mist<sup>4</sup>**

### **Summary**

- Sulphuric acid mist at high concentrations causes corrosion of the teeth and is irritating to the respiratory system, but long-term low concentration exposure can also cause cancer of the larynx.
- The AIOH believes that exposure may be adequately controlled by conventional means such as local exhaust ventilation and segregation of workers from areas of high concentration.
- A standard to limit exposure to no more than 0.1 mg of sulphuric acid mist in each cubic metre of air is recommended for the measured inhalable fraction.

### **General Exposure Information**

Sulphuric acid is a strong acid and will oxidise, dehydrate or sulphonate most organic compounds. Dehydration occurs because sulphuric acid has a strong affinity for water. It forms various hydrates when in contact with organic matter or water vapour. Although it is miscible with water, contact with water generates heat and may produce a violent reaction. The reaction with water releases toxic and corrosive fumes and mists. Sulphuric acid is non-combustible, but it can release flammable hydrogen gas when in contact with metals.

Sulphuric acid mists have long been recognised as having the potential to cause the following health effects (NSAA, 2013):

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<sup>4</sup> <https://www.aioh.org.au/static/uploads/files/sulphuric-acid-position-paper-wfgrnbfbivc.pdf>

- Short-term irritation of eyes and skin.
- Irritant dermatitis (red, itchy, dry skin) and itching due to repeated exposure to low concentrations of mists or aerosols.
- Etching of teeth after a few weeks exposure, progressing to erosion after a few months exposure. Dental etching and erosion occurred about four times as frequently in a high exposure group (> 0.3 mgfm<sup>3</sup>) compared to a low exposure group (< 0.07 mgfm<sup>3</sup>).
- Irritation of the lungs (chemical pneumonitis) and upper respiratory tract after brief exposure to high concentrations of sulphuric acid mist and in severe cases may cause pulmonary oedema. Symptoms include coughing and shortness of breath and can be delayed until hours or days after the exposure.
- Nasal problems, throat irritation bronchial hyper reactivity and/or damage to the lining of the throat in the region of the larynx after repeated exposure to lower concentrations of the mist.

In 1992 IARC classified strong acid mists containing sulphuric acid as a group 1 carcinogen (known human carcinogen). IARC (2012) reaffirmed this classification for “mists from strong inorganic acids”, noting that such mists cause cancer of the larynx. IARC (2012) also note that a positive association has been observed between exposure to mists from strong inorganic acids and cancer of the lung.

The National Toxicology Program (NTP, 2014) first listed “*Strong Inorganic Acid Mists Containing Sulfuric Acid*” as being ‘*Known to be human carcinogens*’ in 2000. They state that occupational exposure to strong inorganic acid mists containing sulphuric acid is specifically associated with laryngeal and lung cancer.

ACGIH (2011) maintain that sulphuric acid is a suspected human carcinogen that decreases lung function in individuals with pre-existing respiratory disease.

SCoEL (2012) found no evidence that sulphuric acid caused any signs of systemic toxicity upon penetration of the skin (penetration is via corrosion of the skin) hence there is no requirement for a ‘Sk’ notation.

It should be noted that the carcinogen classification is for inorganic acid mists containing sulphuric acid only and does not apply to sulphuric acid or sulphuric acid solutions where no mist or vapour is generated.

### **Strong Acid Solutions – (e.g. Sulphuric Acid)<sup>5</sup>**

#### **Summary - Health Impacts**

Sulphuric acid is corrosive to all body tissues. Inhalation of vapor may cause serious lung damage. Contact with eyes may result in total loss of vision. Skin contact may produce severe necrosis. Fatal amount for adult: between 1 teaspoonful and one-half ounce of the concentrated chemical. Even a few drops may be fatal if the acid gains access to the trachea. Chronic exposure may cause tracheobronchitis, stomatitis, conjunctivitis, and gastritis. Gastric perforation and peritonitis may occur and may be followed by circulatory collapse. Circulatory shock is often the immediate cause of death. Those with chronic respiratory, gastrointestinal, or nervous diseases and any eye and skin diseases are at greater risk. (EPA, 1998)

Contact with eyes or skin causes severe burns, the severity depending on the strength of the acid. Ingestion can cause severe irritation of mouth and stomach. (USCG, 1999)

Carcinogen, Corrosive, Reactive - 2nd degree

#### **Summary – Physical Properties**

It is highly reactive and capable of igniting finely-divided combustible materials on contact. When heated, it emits highly toxic fumes. Avoid heat; water and organic materials. Sulfuric acid is explosive or incompatible with an enormous array of substances. Can undergo violent chemical change at elevated temperatures and pressure.

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<sup>5</sup> [https://pubchem.ncbi.nlm.nih.gov/compound/sulfuric\\_acid#section=EPA-Safer-Chemical](https://pubchem.ncbi.nlm.nih.gov/compound/sulfuric_acid#section=EPA-Safer-Chemical)

May react violently with water. When heated, it emits highly toxic fumes. Hazardous polymerization may not occur. (EPA, 1998)

### **Strong Alkali Solutions – (e.g. Sodium Hydroxide)<sup>6</sup>**

#### *Acute Exposure*

Sodium hydroxide is strongly irritating and corrosive. It can cause severe burns and permanent damage to any tissue that it comes in contact with. The extent of damage to the gastrointestinal tract may not be clear until several hours after ingestion. Inhaled sodium hydroxide can cause swelling of the larynx and an accumulation of fluid in the lungs. Contact with 25-50% solutions produces immediate irritation, while after contact with solutions of 4% or less, irritation may not develop for several hours. It may not be possible to correctly ascertain the degree of damage to eyes for up to 72 hours after exposure.

