Jemena Gas Networks (NSW) Ltd

Commissioning Safety Study Report

Western Sydney Green Gas Project

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An appropriate citation for this paper is:

Commissioning Safety Study - Western Sydney Green Gas Project

Authorisation

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History

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A	12/02/2021	First Draft	Rahul Dorairaj
B	16/02/2021	Update based on team feedback	Jarrod Irving / Rahul Dorairaj
0	03/03/2021	Issued for use	Rahul Dorairaj

Owning Functional Area

Business Function Owner:	Gas Distribution

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Acronyms

Acronym	Definition
ALARP	As Low As Reasonably Practicable
AS/NZS	Australian Standard / New Zealand Standard
BOP	Blowout Preventer
CLC	Closed Loop Cooling
CLT	Commissioning Leadership Team
CSS	Commissioning Safety Study
DPIE	Department of Planning, Industry and Environment
DWS	Demineralised Water System
EGP	Eastern Gas Pipeline
FHA	Fire Hazard Analysis
GGS	Gas Generation System
HAZID	Hazard Identification
HAZOP	Hazard and Operability Study
HIPAP	Hazardous Industry Planning Advisory Papers
HPS	Hydrogen Purification System
HSE	Health, Safety and Environment
HV	High Voltage
ISO	Isometric
JGN	Jemena Gas Networks (NSW) Ltd
LGA	Local Government Area
LOPA	Layer of Protection Analysis
LV	Low Voltage
MCC	Motor Control Centre
MDR	Manufacturing Data Report
NSW	New South Wales
PEM	Proton Exchange Membrane
PHA	Preliminary Hazard Analysis
PLC	Programmable Logic Controller
PPE	Personal Protective Equipment
RO	Reverse Osmosis
SAT	Site Acceptance Testing
SCADA	Supervisory Control and Data Acquisition
SDS	Safety Data Sheet
SIL	Safety Integrity Level
SSD	State Significant Development
SWMS	Safe Work Method Statements

TRS	Horsley Park Trunk Receiving Station
WHS	Work Health and Safety
WSGG	Western Sydney Green Gas (the Facility)

1. Introduction

Jemena Gas Networks (NSW) Limited (Jemena) is undertaking the Western Sydney Green Gas Project (WSGGP) (the Project), which involves trialling Power-to-Gas (P2G) technology by converting purchased green energy from the electricity mains network into hydrogen gas and injecting it into its secondary gas distribution network over a 5-year period. The Project would potentially facilitate ongoing development of commercially viable P2G systems in Jemena's NSW gas network.

The Project is located at the existing Jemena high pressure gas facility in Horsley Park (Horsley Park Facility), located in Western Sydney. The P2G facility will use renewable electricity to generate hydrogen, which can be injected into the natural gas network or used to generate electricity back to the grid by means of a hydrogen-powered micro-turbine.

Jemena is utilising its engineering, maintenance and services company Zinfra (part of the SGSP (Australia) Assets Pty Ltd group of companies that also owns Jemena) for commissioning, operation and ongoing maintenance of the Western Sydney Green Gas Hydrogen Facility (Facility). This Commissioning Safety Study (CSS) has been developed based upon the requirements and guidance of:

- Hazardous Industry Planning Advisory Paper No 7
- NSW Work Health and Safety Regulation 2017
- NSW Work Health and Safety Act 2011
- ISO 45001:2018 - Occupational health and safety Standard

1.1 Purpose

The purpose of this CSS is to detail the requirements for managing workplace health and safety throughout the commissioning, performance testing and handover to operations phases of the Western Sydney Green Gas Project (the Project).

This CSS has been prepared in accordance with the Department's Hazardous Industry Planning Advisory Paper No. 7, 'Construction Safety'.

1.2 Study Objectives

The objectives of this CSS are to:

- identify potentially major hazardous incidents during commissioning and to identify appropriate upgrading and revision of programs, safeguards and safety and emergency procedures; and
- ensure that all required control measures are in place, so that the selection, checking, fabrication, construction, and commissioning of all the safety critical elements of the facility are in accordance with the design intent and specifications, consistent with requirements and findings arising from other safety studies, and that the design and specifications are appropriate.

In order to address the objectives above, a Commissioning Safety Study team was formed using project team members with the overall responsibility for safety performance and who have the authority to allocate resources and ensure that recommendations of the study are implemented.

1.3 Commissioning Scope

This Commissioning Safety Study Report covers all the commissioning activities for the Project. The Project is comprised of the following major equipment, all of which will be commissioned:

- Electrolyser – Produces hydrogen from mains water and power;
- Pipeline buffer store – Stores hydrogen in an underground pipeline which is located within the site lease boundary;
- Gas Grid Injection Panel – Controls the injection of hydrogen into the natural gas network;
- Gas Panel – Regulates and distributes hydrogen from the electrolyser and buffer store to the various uses on site;
- High Voltage (HV) Substation – Provides power to the site;
- Electrical Equipment Room – distributes power to on-site uses and controls the system; and
- Micro-turbine – Generates electricity for grid export from natural gas and hydrogen.

It is noted that key future scope has been assessed as part of this CSS, as it is paramount to ensure risk assessments include potential future commissioning activities, the future scope includes:

- Fuel cell – Generates electricity for grid export from hydrogen; and
- Compressor package – Compresses hydrogen to fill transportable cylinders.

1.4 Project Approvals

The delivery of the Project is facilitated by the Development Consent SSD 10313 approved by the Minister for Planning and Public Spaces, under Part 4, Division 4.7 of the Environmental Planning and Assessment Act 1979 and, in accordance with Section 4.38 (Approval).

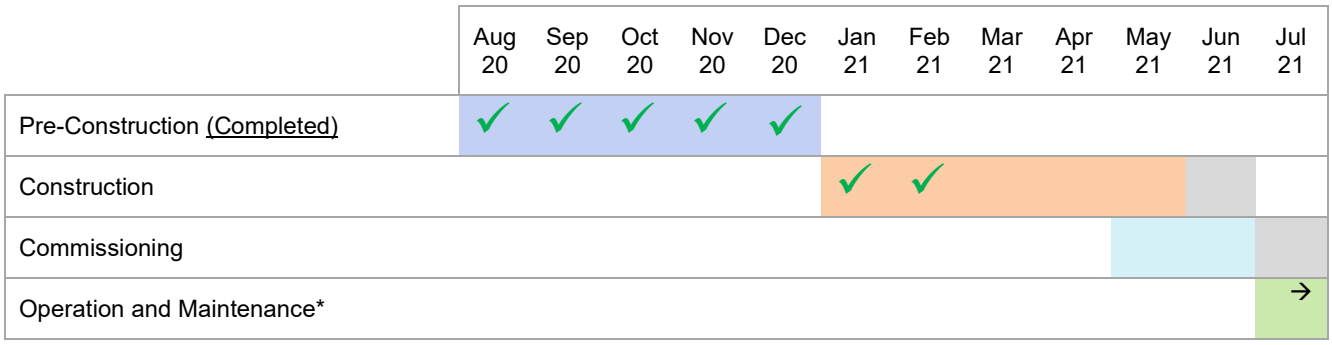
This CSS has been developed specifically to address the requirements of Condition B1 (a) of the Development Consent. The requirements of Condition B1 (a) are:

> *Unless the Secretary agrees otherwise, the Applicant must prepare the following documents at least one month prior to commencing construction of the development to the satisfaction of the Secretary:*
>
> *(a) a Construction Safety Study that is consistent with the Department's Hazardous Industry Planning Advisory Paper No. 7, 'Construction Safety';*

It is noted that a Construction Safety Study for the Construction phase of the project (*Western Sydney Green Gas Project – Construction Safety Study, Wasco, 8 Oct 20*) was submitted and subsequently approved by the Department of Planning, Industry and Environment (DPIE) on 16 November 2020.

In accordance with the phasing of works this document seeks to address the Commissioning Phase of the works as per the indicative project timeline (as per the current construction progress) provided below:

Figure 1.1 Indicative Project timing



Notes

* 5 year operation in accordance with condition of approval Condition of Approval (CoA) A8

Grey – Potential carryover

1.5 Commissioning Safety Study Team

The Commissioning Safety Study team consisted of the following team members:

David Hawks –HSE Business Partner, Facilitator of the Commissioning Hazard Identification (HAZID) Workshop with experience in mining and Oil and Gas Major Projects.

Rahul Dorairaj – HSE Business Partner with experience in mining and oil and gas Major Projects and maintenance of Gas Distribution Networks.

Jarrod Irving – experienced Project Manager with background in complex projects across wide-ranging industries including airport, rail and maritime services, defence, energy (including oil and gas) and manufacturing. He has experience across all facets of the project lifecycle from business case and concept phases to integration and operations.

Tom Breadon – Project Engineer - Process (Chemical) Engineering background with experience in gas processing, gas plant operations and maintenance.

Frank Libri – Integration and Commissioning Manager - Extensive background in Gas Transmission & Distribution facilities/pipelines operation and maintenance. Experienced commissioning manager of Gas Transmission & Distribution facilities and pipelines, experienced in managing major Gas facility, pipeline and network operations.

Mitchel Lowe - Mechanical Engineer with experience in the oil & gas and power industries covering project engineering, detailed design of integrated multidisciplinary projects, technical support for brownfield construction projects and preparation of commissioning plans and procedures for facility upgrades.

Paul Dixon - Technical Officer with extensive background in gas transmission facilities Electrical and Instrumentation operation and maintenance.

Nathan Tickle - Technical Officer with experience in Gas Transmission & distribution Mechanical operation, maintenance and Hot tapping.

Gavin Wakeford - Gas Controller with experience in Control Room Operations along with background in Gas Transmission & distribution mechanical operation, maintenance and hot tapping.

Aldo Pace – Team Leader and Project Manager for ANT (Applied Nanotechnologies), Representative of Vendor Hydrogenics Electrolyser.

Alistair Wardrope – Senior Lead Engineer – Renewable Gas – experience in hydrogen, gas distribution operation and maintenance.

Andrew Hargraves – Construction Manager (WASCO) with over 20 years' experience in oil & gas, infrastructure, mining, energy and defence sectors.

Daniel Politylo – Project Engineer (WASCO) with experience in pipeline and compression projects.

Jason Dini – Senior Electrical Engineer (GPA) with extensive experience in electrical design of gas facilities on Major Projects in Australia.

2. Proposed and Existing Operations

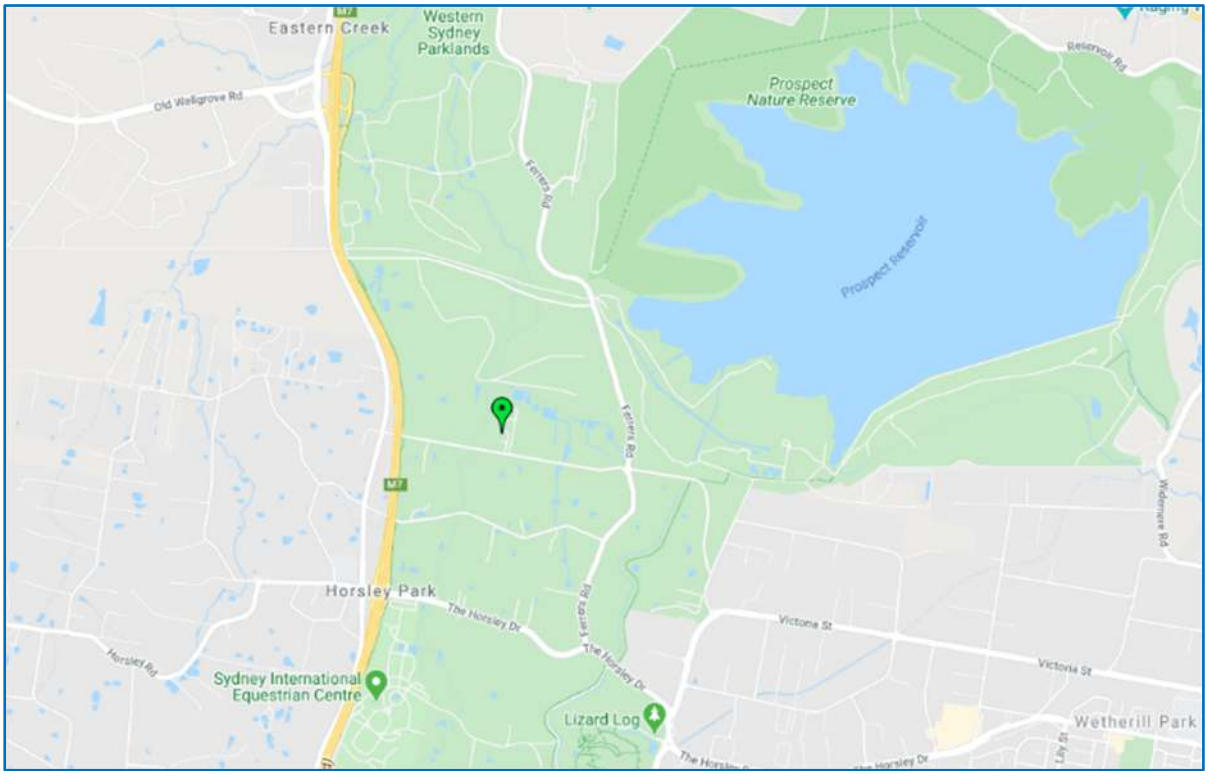
The Western Sydney Green Gas facility will be one of the most comprehensive 'renewable' hydrogen trials in Australia. The facility will use renewable electricity to power a 500 kW Proton Exchange Membrane (PEM) electrolyser for the production of hydrogen gas. The electrolyser has the rated capacity to produce a 100 Nm^3/h of hydrogen gas. Primarily the hydrogen gas will be injected into the existing natural gas distribution network (co-located with this trail facility) at up to 2% by volume via a dedicated injection control panel.