#### *Respiratory*

Inhalation of sodium hydroxide is immediately irritating to the respiratory tract. Swelling or spasms of the larynx leading to upper-airway obstruction and asphyxia can occur after high-dose inhalation. Inflammation of the lungs and an accumulation of fluid in the lungs may also occur.

People with asthma or emphysema may be more susceptible to the toxicity of this agent.

#### *Dermal*

Skin contact with solid sodium hydroxide or its concentrated solutions can cause severe burns with deep ulcerations. Burns appear soft and moist and are very painful. Although contact with concentrated solutions causes pain and irritation within 3 minutes, contact with dilute solutions may not cause symptoms for several hours.

#### *Ocular*

Eye exposure may produce diffuse or localized blood vessel clots and an accumulation of fluid in the eye. Softening, sloughing, and ulcerations of the cornea may occur. Ulcerations may continue to progress for many days. Severe injury can lead to clouding of the eye surface and blindness.

#### *Gastrointestinal*

Ingestion of sodium hydroxide can cause spontaneous vomiting, chest and abdominal pain, and difficulty swallowing with drooling. Corrosive injury to the mouth, throat, esophagus, and stomach is extremely rapid and may result in perforation, hemorrhage, and narrowing of the gastrointestinal tract.

#### *Carcinogenicity*

Sodium hydroxide has not been classified for carcinogenic effects.

#### *Reproductive and Developmental Effects*

Sodium hydroxide dissociates within the body and would not reach the reproductive organs in an unchanged state. No data were located concerning reproductive endpoints in humans exposed to sodium hydroxide. Sodium hydroxide is not teratogenic in rats. Sodium hydroxide is not included in *Reproductive and Developmental Toxicants*, a 1991 report published by the U.S. General Accounting Office (GAO) that lists 30 chemicals of concern because of widely acknowledged reproductive and developmental consequences.

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<sup>6</sup> Information derived from the US Agency for Toxic Substances & Disease Registry at:  
<https://www.atsdr.cdc.gov/mmg/mmg.asp?id=246&tid=45>

## APPENDIX B: ENVIRONMENTAL RISK ASSESSMENT

### RISK ASSESSMENT FORM

<b>Organisation</b>	<b>Facility</b>	<b>Project / Operation Assessed</b>	<b>Date of Assessment</b>	<b>Reference No.</b>
Hydromet Corporation Pty Limited	Unanderra	Site Activities	12/03/2018	HMC.PIRMP-RA.001 v.1

Participants					
Name	Title	Company	Name	Title	Company
Jeremy Perera	Executive Director	Hydromet Corporation Pty Limited	Heath Pylyp	Plant Supervisor – Liquid Waste Treatment Operations	Hydromet Corporation Pty Limited
Ross Gale	Manager – Battery Recycling Operations (NSW)	Hydromet Corporation Pty Limited			

#	Risk Category	Potential Risk or Hazard	Associated Harm	Likelihood	Consequence	Risk Rating	Existing Control Measures	Proposed Control Measures	Due Date	By
1	Environmental Impacts	Spill during loading & unloading of packaged hazardous chemicals	Water pollution; Soil Contamination	(C) Possible	(2) Negligible	LOW	Product packaging; Spill kit; Sump drain; Bunding & hardstand; First flush system	-	n/a	n/a
2	Environmental Impacts	Spill during loading & unloading bulk hazardous chemicals	Water pollution; Soil Contamination	(C) Possible	(4) Extensive	HIGH	Spill kit; Sump drain; Bunding & hardstand; Covered unloading bay	-	n/a	n/a
3	Environmental Impacts	Release of acid mist from operations	Air pollution from acid mist emissions	(D) Likely	(3) Moderate	HIGH	Wet scrubber; Procedures; Covered buildings	-	n/a	n/a
4	Environmental Impacts	Odour from operations	Complaints from neighbours	(C) Possible	(2) Negligible	LOW	Wet scrubber; Procedures; Covered buildings	-	n/a	n/a
5	Environmental Impacts	Noise from operations	Complaints from neighbours	(E) Almost Certain	(2) Negligible	LOW	Zoning; Consent Conditions	-	n/a	n/a
6	Environmental Impacts	Dispersion of lead dust from operations	Water pollution; Soil contamination	(C) Possible	(3) Moderate	MEDIUM	Hardstand; Housekeeping; Procedures; Covered buildings	-	n/a	n/a
7	Environmental Impacts	Loss of containment of hazardous chemicals from storage tank/IBC rupture	Water pollution; Soil contamination	(B) Unlikely	(3) Moderate	LOW	Equipment fit-for-purpose; Materials selection; Procedures; Bunding & Hardstands; Covered storage; Protective coatings on floors & walls; PIRMP	-	n/a	n/a
8	Environmental Impacts	Fire or explosion from storage of flammable liquids & gases	Air pollution; Water pollution from fire water	(A) Rare	(4) Extensive	LOW	Equipment fit-for-purpose; Materials selection; Procedures; Bunding; Physical segregation of incompatible substances; First flush system; PIRMP	-	n/a	n/a
9	Environmental Impacts	Fire from storage of timber pallets	Air pollution; Water pollution from fire water	(A) Rare	(4) Extensive	LOW	Equipment fit-for-purpose; Materials selection; Procedures; Bunding; Physical segregation of incompatible substances; First flush system; PIRMP	-	n/a	n/a
10	Environmental Impacts	Contaminated surface water runoff during a rain event	Water pollution	(C) Possible	(2) Negligible	LOW	Bunding & hardstand; Housekeeping; Procedures; Covered buildings	-	n/a	n/a

<b>Very High (VH)</b>	<b>Immediate action required by the Executive with detailed planning, allocation of resources and regular monitoring.</b>
<b>High (H)</b>	<b>High risk, senior management attention needed.</b>
<b>Medium (M)</b>	<b>Management responsibility must be specified.</b>
<b>Low (L)</b>	<b>Monitor and manage by routine procedures.</b>
<b>Very Low (VL)</b>	<b>Managed by routine procedures.</b>

## APPENDIX B: ENVIRONMENTAL RISK ASSESSMENT

				CONSEQUENCE					
				Health & Safety	Minor injury or first aid treatment	Injury requiring treatment by medical practitioner and/or lost time from workplace	Major injury / hospitalisation	Single death or multiple major injuries	Multiple deaths
				Environmental Impacts	Minor localised spill with insignificant effects on employees and/or community	On site release, immediately contained & restored with short-term effects	On site release, contained & restored with medium term effects on employees/groundwater	Off site release, contained & medium term effects on community health and/or groundwater	On or off site spill causing groundwater pollution with detrimental long term effects
				Financial Loss	Relatively low financial loss (1% of budget)	Tolerable financial loss (2-5% of annual budget)	Moderate financial loss (5-10% of annual budget)	Major financial loss (>10% of annual budget)	Severe financial loss (>30% of annual budget)
				Asset Damage	Minor damage or vandalism to asset	Minor damage or loss of <5% of total assets	Damage or loss of <20% of total assets	Extensive damage or loss of <50% of total assets	Destruction or loss of >50% of total assets
				Reputational Damage	Local mention only; Quickly forgotten; Freedom to operate unaffected; Self improvement review required	Scrutiny by Executive or internal audit to prevent escalation; Short term local media concern; Some impact on local level activities	Persistent national concern; Scrutiny required by external agencies; Long term 'brand' impact	Persistent intense national public, political and media scrutiny; Long term 'brand' impact; Major operations severely restricted	International concern; Government inquiry or sustained adverse national/international media; 'Brand' significantly affects organisational abilities
				Information Breach	Compromise of information otherwise available in the public domain	Minor compromise of information sensitive to internal or sub-unit interests	Compromise of information sensitive to the organisations operations	Compromise of information sensitive to organisational interests	Compromise of information with significant ongoing impact
				Organisational Capability	Minor skills impact; Minimal impact on non-core operations; The impact can be dealt with by routine operations	Some impact on organisational capability in terms of delays but able to be dealt with at operational level	Impact on the organisation resulting in reduced performance such that targets are not met; Organisations existence is not threatened, but could be subject to significant review	Breakdown of key activities leading to reduction in performance (eg. service delays, revenue loss, client dissatisfaction, legislative breaches)	Protracted unavailability of critical skills; Critical failures preventing core activities from being performed; Survival of the project/activity/organisation is threatened
					1	2	3	4	5
					Insignificant	Negligible	Moderate	Extensive	Significant
LIKELIHOOD	Chance	Probability	Frequency						
	Is expected to occur in most circumstances	>95%	Has occurred 9 or 10 times in the past 10 years in this organisation or circumstances are in train that will almost certainly cause it to happen	E Almost Certain	6	7	8	9	10
	Will probably occur in most circumstances	>65%	Occurred more than 7 times over 10 years in this organisation or circumstances are such that it is likely to happen in the next few years	D Likely	5	6	7	8	9
	Might occur at some time	>35%	Has occurred in this organisation more than 3 times in the past 10 years or is considered to have a reasonable likelihood of occurring in the next few years	C Possible	4	5	6	7	8
	Could occur at some time	<35%	Has occurred 2 or 3 times over 10 years in this organisation	B Unlikely	3	4	5	6	7
	May occur only in exceptional circumstances	<5%	Has occurred or can reasonably be considered to occur only a few times in 100 years	A Rare	2	3	4	5	6
Very High (VH)		Immediate action required by the Executive with detailed planning, allocation of resources and regular monitoring.							
High (H)		High risk, senior management attention needed.							
Medium (M)		Management responsibility must be specified.							
Low (L)		Monitor and manage by routine procedures.							
Very Low (VL)		Managed by routine procedures.							