The facility also includes a gas-fuelled generator package (microturbine) that will initially be operated on natural gas to generate power for export to the grid. The microturbine will be converted to dual fuel operation using natural gas/hydrogen as the fuel source in late 2021.

2.1 Location

The Horsley Park Facility is located at 194 – 214 Chandos Road, Horsley Park (Lot 1 DP 499001 and Lot 3 DP 1002746) in Western Sydney, NSW (refer to **Figure 2.1**).

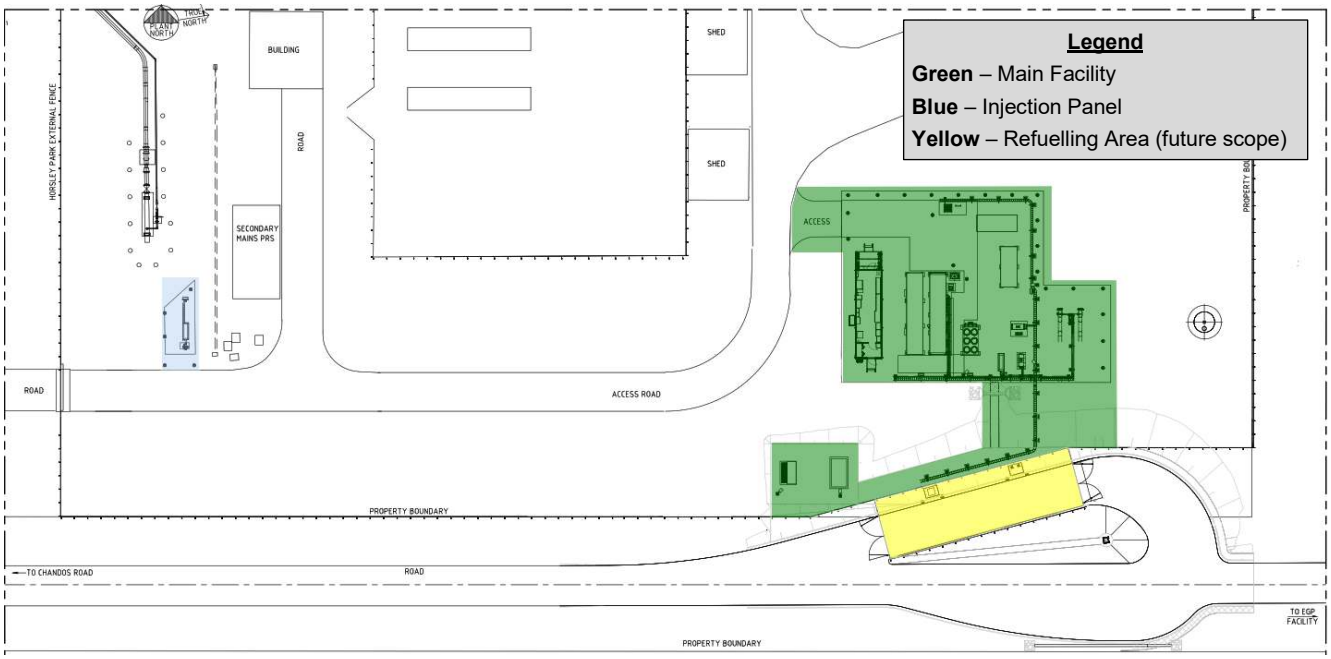
Figure 2.1: Site Location



The general layout of the site is shown in Figure 2.2 below and the WSGG Facility layout presented in Figure 2.2 below.

Figure 2.2: General Layout of Development

Figure 2.3: WSGG Facility



2.2 Existing Operations

The hydrogen facility is located within the boundaries of Jemena's Trunk Receiving Station (TRS) High Pressure Gas Facility, located at 204 – 214 Chandos Road, Horsley Park, NSW 2175, Australia, 32 km west of Sydney CBD, which is located on Jemena owned land within the Fairfield City Council Local Government Area (LGA).

The Eastern Gas Pipeline (EGP) Horsley Park Meter Station (194 – 202 Chandos Road, Horsley Park, NSW 2175) is located directly north of the site. The TRS and EGP facilities adjacent to hydrogen facility are operated under NSW regulation and have their own Emergency Management Plans. To minimise any potential conflict, the three plans are consistent and come under the umbrella of the Jemena Emergency Management Framework.

2.3 Surrounding Environment

The site is within the boundaries of the Western Sydney Parklands. Jemena have and continue to engage with the Western Sydney Parklands Trust and they are aware of the hydrogen facility. The Western Sydney Parklands Trust has agreed to inform Jemena of any potential changes to land use that may result from future tenants.

The facility is located 600 m to the east of the Westlink M7 toll road. Eastern Creek runs in a northerly direction in a wooded area between the M7 and the facility. A market garden is located directly east of the site and a quarry is located to the far north.

Private residences are located approximately 250 m to the south of the facility along Chandos Road. The building to the east of the site is a farm shed and the residence for that property is located on Chandos Road.

Other development in Chandos Road can be characterised as 'residential rural, with a collection of small market farms, including farm houses and farm buildings. Current and future possible land uses may include crops, greenhouses, farm sheds, chemical storage sheds or farm gate produce sales.

There are no schools, hospitals or other similar development that are in the vicinity of the facility.

2.4 Facility Primary Function

The facility will perform the following key functions:

- convert mains water into hydrogen gas using grid (renewable) electricity through electrolysis;

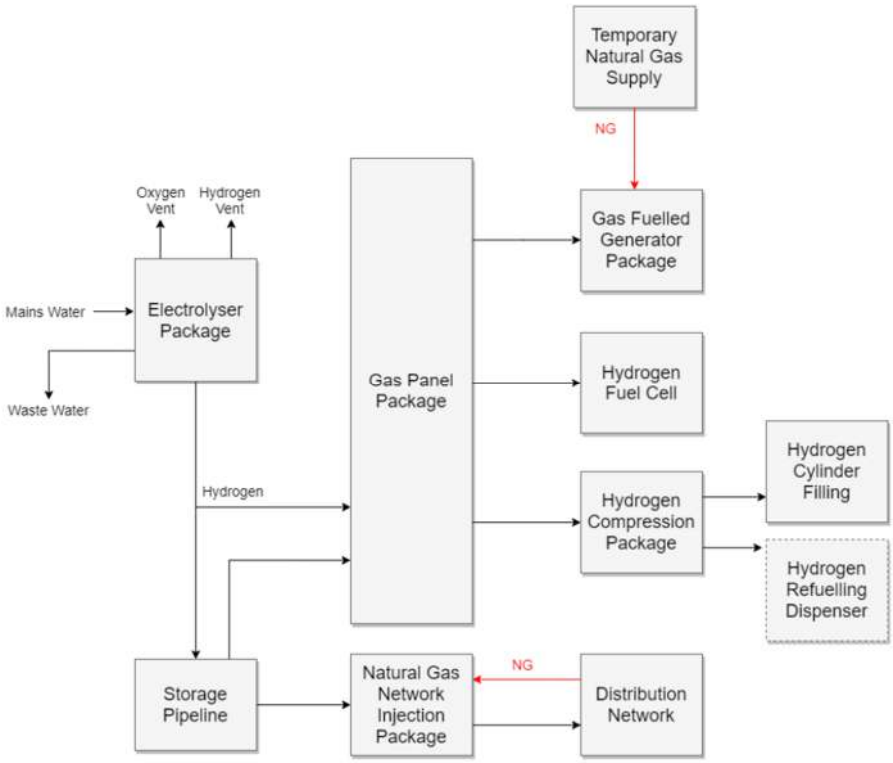
- store hydrogen gas in a buried on-site carbon steel pipeline; this will be used for buffering the various produced hydrogen gas usage options;
- control and safely manage hydrogen gas pressures, temperatures and flow rates for injection into Jemena's Secondary Mains gas pipeline and downstream medium and low pressure network; and
- provide a hydrogen microturbine generator to convert stored hydrogen into electrical energy for supply to the grid.

Additional future proposed key functions include:

- providing a hydrogen fuel cell, to convert stored hydrogen into electrical energy for supply to the grid; and
- providing hydrogen dispensing facilities to allow the filling of transportable hydrogen cylinders.

A general flow diagram of the facility operation is provided in **Figure 2.4** below.

Figure 2.4: Flow Diagram and General Facility



2.5 Key Facility Features

The WSGG facility includes the following plant and infrastructure:

Feature	Details
Electrolyser	• Package – Three main packages consisting of electrolyser stack, power container and cooling unit • Production – 100Nm^3/h or 100kg hydrogen

	• Standard Operation – 12 hours per day
Hydrogen buffer storage pipeline	• Location – Buried below ground, with two risers located at the facility east • Length – ~340 m • Material – X52 Carbon Steel • Operating Pressure – 3,200 kPag • Maximum Allowable Operating Pressure – 3,800 kPag • Hydrogen Stored – ~100 kg • Emergency Operation – Blowdown vent located on the first riser

Site Control Hut	• Purpose:
	  ○ Management of low voltage (LV) supply;
	  ○ Data and communication between packages and NSW Control Room;
	  ○ Remote operations and field desk
	• Criticality – Provides power to the TRS facility through LV to TRS switchboard at the front of site.

Gas Control Panels	• Purpose:
	  ○ Hydrogen Panel – Manage hydrogen gas within the facility, multiple controls and valves.
	  ○ Injection Panel – Injection into the Jemena Gas Network (JGN) Secondary Network.
	• Monitoring – Active hydrogen monitoring in place at both panels

Hydrogen Microturbine	• Production – 60kWh • Operation – 7 am – 7 pm only • Supply – Natural gas until changeover to 100% hydrogen Q4 2021
Transformer	• Rating – 2.5 mVA • Criticality – Provides power to the WSGG & TRS facility
Switchgear	• Criticality – Provides power to the WSGG &TRS facility

3. Study Methodology

The methodology used for the Commissioning Safety Study follows the guidelines outlined within HIPAP 7. The study addressed the following questions:

1. What are the potential hazardous incidents that could occur during the proposed commissioning activities?
2. What procedures will be in place to:
   a) Minimise the likelihood of commissioning activity causing a hazardous incident?
   b) Ensure such incidents will not generate a hazardous incident external to the site?
3. Are emergency procedures in place to handle commissioning emergencies?
4. What safety assurance systems are in place?
5. What arrangements are in place for management of change during commissioning?

The Project Management team has adopted a risk acceptance criterion based on a rigorous risk identification and assessment process and through implementation of effective mitigation measures to reduce the level of risk associated with the business's activities to ALARP (as low as reasonably practicable).

The commissioning hazard risk ranking is based on the requirements under AS/NZS ISO 31000:2009 Risk Management – Principles and Guidelines. In assessing the level of risk associated with a particular commissioning hazard identified as being associated with a commissioning process, a risk ranking process based on the Jemena Risk Model was used consistent with the requirements of Jemena Risk Management Procedure. The AS/NZS ISO 31000:2009 Risk Management process is shown below:

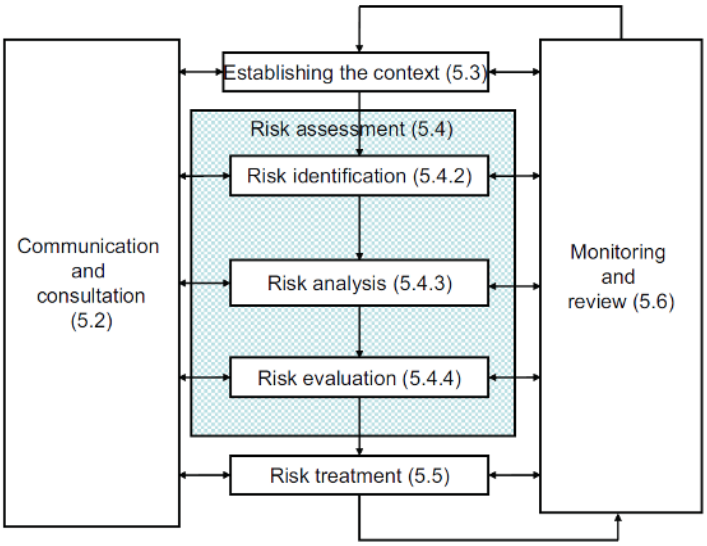


Figure 1.1 Risk Management Framework – Overview

3.1 Previous Design Risk Reviews and Close Out

Detailed risk assessments have been completed over the life of the project to ensure appropriate hazard identification, controls and actions have been completed prior to the commissioning, these are detailed below.

3.1.1 HAZOP

The facility has been the subject of multiple Hazard and Operability studies and a Hazard Identification study. These studies have been documented in the HAZOP report P2G-2099-RP-HZ-002 – HAZOP Report. Actions coming out of these studies were prioritised using the criteria listed below

1. Prior to design completion
2. Prior to commissioning
3. Post commissioning

The commissioning procedures will reference the HAZOP report to prompt the Commissioning Team to verify the close out of HAZOP priority items 2prior to commissioning. The procedures will also prompt the commissioning team to ensure priority 3 items are either closed prior to handover to operations or effectively communicated to the operations team of their existence.

3.1.2 Pipeline Safety Management Study

The pipeline Safety Management Study is documented in report P2G-2099-RP-RM-001. All priority 1 & 2 actions shall be closed out prior to commissioning the pipeline. At the time of writing this revision of the Commissioning Study Report, one priority 2 action remains outstanding regarding the information and modelling of fatigue due to pipeline pressure cycling (to be included in the pipeline integrity management plan). This is being considered as hydrogen is known to reduce the fatigue life of steel.

3.1.3 Other Safety Assessments

The facility has been the subject of the following safety in design reviews:

- 60 and 90% design reviews;
- Vendor HAZOPs for packages;
- Layer of Protection Analysis (LOPA) / Safety Integrity Level (SIL) review;
- Human Factors Review (as part of the model review);
- Constructability review (as part of the model review);
- Environmental Impact Statement;
- Construction Safety Study prepared in accordance with the *NSW Planning Department's Hazardous Industry Planning Advisory Paper No. 7, 'Construction Safety'*;
- Noise Study; and
- A preliminary hazard analysis (PHA) and final hazard analysis (FHA) prepared in accordance with the NSW Planning Department's Hazardous Industry Planning Advisory Paper No. 6, 'Hazard Analysis' and Multi-level Risk Assessment.
- Fire Safety Study prepared in accordance with the *NSW Planning Department's Hazardous Industry Planning Advisory Paper No 2 'Fire Safety Study Guideline.'*

4. Commissioning Summary

The proposed commissioning activities and proposed program is presented below.

4.1 Commissioning Activities

For testing and commissioning activities the facility has been separated into isolatable sub-sections to allow for a staged commissioning approach. It is anticipated that commissioning will be completed at different stages for each sub-section. The separation of the facility into isolatable sub-systems has been done to:

- Allow a progressive transition from the construction to commissioning phase;
- Allow for the earliest possible commencement of commissioning for critical path systems;
- Allow for the manageable, efficient and safe execution of the commissioning phase by having smaller, simpler, isolatable sub-systems for the commissioning team to focus on one at a time; and,
- Allow for clear and transparent commissioning progress reporting to the Project Manager and other key project stakeholders.

The sub-sections and associated systems are listed in the Table 4-1 below.

Table 4-1 - Commissioning System Breakdown

#	System title	Primary function	Main equipment
1	Power	Provides power to the facility via the electrical equipment room	HV switchgear & Transformer HVSB-55001 Motor Control Centre MCC-55001
2	Instrument air	Instrument air distribution to the blowout preventer (BOP) for valve actuation, external to the electrolyser (Instrument air for BOP is supplied from the electrolyser	Instrument air compression (Within electrolyser)
3	Control system	Provides control of all the facilities on site	Facility PLC and SCADA systems
4	Water	Provides water to the electrolyser water treatment system. Provide waste water from the electrolyser for irrigation	Water storage tank T-H10001 Irrigation pump P-H10001
5	Nitrogen	Provides nitrogen from bottle storage to the electrolyser for purging	Nitrogen bottle storage Nitrogen filtration, regulation and isolation skid
6	Hydrogen production	Production of hydrogen from mains water and power	Electrolyser Power and Process container (EYX-H01001) including the demineralised water system (DWS), gas generation system (GGS), hydrogen purification system (HPS), Reverse osmosis (RO) system and the closed loop cooling (CLC) systems Dry Cooler (DC-0419)
7	Hydrogen Storage	Bulk hydrogen storage	Pipeline buffer storage Pipeline isolation valves (XSV-02002, XSV-02003) Pipeline blowdown vent (FY-02005)

8	Hydrogen Injection	Controls the injection of hydrogen into the secondary mains	Secondary mains injection panel (FG-H06001) Secondary main hot taps
9	Hydrogen distribution	Regulates and controls the flow of hydrogen from the buffer store pipeline to various users on site	The Gas Panel (FG-H03001)
10	Power generation (Hydrogen)	Generates electrical energy by consuming hydrogen	The fuel cell package (GX-H08001)
11	Power generation (Natural Gas)	Generates electrical energy through natural gas combustion	The micro-turbine (GX-H09001)

4.2 Commissioning Sequence

The commissioning sequence will generally follow the order listed in Table 4-1 above The commissioning sequence can be altered at the discretion of the Commissioning Team, subject to timing of construction completion of each system, availability of materials and resources, timing of relevant approvals are, provided the alternate sequence can be executed safely and efficiently.

4.3 Commissioning Hazardous Materials

It is not expected that hazardous materials will be handled during commissioning.

Ion exchange resins are used within the water treatment system however these materials are non-hazardous according to the criteria of the Work Health and Safety regulations, Australia. Refer to Section 3.1.3 of the Fire Safety Study (P2G-2099-RP-RM-006) for more information on these materials.

5. Hazards Identified And Proposed Safeguards

The Commissioning Safety Risk Register is provided in **Appendix A**.

5.1 Risk and Hazard Approach

Risk Management is conducted in accordance Jemena Risk Management Manual. A formal HAZID Workshop has been completed as part of the commissioning works. The Workshop has engaged key representatives from the commissioning team business and has followed the Jemena's Risk Management Process.

The likelihood, consequence and rating are categorised as follows:

Likelihood		Consequence				
		Minor	Serious	Severe	Major	Catastrophic
		1	2	3	4	5
Almost Certain	5	Moderate	High	Extreme	Extreme	Extreme
Likely	4	Moderate	Significant	High	Extreme	Extreme
Possible	3	Moderate	Moderate	Significant	High	Extreme
Unlikely	2	Low	Low	Moderate	Significant	High*
Rare	1	Low	Low	Moderate	Moderate	Significant*

Figure 3.1 Consequence Table

Likelihood Descriptions		Guide
5 Almost Certain	Event is **expected** to occur in most circumstances	• Expected to occur once (or more) within 1 year, or • > 75% probability of occurrence, or • Has occurred recently and likely to occur again.
4 Likely	Event will **probably** occur in most circumstances	• Will probably occur at some time within the next 2 years, or • 51% - 75% probability of occurrence, or • Has a history of occurrence or could be difficult to control due to some external influences.
3 Possible	Event **should** occur at some time	• Might occur at some time within the next 5 years, or • 26% - 50% probability of occurrence.
2 Unlikely	Event **could** occur at some time	• Could occur at some time within the next 10 years, or • 5% - 25% probability of occurrence.
1 Rare	Event **may** occur only in exceptional circumstances	• Improbable occurrence only in exceptional circumstances (i.e. may only occur in more than 10 years), or • < 5% probability of occurrence.

Figure 3.2 Risk Likelihood Table

5.2 Hazard Identification

The identification, assessment and reporting of commissioning risks shall be performed by a number of specialist/functional areas with responsibilities for different disciplines across the commissioning.

5.3 Hazard and Risk Quantification & Analysis

The Hazard and Risk Management process to be followed is:

1. Establishing the Context of the Risk and identify the key stakeholders - What are we trying to achieve, what are the objectives. Express the context in 25 words or less that the group agrees with. Who are the stakeholders that may be impacted by risks?
2. Risk Identification - Risks are anything that can impact on objectives, what can happen, how can it happen, when can it happen? May be threats (downside) or opportunities (upside).
3. Risk Analysis - What is the consequence if the risk event occurs and what is the likelihood or frequency of the event? Then evaluate the risk. The Risk Analysis process should be applied to risks at up to three levels, until the acceptable tolerance is reached.
    - The risk is first analysed as an Inherent (raw) risk, as if with no controls in place, to determine likelihood and consequence and hence classify it.
    - If the classification exceeds tolerance then the risk is analysed with controls in place that will reduce the likelihood to give the Residual risk classification.
    - Finally If the classification still exceeds tolerance then the risk is treated (action plan) to reduce the likelihood and/or consequence to within tolerance.
4. Evaluate Risks – The risk is classified based on its likelihood and consequence, and then the tolerance is evaluated.
5. Monitor & Review - Monitor to ensure actions are completed by agreed dates. Monitor key risks for change. Monitor the external and internal environment for change in risk profile.
6. Communication and Consultation - Report risks and progress on action plans to Management as agreed. Jemena has documented the risk process in JAA MA 0050 ‘Group Risk Management Manual’.

5.4 Risk Response

There are four potential risk responses:

1. **Accept** – take the risk on board without mitigation at this time;
2. **Transfer** – outsource the scope of work to an organisation with the expertise;
3. **Mitigate** – assign mitigation activities, triggering events, contingency money; and
4. **Avoid** – remove the scope of work, redefine the requirements.

5.5 Commissioning HAZID Study

Commissioning HAZID study was carried out to

- identify potentially major hazardous incidents during commissioning and to identify appropriate upgrading and revision of programs, safeguards and safety and emergency procedures; and
- ensure that all required control measures are in place, so that the selection, checking, fabrication, construction, and commissioning of all the safety critical elements of the facility are in accordance with the design intent and specifications, consistent with requirements and findings arising from other safety studies, and that the design and specifications are appropriate. The Commissioning HAZID Risk register is provided in Appendix E.

5.6 Commissioning HAZID Study Outcome

The study highlighted potential hazards events that could occur during commissioning.

5.7 Unique Hazards

5.7.1 Hydrogen

The commissioning of the WSGGP will be the first time Jemena and Zinfra personnel will be dealing with hydrogen. Hydrogen has different properties to natural gas which can make it dangerous to handle. These properties are described below:

- Hydrogen is flammable over a very wide range of concentrations in air (4 – 75%) and is explosive over a wide range of concentrations (15 – 59%) at standard pressure and temperature. As a result, even small leaks of hydrogen have the potential to burn or result in an explosion. Where leaked hydrogen can accumulate in an enclosed environment, the risk of combustion and explosion is significantly increased. Hydrogen flames are very pale blue and are almost invisible in daylight due to the absence of soot.
- The hydrogen molecule is smaller and lighter than that of all other gases, and therefore is highly buoyant in air and diffuses easily. Leaking hydrogen will rise and become diluted quickly, especially outdoors. The hazardous area associated with hydrogen (that is, the region in which a flammable atmosphere may exist) is therefore relatively small.
- Prolonged exposure to hydrogen can affect some materials and compromise their mechanical properties. In particular, steel and other metals experience hydrogen embrittlement. Hydrogen embrittlement results in a reduced tolerance to defects and a reduction in fatigue life; this can be accommodated in design by ensuring that materials are defect-free, by keeping the stress in the material low, and by avoiding cyclic loading. Factors known to influence the rate and severity of hydrogen embrittlement include hydrogen concentration, pressure, the chemical composition of the material, stress level, metal tensile strength, grain size and microstructure

5.7.2 Oxygen

Oxygen will also be produced during commissioning of the WSGGP. Jemena and Zinfra personnel do not typically deal with oxygen. Oxygen has different properties to natural gas and hydrogen which can make it dangerous to handle. The unique hazards associated with oxygen are:

- Oxygen reacts with most materials. The higher the oxygen concentration and pressure in the atmosphere or in an oxygen system then:
    - the more vigorously a combustion reaction or fire takes place;
    - the lower the ignition temperature and ignition energy to get a combustion reaction started; and
    - the higher the flame temperature and destructive capability of the flame.
- Some materials that do not burn in air, including some fire resistant materials, can burn vigorously in oxygen-enriched air or pure oxygen.
- Oxygen enrichment of the atmosphere can be the result of oxygen vents. Areas near oxygen vents can be particularly hazardous.
- In enriched oxygen atmospheres, a common combustible material that most directly affects safety of personnel is clothing. All clothing materials will burn fiercely in oxygen enriched atmosphere. The same applies to plastics and elastomers.

6. Assessment of Operational Safeguards

6.1 Site Safety and Security

The safety controls relevant to the commissioning works include the following:

- Defined safety roles and procedures for project personnel.
- Communication and consultation procedures, Inductions, Daily prestart meetings
- Safety Data Sheets (SDS) for all chemicals are kept on-site if information such as first-aid advice is required
- Emergency Plan in place at the operating facilities.
- Security measures including site fences and alarm systems
- Safe Work Method Statements (SWMS)
- Daily Prestart Plant checklists.
- Use / installation of safety equipment such as notices and signage, first aid facilities.
- Traffic management plan in place for the commissioning works
- Personal Protective Equipment (including minimum of steel capped boots, high visibility cotton workwear, hard hats, gloves, safety glasses)
- Firefighting equipment will be installed / put in place and made available for use where required
- All personnel needing to work within Commissioning controlled locations will be required to undertake the commissioning induction which defines the additional hazards and controls applicable to these areas.

6.2 Commissioning Leadership Team

The Commissioning Leadership Team (CLT) consists of Project Manager, Commissioning Manager, Project Engineer and HSE Advisor. The Project Manager is accountable for the success or failure of health and safety performance of the Project.

The Project Manager is assigned discipline authority and responsibility for establishing the Project Health and Safety objectives, and for ensuring that adequate resources are made available to the team to enable these objectives to be achieved.

The CLT is responsible for the implementation of this Commissioning Safety Study report in accordance with Jemena and Zinfra specified objectives on health and safety.

The Commissioning Team shall actively promote and ensure that all Project personnel under their control are fully conversant with this report and any incumbent responsibilities.