## APPENDIX C: CHEMICAL REGISTER

Business Name	Business Address
Hydromet Corporation Pty Limited	201 Five Islands Road, Unanderra NSW 2526

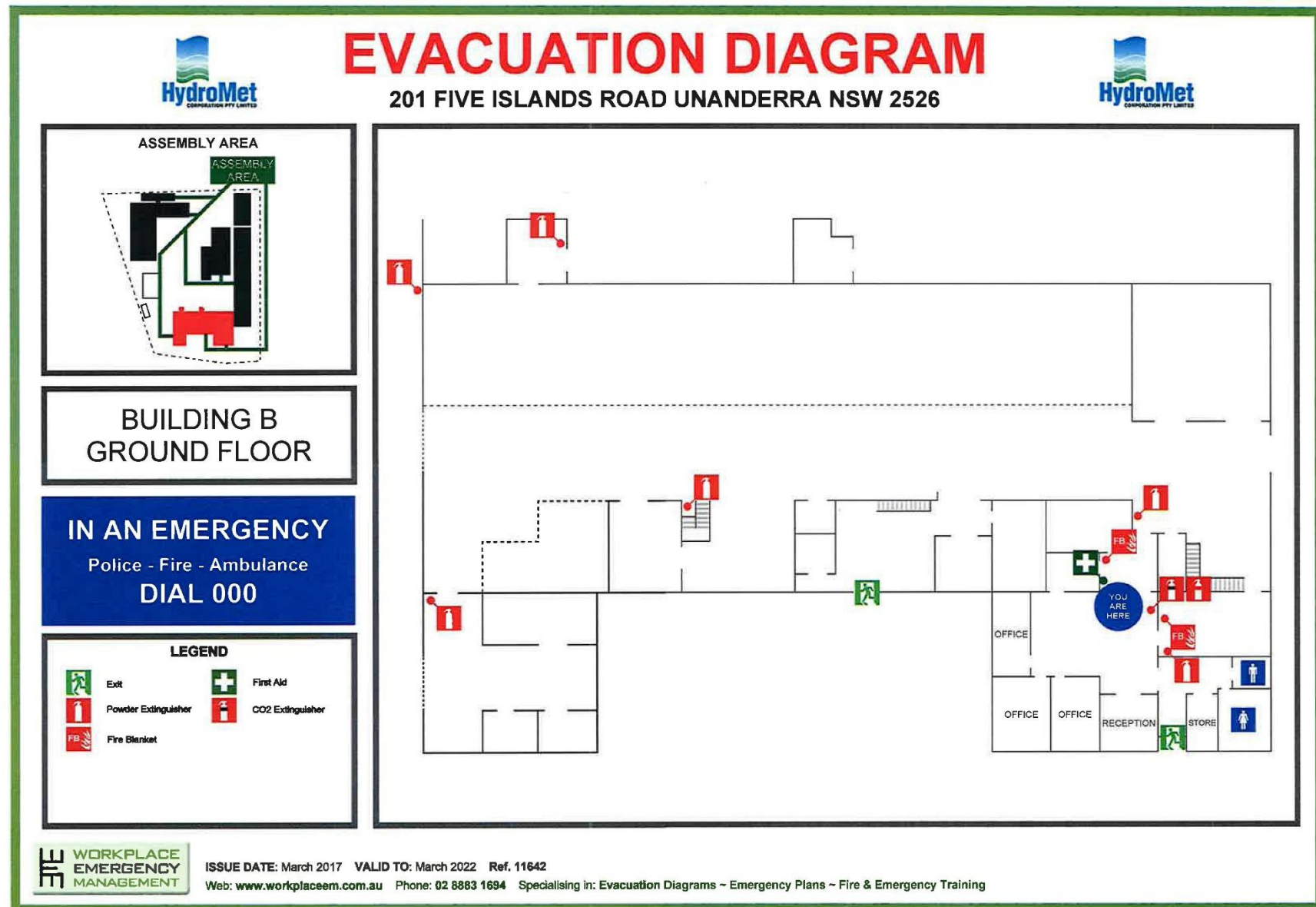
NA: None Allocated; N/A: Not Applicable (substance is not hazardous nor is the way the substance is being used hazardous); N/R: Not Required (substance is being used in accordance with the SDS and the purpose for which it is intended); REQ: Required (substance is being mixed or used in a manner that increase the risk controls required above those indicated on the SDS)

Chemical/Trade Name	Storage Depot	DG Class	UN No.	Packing Group	Hazchem Code	Supplier	Total Quantity	SDS Issue Date	Chemical Risk Assessment Completed
Acetylene	STORE H	2.1	1001	NA	2SE	Supagas	50kg	05.05.2017	N/R
Activated Carbon	STORE A	N/A	N/A	N/A	N/A	Haycarb	20t	01.10.2016	N/A
Air Compressed	STORE H	2.2	1002	N/A	2T	Supagas	153kg	30.04.2017	N/R
Argon	STORE H	2.2	1006	N/A	2T	Supagas	76kg	09.06.2015	N/R
Batteries - Lead Acid	STORE D&E	8	2794	NA	2R	Hydromet	2000t	01.11.2015	YES
Battery Acid	STORE B	8	2796	II	2R	Hydromet	200t	01.11.2018	YES
Calcium Chloride Dihydrate	STORE A	N/A	N/A	N/A	N/A	Redox	10t	18.12.2015	N/A
Caustic Soda Liquid	STORE A	8	1824	II	2R	Redox	10t	03.11.2016	YES
CORE SHELL 71300	N/A	N/A	N/A	N/A	N/A	Nalco	100kg	10.06.2016	YES
Diatomaceous Earth	STORE A	N/A	N/A	N/A	N/A	Redox	30t	01.01.2016	N/A
Diesel	STORE I	9	3082	III	NA	Shell Australia	15t	18.07.2016	YES
Foamexit 8002	N/A	N/A	N/A	N/A	N/A	Ovivo	50L	08.03.2016	N/R
Gypsum Filter cake	STORE K	N/A	N/A	N/A	N/A	Hydromet	100t	01.06.2015	N/A
Hydrated Lime	STORE A	N/A	N/A	N/A	N/A	Boral	20t	21.01.2015	N/A
Hydrochloric Acid 33%	STORE F	8	1789	II	2R	Ixom	10t	22.06.2017	YES
Hydrogen Peroxide 20-60%	STORE B	5.1 / 8	2014	II	2P	Redox	5t	12.04.2016	N/R
Lead Grid	Store C	N/A	N/A	N/A	N/A	Hydromet	500t	01.06.2015	N/A
Lead Paste	Store C	N/A	N/A	N/A	N/A	Hydromet	500t	01.06.2017	N/A
LPG	STORE I	2.1	1075	NA	2YE	Supagas	100kg	10.12.2015	YES
Magnesium Oxide	STORE A	N/A	N/A	N/A	N/A	Swancorp	10t	23.10.2015	YES
NALCLEAR 7767	N/A	N/A	N/A	N/A	N/A	Nalco	100kg	10.06.2016	YES
NALCO 71D5 PLUS	N/A	N/A	N/A	N/A	N/A	Nalco	100kg	22.01.2018	YES
Oxygen	STORE H	2.2&5.1	1072	N/A	2S	Supagas	50kg	30.04.2017	N/R
Petrol Vortex 95	N/A	3	1203	II	3YE	Caltex	40L	03.11.2016	N/R
Phosphoric Acid	STORE F	8	1805	III	2R	Redox	50t	25.05.2018	YES
Polypropylene	N/A	N/A	N/A	N/A	N/A	Hydromet	20t	01.06.2015	N/A
Quicklime	STORE A	N/A	N/A	N/A	N/A	Boral	60t	21.01.2015	YES