The Commissioning Team shall:

- Provide leadership in the implementation of all health and safety initiatives
- Determine the resources necessary to conduct specific activities and achieve project objectives
- Ensure that all operations have been assessed to evaluate the potential presence of risks and hazards that any specified mitigation measures have been implemented
- Develop a construction methodology with due regard for the health and safety
- Ensure mitigation actions agreed as part of the risk assessment process are included in this report, supporting plans and procedures
- Establish sufficient resources for emergency response systems
- Provide training to ensure that each member of the project team within their discipline is competent
- Be actively involved in the HSE meetings, audits and reviews

- Ensure the government approved COVID 19 plan is fully implemented for the project and all project team members are meeting its requirements
- Ensure client-imposed policy, procedure or systems are implemented as instructed

6.3 Selection of Personnel and Training

In understanding the requirements for employee selection, competency and training it is important to recognise that almost all personnel involved in commissioning can create a hazard if they are not competent, qualified and suitably trained to carry out their role.

The Project Manager, in consultation with the Commissioning Manager, will assess and plan the human resource requirements of the project to ensure personnel are suitably fit, competent and have the necessary personal safety attributes for the tasks assigned and to contribute to a positive safety culture on site.

The Commissioning Manager, will refer to the project work description and identify the competency criteria and safety attributes necessary for each role involved in Commissioning. Where a work description identifies statutory competencies (i.e. certification) the Project Manager will ensure that evidence of statutory competencies is obtained prior to selection and retained on site as documentary evidence of such competencies.

Zinfra will specify within its Human Resources Management Planning, provisions to ensure the confirmation of employee competency and fitness for work during the employment process, the process of capture of competency information, responsibility and arrangements for maintaining that information and methodology to ensure ongoing monitoring that employee competency remains current for the Project duration.

Certification – licenses – permits – will be maintained on site by the HSE Advisor for occupations with this requirement.

In accordance with project requirements for Induction and Training, the Commissioning Manager is to ensure that all project personnel are inducted before commencement of commissioning.

All personnel must have completed both the General Induction and Site-specific inductions to enter or work on the project. Contractors will need to undertake an induction appropriate to the sort of work they are undertaking on site. Visitors must undertake a visitors' induction and be accompanied by a fully inducted person at all times.

6.4 Roles and Responsibilities

The Commissioning Team consisting of representatives from the Project Team, engineering, construction, SCADA and Operations and Maintenance teams will form the personnel required for commissioning to ensure competence in all aspects is covered. Commissioning personnel will also be provided by the engineering contractor, construction contractor and all vendor supplied equipment packages.

The Commissioning Team and their responsibilities in commissioning the WSGGP is detailed in Table 6-1.

Table 6-1 - Commissioning Team

Position	Responsibilities
Integration & Commissioning Manager	• Reviewing project specific commissioning documentation • Carrying out/controlling all commissioning/operational test activities at site • Advising Project Manager of any potential delay or additional costs • Scheduling and co-ordinating work for the successful completion of commissioning

	• Reviewing pre-commissioning documentation to ascertain correctness and completeness prior to moving into commissioning phase • Resource coordination • Ensuring commissioning team members are suitable and have the required competencies to carry out the work • Confirm Site Inductions, training and Hazard/Risk Assessments are completed before work commences • Reviewing and certifying documentation completed by others at the end of each day prior to closing work permits • Checking documentation for completeness • Completion and integrity of the punchlist • Ensure marking up of drawings to produce “Final As-Builts” • Ensuring commissioning documents are completed progressively • Ensuring a review is conducted prior to each major phase of commissioning to avoid safety or environmental incidents • Surveillance of the Subcontractors commissioning activities to ensure conformance to the required standards and commissioning program milestone dates • Maintain good working relationship with the, Contractor, Personnel and or Subcontractors • Providing basic field training of Operator’s personnel during the commissioning process including review of competence to safely and technically operate the equipment and facilities
Project Manager	• Organise regulatory approvals for commissioning • With the documentation provided by the commissioning team, organise internal Jemena approvals for commissioning • Advise commissioning team on budget and schedule constraints • Organise resources requested by the Commissioning Team to facilitate commissioning • Keep project stakeholders informed of commissioning progress.
HSE Advisor	• Review HSE Hazard Reports; • Address HSE issues as raised by Workers; • Maintain HSE records; • Ensure personnel and visitors are suitably inducted; • Enforce Site HSE standards; • Conduct HSE audits and inspections; • Review certificates, licenses and tickets for personnel; • Attend meeting with Commissioning supervision.
Technical Lead	• Reviewing project specific commissioning documentation • Assist the Project Manager with organising regulatory approvals for commissioning • With the documentation provided by the commissioning team, organise internal Jemena approvals for commissioning
Commissioning Engineer (Mechanical / Process / Structural)	• Preparing project specific commissioning documentation • Carrying out/controlling all commissioning/operational test activities at site under direction of the Integration Manager • Developing & reviewing pre-commissioning documentation to ascertain correctness and completeness prior to moving into commissioning phase • Completing commissioning documentation • Verifying contractor “Final As-Builts” (Process, Mechanical and Structural) • Completing commissioning documents progressively • Maintenance of various commissioning registers and Jemena documentation

	• Maintenance of “Master Drawing” set during commissioning (Process, Mechanical and Structural) • Liaison with the Engineering consultant for design technical queries • Recommending changes to drawings and procedures to the Commissioning Team Lead • Maintain the commissioning schedule
Commissioning Engineer (Electrical)	• Preparing project specific commissioning documentation • Carrying out/controlling all commissioning/operational test activities at site under direction of the Integration Manager • Developing & reviewing pre-commissioning documentation to ascertain correctness and completeness prior to moving into commissioning phase • Completing commissioning documentation • Verifying contractor “Final As-Builts” (Process, Mechanical and Structural) • Completing commissioning documents progressively • Maintenance of various commissioning registers and Jemena documentation • Maintenance of “Master Drawing” set during commissioning (Electrical) • Liaison with the Engineering consultant for design technical queries • Recommending changes to drawings and procedures to the Commissioning Team Lead
Commissioning Engineer (Instrumentation / Controls)	• Leading the control system SAT • Preparing project specific commissioning documentation • Carrying out/controlling all commissioning/operational test activities at site under direction of the Integration Manager • Developing & reviewing pre-commissioning documentation to ascertain correctness and completeness prior to moving into commissioning phase • Completing commissioning documentation • Verifying contractor “Final As-Builts” (Instrument & Controls) • Completing commissioning documents progressively • Maintenance of various commissioning registers and Jemena documentation • Maintenance of “Master Drawing” set during commissioning (Electrical) • Liaison with the Engineering consultant for design technical queries • Recommending changes to drawings and procedures to the Commissioning Team Lead
Project Engineer	• Assist the Project Manager in fulfilling their responsibilities as directed by the Project Manager • Liaise with vendor representatives for commissioning support as required
Zinfra Permit Issuer	• Ensure management of the facilities in accordance with Jemena safe work systems • Coordinate response to incidents and emergencies including the emergency response exercise • Issue commissioning permits
Zinfra Mechanical Technician	• Carryout the mechanical work to commission the facility under the guidance of the commissioning engineers
Zinfra E&I Technician	• Carryout the electrical & instrumentation work to commission the facility under the guidance of the commissioning engineers

Construction Supervisor Wasco	• Ensure completion of construction MDRs and other documentation to allow progression of commissioning • Complete construction punch list and develop plan to complete punch listed items • Participation in toolbox meetings
Construction Project Engineer Wasco	• MDR final collation • Hazardous Area Dossier collation • Assist Construction Supervisor in the development and close out of Construction punch list items.
Mechanical Technician Wasco	• Carryout the mechanical work to commission the facility under the guidance of the commissioning engineers • Address punchlist items from construction
E&I Technician Wasco	• Carryout the electrical & instrumentation work to commission the facility under the guidance of the commissioning engineers • Address punchlist items from construction
Vendor Package Commissioning Personnel Various	• SAT of individual vendor packages • Training of Jemena Operators • Completion of vendor package MDRs / ITPs
NSW Control Room Emergency Response	• Emergency response and management
NSW Control Room	• Facility Control as directed by the Integration Manager

All members of the Commissioning Team will be competent to undertake the tasks for which they are engaged. Operating, maintenance and emergency personnel involved in commissioning will be competent and briefed on the commissioning plan.

6.5 Health and Safety

Zinfra has developed several tools and processes that provide safe systems of work when performing work activities. The tools and processes used vary depending on the level risk that apply to each of the risk categories.

6.5.1 HSEQ Management System Standards

The Zinfra fourteen (14) HSEQ Management Standards contain the performance requirements to meet the objectives, which are:

- G-HS-ST-00010 HSEQ Management Commitment Standard
- G-HS-ST-00011 HSEQ Performance Monitoring, Reporting and Improvement
- G-HS-ST-00012 HSEQ Compliance
- G-HS-ST-00013 HSEQ Risk and Change Management
- G-HS-ST-00014 HSEQ Incident, Emergency and Crisis Management
- G-HS-ST-00015 HSEQ Communication, Consultation and Coordination
- G-QM-ST-00016 HSEQ Product Realisation and Control
- G-HS-ST-00017 HSEQ Supplier, Subcontractor and Service Provider Management
- G-QM-ST-00018 HSEQ Document, Content and Data Control
- G-QM-ST-00019 HSEQ Records Management

- G-HS-ST-00020 HSEQ Management of Plant, Equipment and Facilities
- G-QM-ST-00021 HSEQ Client Requirements and Satisfaction
- G-HS-ST-00022 HSEQ Learning and Development
- G-QM-ST-00023 HSEQ Design Management

6.5.2 Safety Non-Negotiables

Zinfra has implemented 10 Safety Non-Negotiables (SNN), which are group-wide minimum and mandatory requirements to mitigate the risks associated with the 10 key critical hazards common across its operations in line with HSEQ Regulations and industry code of practices. They include:

1. G-HS-ST-00736 Confined Space Entry
2. G-HS-ST-00737 Working in or near Live Traffic
3. G-HS-ST-00738 Crane Lifting
4. G-HS-ST-00739 Working at Height
5. G-HS-ST-00740 Excavations and Trenches
6. G-HS-ST-00741 Working with and around High Risk Plant
7. G-HS-ST-00742 Hazardous Area
8. G-HS-ST-00743 Electrical Hazards
9. G-HS-ST-00744 Working near Underground Services
10. G-HS-ST-00745 Working with Live Electricity

To support the implementation of SNN, a corresponding Hazard Control Procedures (HCP) has been developed to support the risk assessment process. A series of training packs and factsheets have also been developed to support their implementation.

6.5.3 HSEQ Management Procedures

These standards are supported by Zinfra wide procedures applicable to all operations in the business. These procedures are classified in two broad categories, System Management Procedures and HSEQ Risk Control Procedures, which includes Hazard Control Procedures and Environmental Aspect and Impact Control Procedure.

6.6 Permit To Work

All unproven equipment must initially be in a de-energised state and prohibited from use by the attachment of lockout devices & safety tags, until proven safe for use.

Jemena Safe Work Systems shall be implemented for any works involving hydrogen including the production of hydrogen and energisation of the electrolyser. Hydrogen purging and hydrogen pressurisation of the pipeline shall be carried out under a Hot Work Permit issued by a Hydrogen Permit to Work Issuer authorised by Jemena.

Where access to work on or near plant, equipment or systems with the potential to be energised is required, the following controls shall be implemented:

- Safety Non-Negotiables G-HS-ST-00743 Electrical hazards and G-HS-ST00745 Working with Live Electricity;

- Zinfras G-HS-PR-00755 Permit to work Procedure
- Zinfras G-HS-PR-00756 Equipment Isolations procedure
- Specific Safe Work Method Statements e.g. Testing and Energisation of Equipment.

6.7 Safe Work Method Statements (SWMS)

The commissioning work crew shall develop a task specific Safe Work Method Statements (SWMS) for all the commissioning work.

The Commissioning Manager shall ensure that all employees are to review a SWMS immediately prior to any new or changed work activity. This SWMS is to be reviewed by each employee involved in the work activity when the work activity is conducted for the first time or where change has occurred in the commissioning process or receiving environment. The consequences and likelihood of occurrence of each hazard identified during task risk assessment will be assessed in accordance with the Zinfra HSE Risk Matrix.

For all work, which requires a permit, the specific procedure or work instruction being referenced must be identified on the permit and a SWMS specific to the job must accompany the displayed permit.

6.8 Parallel Commissioning Close-Out and Construction Activities

During the construction completions and handover process, in certain areas there will be both site acceptance testing and construction and/or Punchlist closeouts activities occurring. The risks associated with these simultaneous operations include,

- Transfer of energy (electrical, pneumatic, liquids) from SAT works to a commissioning controlled location and visa-versa;
- Construction personnel completing work in a commissioning controlled location without understanding the additional hazards that may be present in these areas and the controls that must be adhered to;
- Construction personnel not being aware that particular equipment/systems have been energised; and
- Conflicting works being planned.

These risks shall be managed through the implementation of the following controls:

- Boundary Isolations to be reviewed, agreed and implemented between the Construction Contractors and the Commissioning Team to prevent the transfer of energy.
- Daily Planning meetings between Construction Team and the Commissioning Team.

6.9 Subcontractor Management

Selection and retention of subcontractors are based on the subcontractor's ability to meet the requirements of this Plan. This is managed during the entire subcontractor management process commencing at Pre-Contract to Contract Closure. Effective alignment of the Project and subcontractors' HSEQ objectives and management processes with Zinfras are an integral part of the HSEQ Subcontractor Management Process

During Pre-Contract and Contract Formation stages as part of the Purchase Approval Process, subcontractor's HSEQ System is assessed to ensure that it meets this Plan and must be conducted and completed prior to works being undertaken on the project.

Prior to mobilisation, a series of reviews are conducted to ensure subcontractors are ready to commence on the Project and have met all requirements. Upon mobilisation, subcontractors are inducted, their licenses and competency are checked and their plant and equipment are inspected.

6.10 Emergency Management

The emergency response process shall be in accordance with the requirements of the Emergency Plan submitted to DPIE in accordance with *NSW Planning Department's Hazardous Industry Planning Advisory Paper No. 1, 'Emergency Planning'.*

6.11 Hazardous Substance Management

All hazardous substances shall be stored and handled appropriately according to their Safety Data Sheet (SDS). Any Dangerous Goods are to be stored in a suitably bunded Dangerous Goods container, with goods segregated as per Dangerous Goods regulations.

PRIOR to any Dangerous Goods being planned for transport to the facility, an SDS must be supplied and approval to bring the Goods to site is sought from the HSE Manager and the Commissioning Manager.

The HSE Advisor is responsible for maintaining registers of the chemicals brought onto the Project. Appropriate PPE for the handling of all chemicals on site shall be made available at all times.

All hazardous substances that are used on site shall be in accordance with G-EN-PR-50244 Hazardous Substance Management Procedure.

6.12 HSE Incident Management and Investigation

The Commissioning Manager shall ensure that all incidents are managed and investigated as per G-HS-PR-00153 – Incident Management procedure.

The level of the investigation must match the level of the actual or potential risk of the incident.

Whenever an incident occurs and there is a possibility of legal action by a regulatory authority, these matters must be raised immediately to the Project Manager.

Upon completion of an investigation, the findings and recommendations which are permitted to be released into the public domain shall be distributed to the relevant work crews for discussion at Toolbox meetings.

6.13 Injury Management

In the event of injury or ill health, arrangements shall be made for the person to receive appropriate first aid and/or medical treatment.

As a minimum, one person at the facility shall hold a current Advanced First Aid qualification and shall be present at all times while work is in progress. Additional personnel on the facility shall hold a current Senior First Aid qualification. Where the assessment of a workplace location has identified increased risk, additional trained personnel shall be assigned as appropriate.

Sufficient first aid kits will be available on the facility and one first aid kit shall be provided in each vehicle used on Site. The contents of the first aid kit shall be appropriate for the nature of the work being undertaken and inspected weekly.

First aid facilities / cabinets, details of first aiders and the location of first aid facilities will be included in the induction program. Names and images of first aiders will be posted on the facility and made known to all personnel.

6.14 Communication and Reporting

Regular meetings will be undertaken and attended by all interfacing parties to report, brief, discuss and plan forthcoming commissioning works. Regular reports will be developed by the Commissioning Manager to the Project Manager. The details of the frequency and the content of the meetings and reports are provided in the Commissioning Management Plan P2G-2099-PA-CS-001.

6.15 Review of Operational Safeguards

It is not uncommon on projects for conditions to change (scope, environment etc.) that may impact established safeguards. It is critical that operational safeguards be reviewed and revised to suit these changing conditions. The Project Manager shall manage these situations in accordance with the Zinfra's HSEQ Change Management Procedure G-HS-PR-50113.

7. Safety and Quality Assurance

For a facility to operate safely (in accordance with the risk levels estimated as part of the hazard analysis process) it is essential that it be built and commissioned according to design intent and to the required level of quality. Incorrect commissioning may account for a significant incident.

Note: Safety and Quality assurance relating to construction activities are covered in Construction Safety Study Report.

7.1 Document Management

All commissioning related procedures, work instructions, SWMS, training records, authorisations and inspection/certification reports will be maintained on site during the commissioning activities. All documentation necessary for safe operation and maintenance will be provided to the relevant personnel. For example, operators will be supplied with operating manuals; and recommended maintenance schedules and procedures will be passed on to maintenance personnel.

All documentation, particularly certification documents, shall be held on site and be available for inspection by auditors during the operating life of the plant.

7.2 Critical Verifications / Safety Reviews

Critical verifications which are required before further work is undertaken shall be carried out as per Commissioning Management Plan.

Pre-startup safety review will be conducted to ensure that all elements of the safety system are in place prior to commissioning, including hardware and software and emergency response equipment. Operating personnel shall familiarise with the plant and all relevant procedures.

7.3 Training Management

The Commissioning Manager shall assess the competency of commissioning personnel and ensure all members of the Commissioning Team are trained and inducted in accordance with the requirements of the Commissioning Management Plan and the Permit to Work System prior to the commencement of the Commissioning.

7.4 Commissioning HSE Responsibilities And Authorities

The below sections detail the health and safety specific responsibilities of the main site roles during commissioning.

Role	HSE Responsibilities
Commissioning Manager	The Commissioning Manager is responsible for the following: • Overall management of the site and activities; • Understanding and implementing the requirements of the Commissioning Safety Study report; • Coordinating and planning the commissioning works in conjunction with the commissioning site representatives; • Reporting incidents to the project team and where relevant, the Zinfra Operations Team; • Reporting to Jemena and Zinfra Management on progress and planned activities.

HSE Advisor	The HSE Advisor is responsible for: • Reviewing HSE Hazard Reports; • Addressing HSE issues as raised by Workers; • Maintaining HSE records; • Ensuring personnel and visitors are suitably inducted; • Enforcing Site HSE standards; • Conducting HSE audits and inspections; • Reviewing certificates, licenses and tickets for personnel; • Attending meeting with Commissioning supervision.
General Work Party Members	It is the responsibility of all work party members to: • Co-operate with their employer to comply with safety policies, rules and the Act or Regulations; • Not misuse items provided for health and safety; • Understand and actively participate in a positive safety culture; • Participate to stop unsafe acts; • Participate in Prestart and Toolbox meetings and raise WHS issues; • Participate in risk assessments relating to work they are involved in; • Ask questions to clarify tasks and safety issues; • Cooperate in WHS matters; • Work in a safe manner at all times, giving due consideration to the safety of themselves and others; • Inspect Plant and equipment before, during and after use, and report any defects; • Keep the workplace clean and tidy at all times; • Attend work fit for duty; • Identify improvements or initiatives for WHS; • Immediately report incidents and unsafe conditions or acts; • Control and make safe hazards where possible; and • Participate in rehabilitation and return to work processes as required.
Visitors	All visitors (including suppliers and vendors) visiting the Site shall comply with the requirements of this Commissioning Safety Study Report and the site visitor's induction and shall: • Comply with all safety and environmental directions at all times; • Immediately report incidents and unsafe conditions or acts; • Comply with relevant operating procedures, legislation, site policies and rules; • Work in a safe manner at all times, giving due consideration to the safety of themselves and others; and • Stop unsafe acts.

7.5 Inspections and Audits

The Commissioning Manager and HSE Advisor shall conduct a documented weekly inspection of all the commissioning activities. Findings of the inspections shall be recorded in the ASPIRE (Incident Management System).

Additional external audits may be arranged by the Project Manager or HSE Advisor.

The objectives of WHS audits shall be:

- To determine the extent to which requirements of the Jemena, regulatory authorities and industry standards are being met; and

- To determine the effectiveness of the Quality Management system, Plans and Procedures.

Audits shall be conducted in accordance with accepted industry standards. They shall incorporate document review, interviews with key personnel, field inspection, collection of evidence, entry and exit interviews and preparation of a report outlining the audit findings and recommendations.

Documents reviewed should include:

- Previous audit documentation;
- Non-Conformance Reports;
- Corrective action Plans;
- Close out of previous audits, actions, Non-Conformance Reports;
- Incident Notification and Investigation Reports;
- Field Inspection Checklists;
- Safe Work Method Statements;
- Minutes of Toolbox and other meetings;
- Permit to work permits and isolations;
- Records of Inductions;
- Notices; and
- Project documentation and mapping including Alignment Drawings.

Audit reports should include:

- Completed Audit Checklists;
- Collected evidence of instances of both good and bad practice (e.g. photographs);
- A summary of key findings; and
- Recommendations for improvement, where necessary.

The safety and quality assurance program shall have the full support of the Project Manager and will apply to the entire project. All project participants (including subcontractors), who are involved in work which could affect safety will be included, no matter how small their role.

8. Management Of Change During Commissioning

Changes may be required as a result of Technical Queries, Requests for Information, risk assessments and other reasons. Such changes shall be managed in accordance with the Zinfra's HSEQ Change Management Procedure G-HS-PR-50113 so as not to present an unacceptable level of risk to safety, health or the environment.

9. References

9.1 Internal

P2G-2099-PA-PM-001 - Project Management Plan

P2G-2099-PA-CS-001 – Commissioning Management Plan

Safety Non-Negotiables

G-HS-ST-00743 - Electrical hazards and

G-HS-ST00745 - Working with Live Electricity;

G-HS-PR-00755 - Permit to work Procedure

G-HS-PR-00756 - Equipment Isolations procedure

G-HS-PR-00040 - Health Safety and Environment (HSE) Risk Management Procedure

G-EN-PR-50244 - Hazardous Substance Management Procedure.

G-HS-PR-00153 - Incident Management procedure.

G-HS-PR-50113 - HSEQ Change Management Procedure

9.2 External

Hazardous Industry Planning Advisory Paper No 7

NSW Work Health and Safety Regulation 2017

NSW Work Health and Safety Act 2011

ISO 45001:2018 - Occupational health and safety Standard

Appendix A – Development Consent Conditions

Development Consent

Section 4.38 of the *Environmental Planning & Assessment Act 1979*

As delegate of the Minister for Planning and Public Spaces, I approve the development application referred to in Schedule 1, subject to the conditions in Schedules 2 to 4.

These conditions are required to:

- prevent and/or minimise any adverse environmental impacts of the development;
- set standards and performance measures for acceptable environmental performance; and
- provide for the ongoing environmental management of the development.

Mike Young
Executive Director
Energy, Resources and Compliance

Sydney: 10 August 2020

SCHEDULE 1

Application Number:	SSD 10313
Applicant:	Jemena Gas Networks (NSW) Limited
Consent Authority:	Minister for Planning and Public Spaces
Land:	See Appendix 1
Development:	Western Sydney Green Gas Project

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DEFINITIONS

Applicant	Jemena Gas Networks (NSW) Limited, or any person who seeks to carry out the development approved under this consent
Blowdown	Ventilation of gas from the hydrogen gas buffer storage blowdown vent
Calendar Year	A period of 12 months from 1 January to 31 December
Cessation of operations	Operation of the development has ceased for a continuous period of 12 months
Conditions of this consent	Conditions contained in Schedules 1 to 4 inclusive
Construction	All physical works associated with the development, including but not limited to demolition and removal of buildings or works, erection or installation of buildings and infrastructure, road upgrades, and the carrying out of works permitted by this consent (but excludes minor pre-construction and preliminary works such as road dilapidation surveys, installation of fencing, geotechnical drilling and/or surveying)
Commencement of Operations	Operations start with the production of hydrogen gas using the power to gas facility
Council	Fairfield City Council
Decommissioning	The demolition and/or removal of buildings, infrastructure and works installed for the development and/or rehabilitation of the site
Department	Department of Planning, Industry and Environment
Development	The development described in the EIS as modified by the conditions of this approval
Development footprint	The area within the site on which the components of the project will be constructed (shown in Appendix 2)
EIS	The Environmental Impact Statement titled *Western Sydney Green Gas Project – Environmental Impact Statement* dated December 2019, the Submissions Report titled *Western Sydney Green Gas Project - Response to Submissions* dated May 2020, and additional information in a letter from the Applicant dated 16 June 2020.
EPA	Environment Protection Authority
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulation	*Environmental Planning and Assessment Regulation 2000*
Feasible	Means what is possible and practical in the circumstances
FRNSW	Fire and Rescue NSW
Gas Supply Act	*Gas Supply Act 1996*
Heritage NSW	Heritage NSW within the Department of Premier and Cabinet
Heritage item	An item as defined under the *Heritage Act 1977* and/or an Aboriginal Object or Aboriginal Place as defined under the *National Parks and Wildlife Act 1974*
HRS	Hydrogen refuelling station to supply hydrogen gas for bus refuelling
Incident	An occurrence or set of circumstances that causes or threatens to cause material harm and which may or may not be or cause a non-compliance
Land	Has the same meaning as the definition of the term in section 1.4 of the EP&A Act
Material harm	Is harm that: • involves actual or potential harm to the health or safety of human beings or to the environment that is not trivial, or • results in actual or potential loss or property damage of an amount, or amounts in aggregate, exceeding $10,000, (such loss includes the reasonable costs and expenses that would be incurred in taking all reasonable and practicable measures to prevent, mitigate or make good harm to the environment)
Microturbine	Gas fuelled generator for the development that converts gas to electricity
Minimise	Implement all reasonable and feasible measures to reduce the impacts of the development
Minister	Minister for Planning and Public Spaces, or delegate
Mitigation	Activities associated with reducing the impacts of the development prior to or during those impacts occurring
Non-compliance	An occurrence, set of circumstances or development that is a breach of this consent but is not an incident
Operation	The operation of the development, but does not include commissioning, trials of equipment or the use of temporary facilities
POEO Act	*Protection of the Environment Operations Act 1997*

Public infrastructure	Linear and related infrastructure that provides services to the general public, such as roads, railways, water supply, drainage, sewerage, gas supply, electricity, telephone, telecommunications, irrigation channels, drainage channels
Reasonable	Means applying judgement in arriving at a decision, taking into account: mitigation benefits, cost of mitigation versus benefits provided, community views and the nature and extent of potential improvements
Rehabilitation	The restoration of land disturbed by the development to a good condition, to ensure it is safe, stable and non-polluting
RFS	NSW Rural Fire Service
Secretary	Planning Secretary under the EP&A Act, or nominee
Secretary - Authorising	Secretary with responsibility for the *Gas Supply Act 1996*
SES	NSW State Emergency Service
Site	As listed in Appendix 1 and shown in Appendix 2
TfNSW	Transport for NSW
Vehicle trip	One vehicle entering and leaving the site
WSPT	Western Sydney Parklands Trust

SCHEDULE 2
PART A ADMINISTRATIVE CONDITIONS

OBLIGATION TO MINIMISE HARM TO THE ENVIRONMENT

A1. In addition to meeting the specific performance criteria established under this consent, the Applicant must implement all reasonable and feasible measures to prevent, and if prevention is not reasonable or feasible, minimise any material harm to the environment that may result from the construction and operation of the development, and any decommissioning of the development and/or rehabilitation required under this consent.