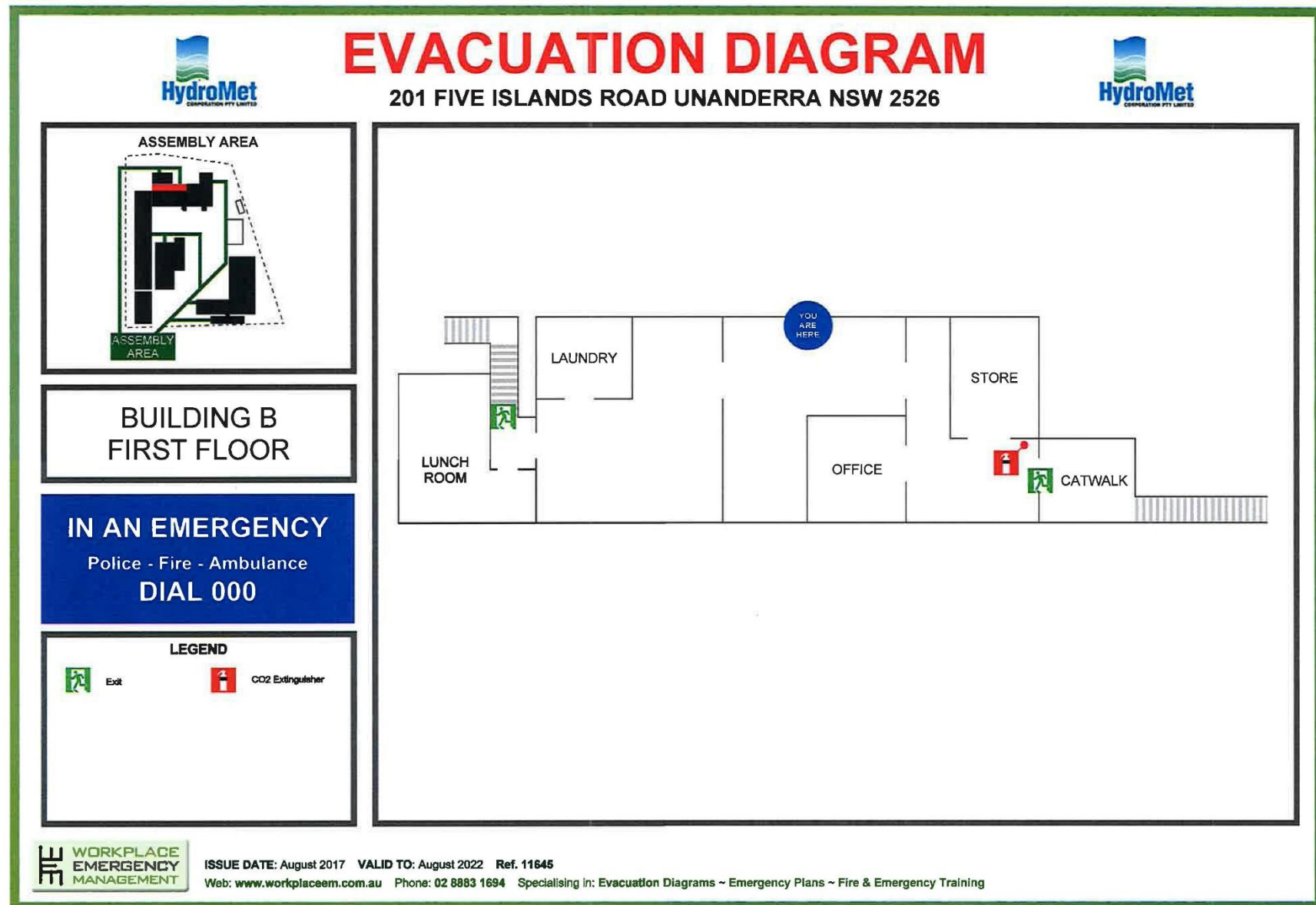
## APPENDIX C: CHEMICAL REGISTER

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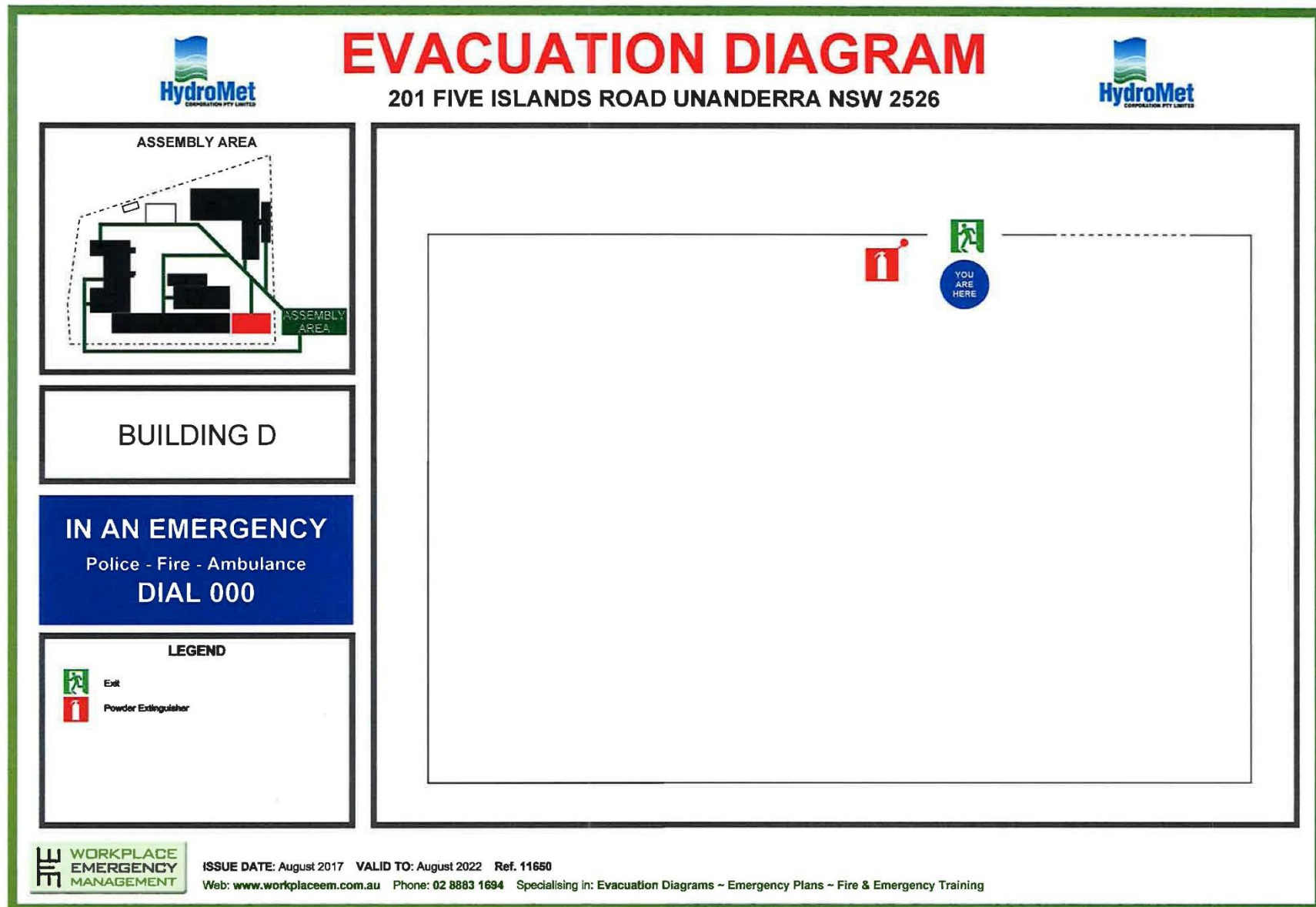
## APPENDIX D: SAFETY EQUIPMENT LOCATIONS