TERMS OF CONSENT

A2. The Applicant must carry out the development:
(a) generally in accordance with the EIS; and
(b) in accordance with the conditions of this consent.

Note: The general layout of the development is shown in Appendix 2.

A3. If there is any inconsistency between the above documents, the most recent document must prevail to the extent of the inconsistency. However, the conditions of this consent prevail to the extent of any inconsistency.

A4. The Applicant must comply with any requirement/s of the Secretary arising from the Department's assessment of:
(c) any strategies, plans or correspondence that are submitted in accordance with this consent;
(d) any reports, reviews or audits commissioned by the Department regarding compliance with this consent; and
(e) the implementation of any actions or measures contained in these documents.

LIMITS OF OPERATIONS

A5. A maximum of 52,600 kilograms of hydrogen gas may be produced at the site in any calendar year.

A6. A maximum of 2% by volume of hydrogen gas may be injected into the Applicant's natural gas distribution network.

A7. Hydrogen cylinder filling is not permitted.

A8. The Applicant may carry out operations for 5 years from the date of commencement of operations.

STRUCTURAL ADEQUACY

A9. The Applicant must ensure that all new buildings and structures, and any alterations or additions to existing buildings and structures, are constructed in accordance with the relevant requirements of the *Building Code of Australia.*

Notes:

- *Under Part 6 of the EP&A Act, the Applicant is required to obtain construction and occupation certificates for the development.*
- *Part 8 of the EP&A Regulation sets out the requirements for the certification of the development.*

DEMOLITION AND REHABILITATION

A10. The Applicant must ensure that all demolition work on site is carried out in accordance with *Australian Standard AS 2601-2001: The Demolition of Structures*, or its latest version.

A11. The Applicant must:
(a) rehabilitate the site progressively, as soon as reasonably practicable following disturbance;
(b) minimise the disturbance area at any time;
(c) employ interim rehabilitation strategies to minimise dust generation, soil erosion and weed incursion on parts of the site that cannot yet be permanently rehabilitated; and
(d) within 18 months of the cessation of operations decommission and remove project infrastructure, unless the Secretary agrees otherwise.

PROTECTION OF PUBLIC INFRASTRUCTURE

A12. Unless the Applicant and the applicable authority agree otherwise, the Applicant must:
(a) repair, or pay the full costs associated with repairing, any public infrastructure that is damaged by the development; and
(b) relocate, or pay the full costs associated with relocating, any public infrastructure that needs to be relocated as a result of the development.

OPERATION OF PLANT AND EQUIPMENT

A13. The Applicant must ensure that all plant and equipment used on site, or in connection with the development, is:
(a) maintained in a proper and efficient condition; and
(b) operated in a proper and efficient manner.

SCHEDULE 3
PART B ENVIRONMENTAL CONDITIONS – GENERAL

HAZARDS AND RISKS

Pre-construction

B1. Unless the Secretary agrees otherwise, the Applicant must prepare the following documents at least one month prior to commencing construction of the development to the satisfaction of the Secretary:

(a) a Construction Safety Study that is consistent with the Department's *Hazardous Industry Planning Advisory Paper No. 7, 'Construction Safety'*;

(b) a Hazard and Operability Study, prepared by a suitably qualified, experienced and independent expert whose appointment has been endorsed by the Secretary, that is consistent with the Department's *Hazardous Industry Planning Advisory Paper No. 8, 'HAZOP Guidelines'*, and must be accompanied by a program for the implementation of all recommendations made in the report. The study must include a suitably designed firewall with Fire Resistance Level (FRL) of at least 240/240/240 to mitigate potential fire-related impacts from the high-pressure hydrogen storage facility. If the Applicant intends to defer the implementation of a recommendation, reasons must be documented;

(c) a Final Hazard Analysis based on the final design of the development that is consistent with the Department's *Hazardous Industry Planning Advisory Paper No. 6, 'Hazard Analysis'*; and

(d) a Fire Safety Study that is consistent with the Department's *Hazardous Industry Planning Advisory Paper No. 2, 'Fire Safety Study Guidelines'* and the New South Wales Government's '*Best Practice Guidelines for Contaminated Water Retention and Treatment Systems*', and in consultation with FRNSW and RFS.

Following the Secretary's approval, the Applicant must operate the development in accordance with the approved Construction Safety Study, Hazard and Operability Study, Final Hazard Analysis, and Fire Safety Study.

Notes:

- *Construction, other than preliminary works that are outside the scope of the hazard studies, must not commence until study recommendations have been considered and, where appropriate, acted upon.*
- *For developments in which the construction period exceeds six months, the commissioning portion of the Construction Safety Study may be submitted two months prior to commencement of commissioning.*

B2. Unless the Secretary agrees otherwise, the Applicant must prepare a revised Safety and Operating Plan (SAOP) at least one month prior to commencing construction of the development to the satisfaction of the Secretary – Authorising in relation to all the assets and equipment located within the development footprint, as shown in Appendix 2.

Pre-commissioning

B3. Unless the Secretary agrees otherwise, the Applicant must develop the following documents at least one month prior to commencement of commissioning of the development to the satisfaction of the Secretary:

(a) a comprehensive Emergency Plan. The Applicant must keep two copies of the plan on-site in a prominent position adjacent to the site entry points at all times The Emergency Plan must:
- be consistent with the Department's *Hazardous Industry Planning Advisory Paper No. 1, 'Emergency Planning'*;
- identify the fire risks and controls of the development;
- include procedures that would be implemented if there is a fire on-site or in the vicinity of the site; and
- include an Evacuation Plan for flooding and bushfire events, in consultation with Council and the NSW SES; and

(b) a comprehensive Safety Management System, covering all on-site operations and associated transport activities involving hazardous materials. The Safety Management System must:
- consistent with the Department's *Hazardous Industry Planning Advisory Paper No. 9, 'Safety Management'*; and
- identify all safety related procedures, responsibilities and policies, along with details of mechanisms for ensuring adherence to the procedures. Records must be kept on-site and must be available for inspection by Secretary upon request.

Following approval, the Applicant must implement the Emergency Plan and Safety Management System.

Notes:

- *The update of a relevant existing site document may satisfy the condition where all the relevant requirements are addressed in the updated document.*

Pre-startup

B4. The Applicant must prepare a Pre-startup Compliance Report for the development to the satisfaction of the Secretary. This report must be submitted to the Secretary for approval at least one month prior to carrying out any operations under this consent, and detail the development's compliance with the documents required under condition 1 of schedule 3 of this consent, including:
(a) date of document preparation;
(b) date that construction and commissioning commenced; and
(c) actions proposed and/or taken in order to implement the recommendations made in the documents.

Storage and Handling of Dangerous Goods

B5. The Applicant must ensure that all dangerous goods and hazardous materials storage and handling undertake on-site is in accordance with:
(a) the requirements of all relevant Australian Standards; and
(b) the NSW EPA's *Storing and Handling of Liquids: Environmental Protection – Participants Handbook* if the chemicals are liquids, or its latest version.

In the event of an inconsistency between the requirements listed from (a) to (b) above, the most stringent requirement must prevail to the extent of the inconsistency.

Operating Conditions

B6. The Applicant must:
(a) Install and maintain a suitably designed firewall with Fire Resistance Level (FRL) of at least 240/240/240 to mitigate potential fire-related impacts from the high-pressure hydrogen storage facility;
(b) minimise the fire risks of the development, including managing vegetation fuel loads on-site;
(c) ensure that the development complies with the relevant objectives in the RFS's *Planning for Bushfire Protection 2019 (or latest version);*
(d) assist the RFS and emergency services as much as practicable if there is a fire in the vicinity of the site; and
(e) notify the relevant local emergency management committee following construction of the development, and prior to commencing operations.

TRAFFIC

Traffic Management Requirements

B7. The Applicant must:
(a) minimise the impacts of the site access upgrades of the development;
(b) maintain all footpaths, roads and utility-related infrastructure on site in a safe and serviceable condition;
(c) upgrade the access road and turning circle to an all-weather sealed surface;
(d) provide sufficient parking on site for all vehicles and ensure vehicles associated with the development do not park on the public road network;
(e) ensure frequency of bus hydrogen refuelling does not exceed three bus trips daily for 350 days per year, unless otherwise agreed by the Secretary subject to the Final Hazard Analysis required under Schedule 3 Condition B1; and
(f) minimise the traffic noise impacts of the development.

Traffic Management Plan

B8. Prior to the commencement of construction, unless the Secretary agrees otherwise, the Applicant must prepare a Traffic Management Plan for the development to the satisfaction of the Secretary. This plan must:
(a) be prepared in consultation with WSPT, Council and TfNSW;
(b) describe the measures that would be implemented to comply with the transport management requirements in condition B7 above;
(c) include details of the transport route to be used for all construction and operational traffic;
(d) include details of the measures that would be implemented to minimise traffic safety issues and disruption to local users of the transport route/s during construction and operations;
(e) include a protocol for undertaking independent dilapidation surveys to assess the existing condition of Chandos Road, prior to and following construction or decommissioning activities;
(f) include a swept path analysis of entry and exit to the site and identify a schedule for access upgrades (if required) to the satisfaction of Council and TfNSW; and
(g) include a program to:

- record and track vehicle and bus movements; and
- monitor the effectiveness of these measures.

The Applicant must implement the approved Traffic Management Plan for the development.

AMENITY

Construction and Operating Hours

B9. The Applicant must comply with the operating hours set out in Table 1.

Table 1: Operating Hours

Activity	*Operating Hours*
Operations excluding microturbines and blowdowns	24 hours a day 7 days a week
Microturbines	7 am to 10 pm 7 days a week
Construction and decommissioning activities	7am to 6pm Monday to Friday 8am to 1pm Saturday
Blowdowns (excluding emergency work)	at no time on Sundays and NSW public holidays

The following activities may be undertaken outside of the hours identified in Table 1 without the approval of the Secretary:

(a) the delivery of materials as requested by the NSW Police Force or other authorities for safety reasons;
(b) emergency work to avoid the loss of life, property and/or material harm to the environment;
(c) construction works that cause L_{Aeq} (15 mins) noise levels that are:
   - no more than 5 dB(A) above the rating background level at any residence in accordance with the *Interim Construction Noise Guideline* (DECC, 2009), or its latest version; and
   - no more than the noise management levels specified in Table 3 of the *Interim Construction noise Guideline* (DECC, 2009), or its latest version, at other sensitive land uses; and
   - for continuous or impulsive vibration values, measured at the most affected residence, no more than those for human exposure to vibration, specified in Table 2.2 of *Assessing vibration: a technical guideline* (DEC, 2006), or its latest version; and
   - for intermittent vibration values measured at the most affected residence, no more than those for human exposure to vibration, specified in Table 2.4 of *Assessing vibration: a technical guideline* (DEC, 2006), or its latest version;
(d) where a negotiated agreement has been reached with affected receivers; or
(e) works as approved through the out-of-hours work protocol outlined in the Environmental Management Strategy under Schedule 4 of this consent.

Noise

B10. The Applicant must:
(a) minimise the noise generated by any construction or decommissioning activities on site in accordance with the best practice requirements outlined in the *Interim Construction Noise Guideline* (DECC, 2009), or its latest version;
(b) implement all reasonable and feasible measures to minimise the operational noise of the development;
(c) notify the occupants of residences within 200 metres of the site boundary and WSPT 24 to 48 hours prior to undertaking blow downs (excluding emergency works); and
(d) comply with the operational noise levels within the *Noise Policy for Industry* (NSW EPA, 2017), or its latest version.

Air

B11. The Applicant must minimise the:
(a) dust emissions of the development, including wind-blown and traffic generated dust;
(b) greenhouse gas emissions of the development;
(c) surface disturbance of the development; and
(d) other air emissions of the development.

B12. The Applicant must ensure that no offensive odours are emitted from the development, as defined under the POEO Act.

Visual

B13. The Applicant must:
(a) minimise the off-site visual impacts of the development, including the potential for any glare or reflection;
(b) ensure the visual appearance of infrastructure (including paint colours) blends in as far as possible with the surrounding landscape; and
(c) not mount any commercial advertising signs or logos on site, except where this is required for identification or safety purposes.

Lighting

B14. The Applicant must:
(a) minimise the off-site lighting impacts of the development; and
(b) ensure that any external lighting associated with the development:
- is installed as low intensity lighting (except where required for safety or emergency purposes);
- does not shine above the horizontal; and
- complies with *Australian Standard AS4282 (INT) 1997 – Control of Obtrusive Effects of Outdoor Lighting*, or its latest version.

SOIL AND WATER

Operating Conditions

B15. The Applicant must:
(a) ensure that the development does not cause any water pollution, as defined under section 120 of the POEO Act;
(b) ensure that stormwater runoff from the development is managed using Waster Sensitive Urban Design (WSUD) techniques consistent with the *Western Sydney Parklands Design Manual* and considers the Fairfield City Council *Stormwater Management Policy*; and
(c) minimise any soil erosion associated with the construction of the development in accordance with the relevant requirements in the *Managing Urban Stormwater: Soils and Construction* (Landcom, 2004) manual, or its latest version.

WASTE

B16. The Applicant must:
(a) minimise the waste generated by the development;
(b) classify all waste generated on site in accordance with the EPA's *Waste Classification Guidelines 2014* (or its latest version)*;*
(c) store and handle all waste on site in accordance with its classification;
(d) not receive or dispose of any waste on site; and
(e) remove all waste from the site as soon as practicable, and ensure it is sent to an appropriately licensed waste facility for disposal.

HERITAGE

Protection of Heritage Items

B17. The Applicant must ensure the development does not cause any direct or indirect impacts on heritage items located outside the approved development footprint.

B18. If historical and/or Aboriginal archaeological heritage items are unexpectedly discovered during construction of the development, all works must cease, and a suitably qualified and experienced archaeologist be brought in to assess the find. Depending on the nature of the discovery, additional assessment, recording and management measures may be required prior to the recommencement of works in the affected area. Heritage NSW and/or members of the relevant Local Aboriginal Land Council must be notified of this discovery in writing.

SCHEDULE 4
PART C ENVIRONMENTAL MANAGEMENT AND REPORTING

ENVIRONMENTAL MANAGEMENT

Environmental Management Strategy

C1. Prior to commencing construction, the Applicant must prepare an Environmental Management Strategy for the development to the satisfaction of the Secretary. This strategy must:
(a) prepared in consultation with the Council and WSPT;
(b) provide the strategic framework for environmental management of the development;
(c) identify the statutory approvals that apply to the development;
(d) describe the role, responsibility, authority and accountability of all key personnel involved in the environmental management of the development;
(e) describe the procedures that would be implemented to:
- keep the local community and relevant agencies informed about the operation and environmental performance of the development;
- receive, handle, respond to, and record complaints;
- resolve any disputes that may arise;
- respond to any non-compliance; and
- respond to emergencies; and

(f) include:
- the following sub-plans:
  - noise;
  - air quality;
  - stormwater management including erosion and sediment controls during construction; and
  - heritage.
- copies of any strategies, plans and programs approved under the conditions of this consent; and
- a clear plan depicting monitoring to be carried out in relation to the development.

Following the Secretary's approval, the Applicant must implement the Environmental Management Strategy.

Notes:

- *The update of a relevant existing site documents may satisfy the condition where all the relevant requirements are addressed in the updated document.*

Revision of Strategies, Plans and Programs

C2. Within 3 months, unless otherwise agreed with the Secretary, of:
(a) the submission of an incident report under condition C5 below;
(b) the submission of an audit report under condition C9 below; and
(c) the approval of any modification to the conditions of this consent; or
(d) a direction of the Secretary under condition A4 of schedule 2;

the Applicant must review, and if necessary revise, the strategies, plans, and programs required under this consent to the satisfaction of the Secretary.

Where this review leads to revisions in any such document, then within 4 weeks of the review the revised document must be submitted to the Secretary for approval, unless otherwise agreed with the Secretary.

Note: This is to ensure the strategies, plans and programs are updated on a regular basis, and incorporate any recommended measures to improve the environmental performance of the development.

COMPLIANCE

Incident Notification

C3. The Applicant must immediately notify the Department, Council and any other relevant agencies immediately after it becomes aware of an incident. The notification must identify the development (including the development application number and name) and set out the location and nature of the incident.

Non-Compliance Notification

C4. Within seven days of becoming aware of a non-compliance, the Applicant must notify the Department of the non-compliance. The notification must identify the development (including the development application number and name), set out the condition of this consent that the development is non-compliant with, why it

does not comply and the reasons for the non-compliance (if known) and what actions have been, or will be, undertaken to address the non-compliance.

Note: A non-compliance which has been notified as an incident does not need to also be notified as a non-compliance.

Compliance Reporting

C5. The Applicant must provide regular compliance reporting to the Department on the development in accordance with the relevant *Compliance Reporting requirements* (DPE May 2020), or its latest version.

NOTIFICATIONS

Notification of Department

C6. Prior to commencing the construction, operations or decommissioning of the development or the cessation of operations, the Applicant must notify the Department and Council in writing of the date of commencement, or cessation, of the relevant phase.

If any of these phases of the development are to be staged, then the Applicant must notify the Department and Council in writing prior to commencing the relevant stage, and clearly identify the development that would be carried out during the relevant stage.

Final Layout Plans

C7. Prior to commencing construction, the Applicant must submit detailed plans of the final layout of the development to the Secretary.

Work as Executed Plans

C8. Prior to commencing operations, the Applicant must submit work as executed plans of the development to the Secretary.

INDEPENDENT ENVIRONMENTAL AUDIT

C9. Unless the Secretary agrees otherwise, 12 months after the commencement of operations of the development and every three years thereafter, the Applicant must commission and pay the full cost of an Independent Environmental Audit of the development. This audit must:

(a) be prepared in accordance with the relevant Independent Audit Post Approval requirements (DPE 2020);
(b) be conducted by a suitably qualified lead auditor and suitably qualified, experienced and independent team of experts in any field specified by the Secretary, whose appointment has been endorsed by the Secretary;
(c) include consultation with Council and relevant agencies;
(d) include a comprehensive Hazard Audit of the development in accordance with the Department's publication *Hazardous Industry Planning Advisory Paper No. 5, 'Hazard Audit Guidelines'* and include a review of the site Safety Management System and a review of all entries made in the incident register since the previous audit;
(e) review the adequacy of any strategies, plans or programs required under the abovementioned approvals;
(f) recommend appropriate measures or actions to improve the environmental performance of the development, and/or any strategy, plan or program required under the abovementioned approvals; and
(g) be conducted and reported to the satisfaction of the Secretary.

Note: This audit must be undertaken in accordance with the Independent Audit requirements (DPE 2018).

C10. Within 12 weeks of commissioning this audit, or as otherwise agreed by the Secretary, the Applicant must submit a copy of the audit report to the Secretary, together with its response to any recommendations contained in the audit report and a timetable for the implementation of these recommendations as required.

The Applicant must implement these recommendations, to the satisfaction of the Secretary.

ACCESS TO INFORMATION

C11. Unless the Secretary agrees otherwise, from the commencement of development under this consent, the Applicant must:

(a) make the following information publicly available on its website as relevant to the stage of the development:

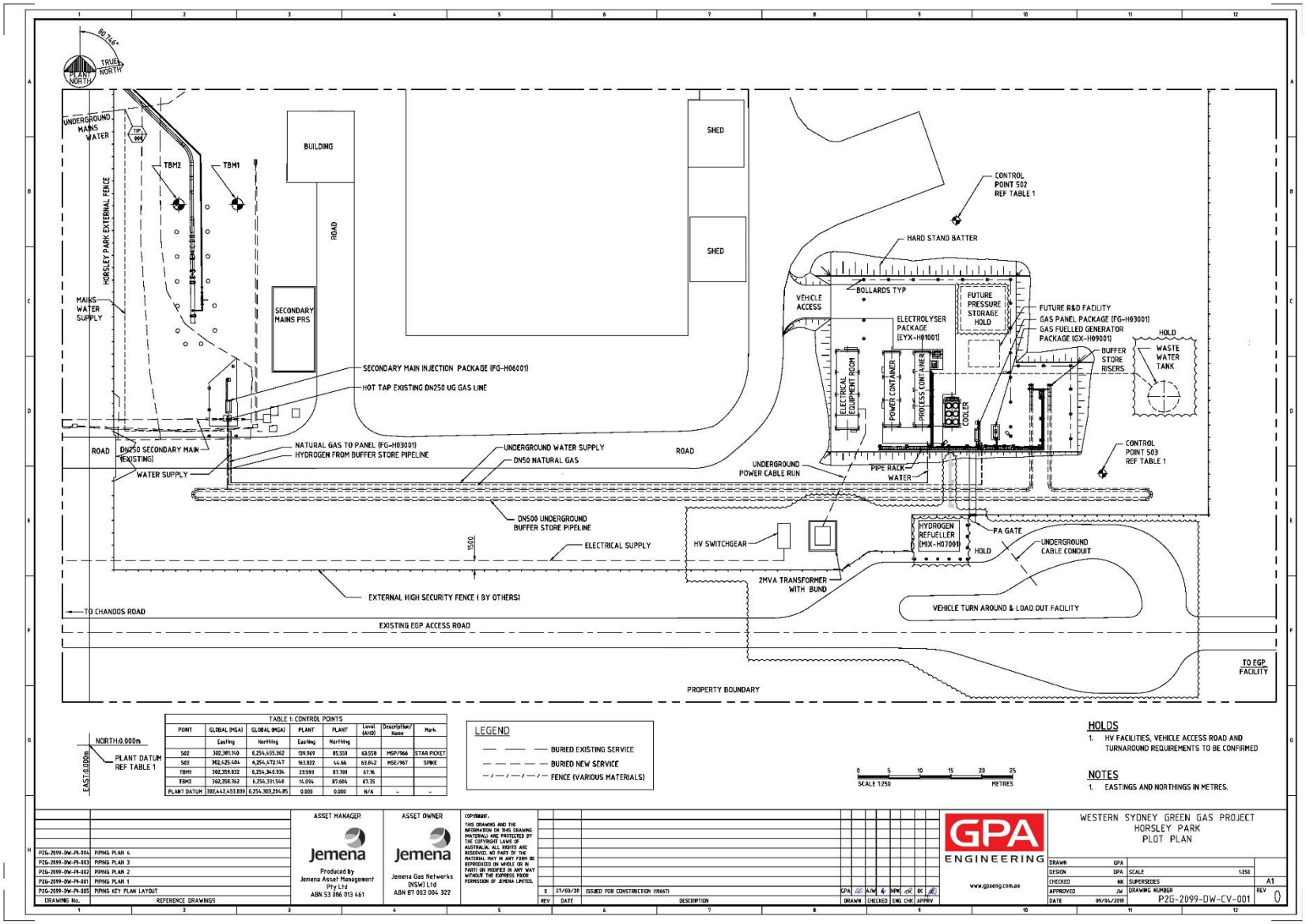
- the EIS;
- the final general arrangement plans for the development;
- current statutory approvals for the development;
- approved strategies, plans or programs required under the conditions of this consent;
- the proposed staging plans for the development if the construction, operation or decommissioning of the development is to be staged;
- how complaints about the development can be made;
- a complaints register;
- compliance reports;
- any independent environmental audit, and the Applicant's response to the recommendations in any audit; and
- any other matter required by the Secretary; and

(b) keep this information up to date.

APPENDIX 1: SCHEDULE OF LAND

Development Site	
Lot	**Deposited Plan**
1	499001
3	1002764

APPENDIX 2: GENERAL LAYOUT OF DEVELOPMENT



NORTH:0.000m
EAST:0.000m
PLANT DATUM REF TABLE 1

TABLE 1: CONTROL POINTS

POINT	GLOBAL (MGA) Easting	GLOBAL (MGA) Northing	PLANT Easting	PLANT Northing	Level (AHD)	Description/ Name	Mark
502	302,381.140	6,254,455.362	139.969	85.558	63.558	MSP/966	STAR PICKET
503	302,425.484	6,254,472.147	183.822	44.66	63.642	MSE/967	SPIKE
TBM1	302,356.832	6,254,343.934	23.593	87.701	67.16		
TBM2	302,358.392	6,254,331.548	14.894	87.684	67.35		
PLANT DATUM	302,442,453.839	6,254,303,214.85	0.000	0.000	N/A	-	-

LEGEND
- BURIED EXISTING SERVICE
- BURIED NEW SERVICE
- FENCE (VARIOUS MATERIALS)

SCALE 1:250 METRES

HOLDS
1. HV FACILITIES, VEHICLE ACCESS ROAD AND TURNAROUND REQUIREMENTS TO BE CONFIRMED

NOTES
1. EASTINGS AND NORTHINGS IN METRES.