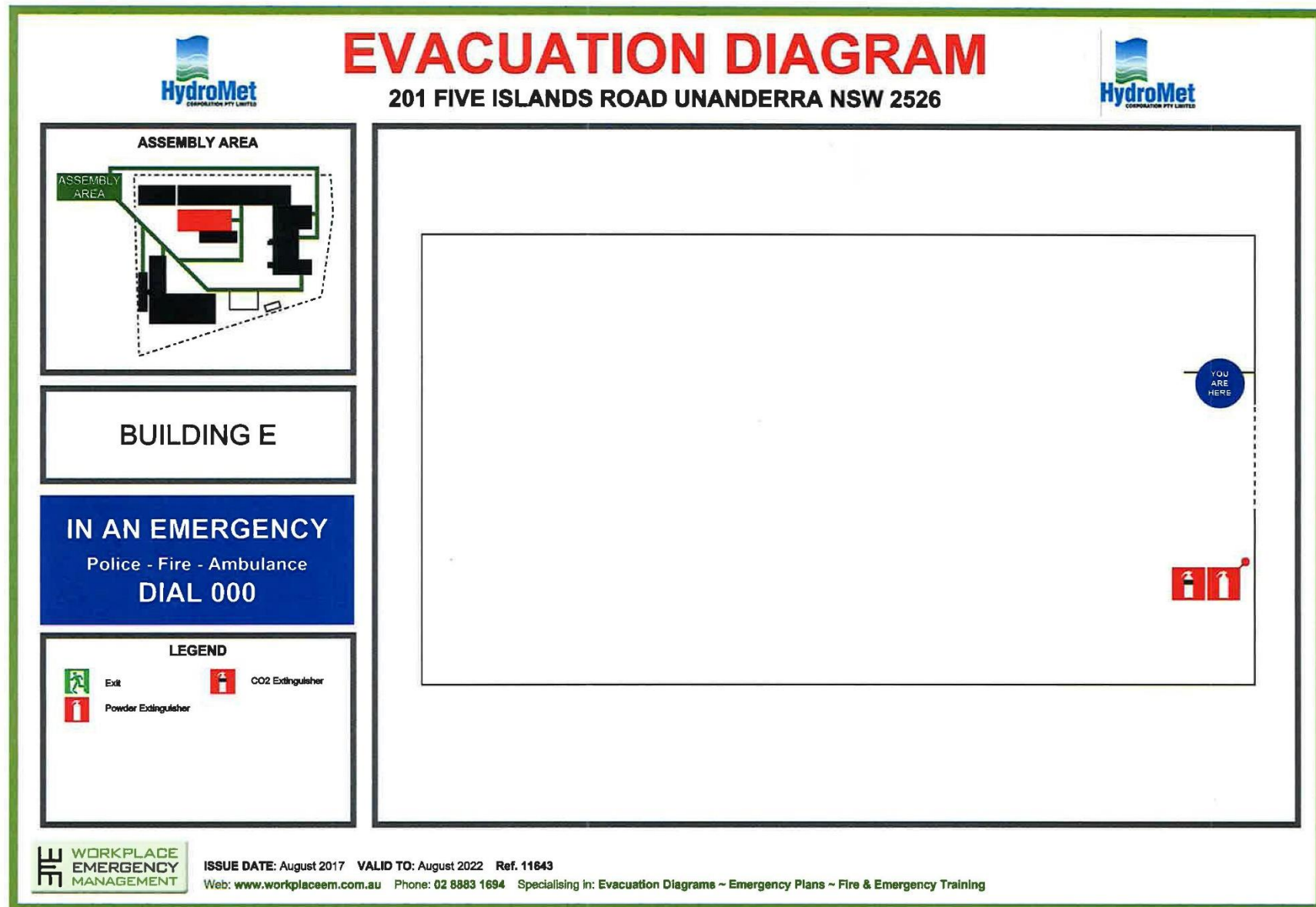
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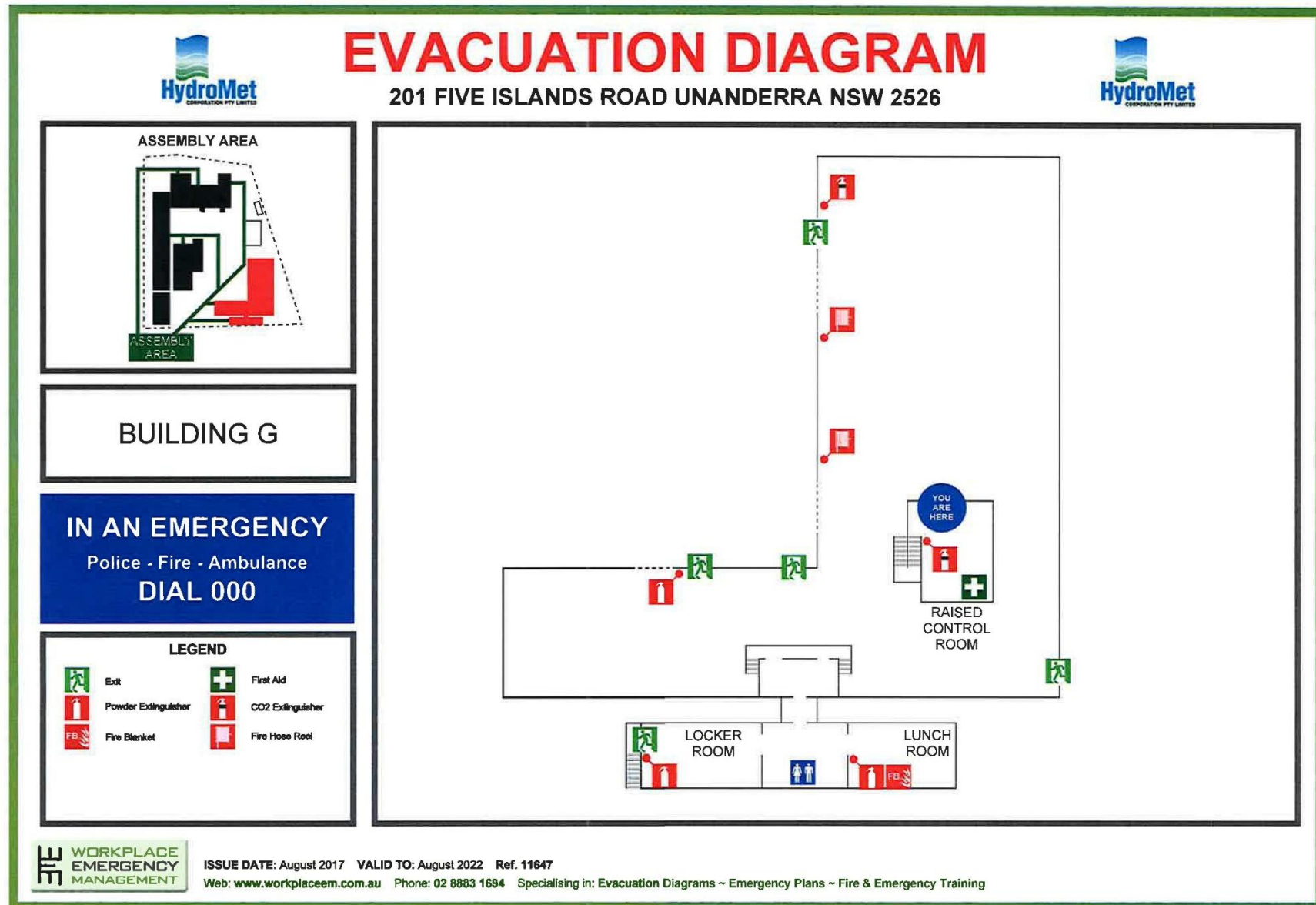
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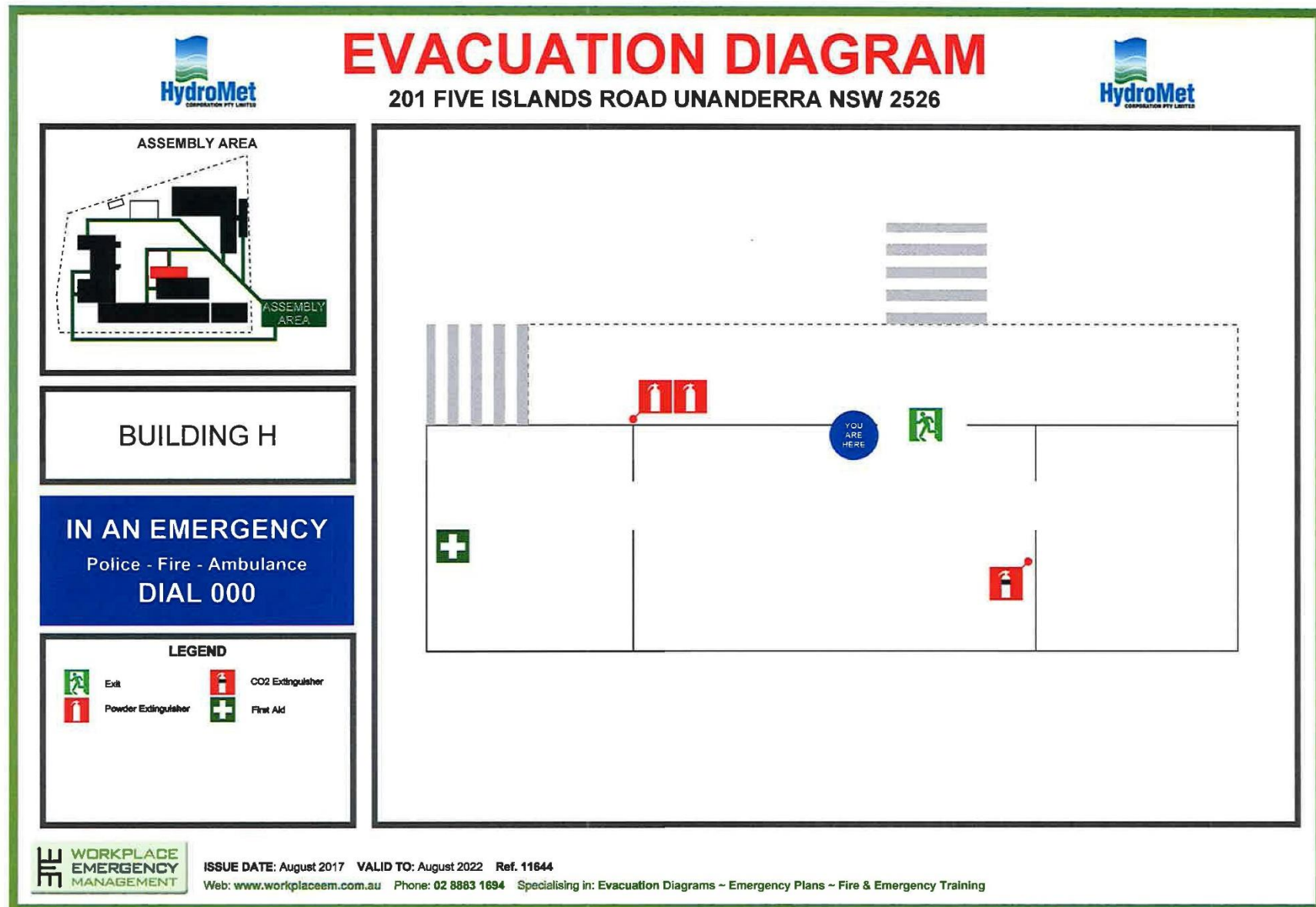
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