DRAWING No.	REFERENCE DRAWINGS
P2G-2099-DW-PI-004	PIPING PLAN 4
P2G-2099-DW-PI-003	PIPING PLAN 3
P2G-2099-DW-PI-002	PIPING PLAN 2
P2G-2099-DW-PI-001	PIPING PLAN 1
P2G-2099-DW-PI-005	PIPING KEY PLAN LAYOUT

ASSET MANAGER: Jemena — Produced by Jemena Asset Management Pty Ltd ABN 53 086 013 461
ASSET OWNER: Jemena — Jemena Gas Networks (NSW) Ltd ABN 87 003 004 322

REV	DATE	DESCRIPTION	DRAWN	CHECKED	ENG CHK	APPRV
0	27/03/20	ISSUED FOR CONSTRUCTION 198671	GPA	AJW	NPK	RK

GPA ENGINEERING
www.gpaeng.com.au

WESTERN SYDNEY GREEN GAS PROJECT
HORSLEY PARK
PLOT PLAN

DRAWN	GPA		
DESIGN	GPA	SCALE	1:250
CHECKED	NK	SUPERSEDES	A1
APPROVED	JW	DRAWING NUMBER	REV 0
DATE	09/04/2019	P2G-2099-DW-CV-001	

Appendix B – SWMS Template

Safe Work Method Statement

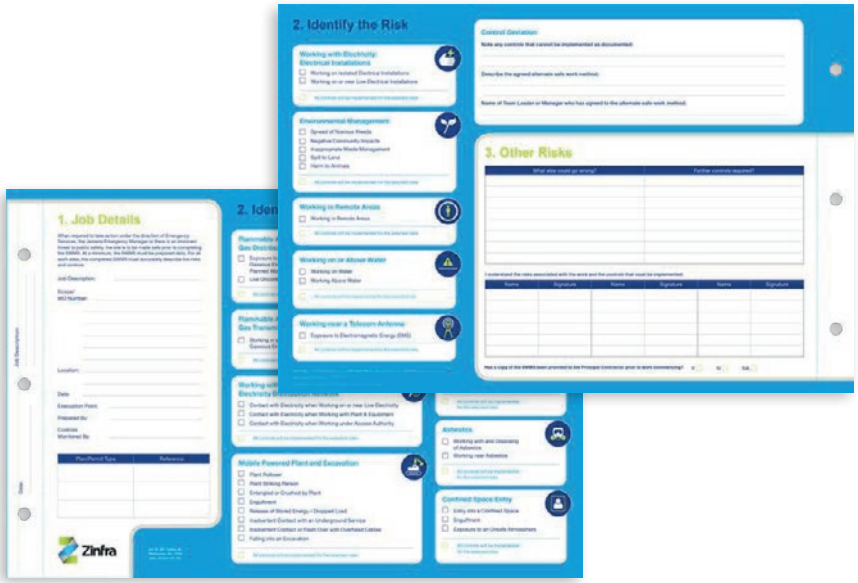
Zinfra

Safety First

The Safe Work Method Statement enables Zinfra to effectively identify risks and implement appropriate controls in the field. This process is mandatory for all field work activities to protect our people, contractors, the public and the environment.

The Safe Work Method Statement ensures the planning for high risk work activities considers the hazards and risks. The process describes the minimum controls that must be in place for high risk work to commence. In the event the minimum controls cannot be implemented, work must not commence without a Team Leader approving an alternate safe work method.

The process to the right describes the steps required to complete the Safe Work Method Statement.



1. Complete the Job Details
2. Identify any plans and permits required for the work
3. Identify all high risk work activities present
4. Identify the risks associated with the high risk work activities
5. Confirm the documented controls will be implemented
   - No → Discuss opportunities to safely undertake the work with your Team Leader → No alternative safe work method agreed. Work must not commence
   - Yes →
6. Conduct a site assessment to identify additional risks and controls → Alternative safe work method agreed and documented
7. Ensure all personnel understand and agree to the Safe Work Method Statement
8. Commence Work

- All work activities must be undertaken in accordance with Zinfra HSEQ Standards, Procedures and Work Instructions. In the absence of an approved Zinfra methodology, Australian Standards and Codes of Practice must be complied with.
- All personnel must have current training for the task they are undertaking.
- All personnel must comply with Zinfra's field PPE requirements at all times and consider additional task specific PPE.
- All operating plant must have a plant risk assessment, operator's manual and safe operating instructions with the high risk plant including registration and currency of maintenance.
- All portable electrical equipment used in a construction, operations and maintenance environment, must be connected to a Residual Current Device (RCD) which must be tested before use.
- The portable electrical equipment must be visually inspected before use and have a current test tag attached. Any defective equipment must be tagged out and removed from use/service immediately.
- When using electrical cables/leads ensure they are supported off the ground on lead stands/hooks to mitigate the risk of damage.
- Extension cable/leads must not be joined together.

Review Date Dec 2022

Doc No.: GS-HS-FM-51573 Rev. 0

Safe Work Method Statement Steps

The following process describes the steps required to complete the Safe Work Method Statement (SWMS).

1 Complete the Job Details

Complete Section 1: Job Details on the Interactive Sheet. For some repetitive tasks, you may not need to use a new Interactive Sheet if the risks are unchanged.

2 Identify any plans and permits required for the work

All Plans and Permits required for the job must be completed in full, authorised as required and noted on the Interactive Sheet.

3 Identify all high risk work activities present

Refer to Section 2: Identify the risks on the Interactive Sheet. Consider the job and identify the high risk work activities you will be performing. The high risk work activities are noted in the blue font.

4 Identify the risks associated with the high risk work activities

For each high risk work activity on the job, identify which risks are present using the blue check boxes.

5 Confirm the documented controls will be implemented

Refer to the documented Control Pages for each high risk work activity present. Confirm that all control measures are available and will be implemented as described. If working in a crew, this must happen as a group discussion.

Confirm that all control measures will be implemented by checking the box 'All controls will be implemented for the selected risk' for each high risk work activity present (orange check box).

If all controls cannot be implemented as described:

Do not commence work. Assess the issue, decided if an alternative method can be identified.

1. If no alternate safe work method can be identified, notify your Team Leader and the work must not commence.
2. If a potential alternative safe work method has been identified, document it on the 'Control Deviation' section of the Interactive Sheet and contact your Team Leader. Discuss the control measure(s) that cannot be implemented and outline the alternative.

The Team Leader must then make a decision as to whether the job shall proceed in accordance with the alternative safe work method. If the Team Leader approves the alternative method, the approval must be noted on the Interactive Sheet.

If the Team Leader does not approve the alternative safe work method, the work must not commence.

6 Conduct a site assessment to identify additional risks & controls

Refer to Section 3: Other Risks. Identify any other risks present on site. These may be related to non-high risk work activities, site specific risks or special instructions from other parties.

7 Ensure all personnel understand and agree to the Safe Work Method Statement

Prior to work commencing, all on-site personnel (including contractors working under Zinfra's direction) must have read and understood the Safe Work Method Statement for the job.

All on-site personnel (including contractors working under Zinfra's direction) must print their name and sign in Section 3 of the Interactive Sheet to confirm their agreement and understanding of how the job will be performed.

The effectiveness of controls must be monitored while the job is in progress. If control measures aren't working or need to be altered, stop the job and review the Safe Work Method Statement. If a control can no longer be implemented due to changing conditions, enact the 'Control Deviation' process (refer Step 5).

Every job must have a current and completed Safe Work Method Statement on site.
The controls referenced in the Safe Work Method Statement must exactly match the conditions on site.

Note: If the job is unable to be carried out in accordance with the documented Safe Work Method Statement, the work must stop immediately and the site made safe.

SWMS Regulatory Requirements and Consultation

The primary requirements of the WHS and OHS Regulations prescribe that a SWMS must:

a. identify the work that is high risk construction work;

b. specify hazards relating to the high risk construction work and the risks to health and safety associated with those hazards;

c. describe the measures to be implemented to control the risks; and

d. describe how the control measures are to be implemented, monitored and reviewed.

The SWMS must be prepared taking into account all relevant matters including:

a. circumstances at the workplace that may affect the way in which the high risk construction work is carried out; and

b. if the high risk construction work is carried out in connection with a construction project, a Safety Management Plan must be prepared for the workplace.

Zinfra's SWMS have been prepared in accordance with these requirements. Additionally, Zinfra's field workforce have contributed to the Safe Work Method Statement development through extensive consultation.

Furthermore Safety Regulators in NSW, Qld & Vic were consulted during the development of these SWMS

Zinfra's SWMS will be reviewed periodically and may be reviewed out of cycle if deemed necessary.

Safe Work Method Statement Control Page

Flammable Atmosphere and Pressurised Gas: Gas Distribution Network

Zinfra

Safety First

Risk

Exposure to a Suspected Gaseous Environment: Planned Works

Live Uncontrolled Gas Release

Controls

1. Gas Detection

- Check for leaks prior to commencement via either snoop test or gas surveyor.

2. Control the Atmospheric Environment

- Assess and identify opportunities to isolate, ventilate and eliminate / control ignition sources.

3. Flash PPE & Fire Extinguisher

- Flash PPE (hoods, gloves) and two 9kg fire extinguishers must be in the vehicle at the job site.
  Note: where flash suits are provided they must be in the vehicle at the job site.
- Where there is the potential for live uncontrolled gas release, flash PPE and fire extinguishers must be out and readily accessible.

1. Communication

- On arrival, contact the Control Room.
- Conduct site assessment and contact the Control Room to confirm resource requirements.
- Maintain regular communication with the Control Room.

2. Fire Extinguisher and Oxygen

- Flash PPE (hoods, gloves) must be onsite for all personnel required to work under live gas conditions.
  Note: where flash suits are provided they must also be on site.
- Flash PPE must be worn when performing work under live gas conditions.
- Two 9kg fire extinguishers must be placed at separate locations and readily accessible to the work area.
- Respiratory protection (gas mask) must be used when conducting work in a gaseous environment and where available a positive pressure system is mandated.
- Minimum of two people to conduct the works when gas masks are in use.

3. Exclusion Zone

- Establish an exclusion zone to ensure pedestrians and third parties are not within a gaseous environment.
- Undertake initial and constant monitoring of gas levels to maintain a suitable exclusion zone.

4. Control the Atmospheric Environment

- Assess and identify opportunities to isolate, ventilate and eliminate / control ignition sources.
- Assess and identify opportunities to remove or control static electric sources of ignition.

5. Site Monitoring

- A designated person must monitor:
  - » gas levels;
  - » wind conditions;
  - » exclusion zone suitability; and
  - » breathing apparatus gauges when in use.

Safe Work Method Statement Control Page

Flammable Atmosphere and Pressurised Gas: Gas Distribution Network

Zinfra

Safety First

Risk

Release of Stored Energy

Exposure to Stray Current

Controls

1. PPE

- Eye protection must be worn.
- Assess the work environment and gas pressure to identify the type of eye protection (safety glasses or full-face shield).

2. Isolation

- Assess opportunities to conduct the work through isolation or lower gas pressures.

3. Asset Integrity Inspection

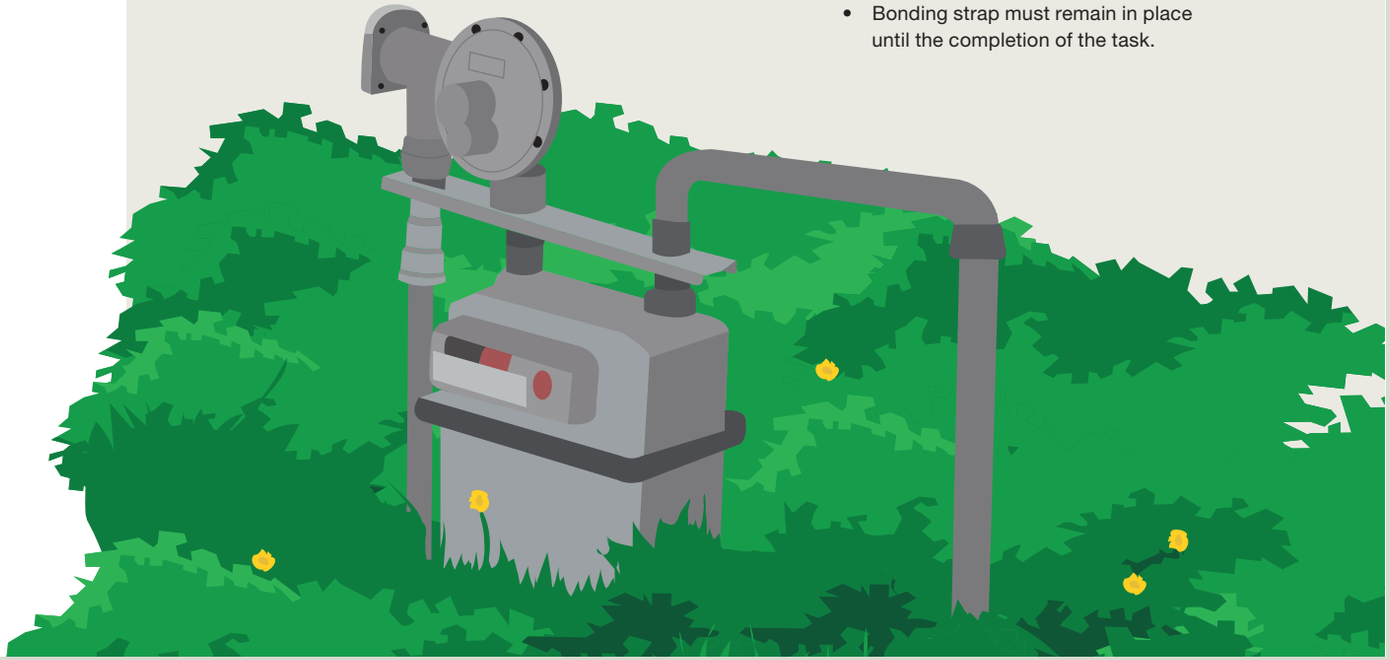
- When using flexible hoses, visual inspection must be conducted to assess the condition and pressure rating of the hose prior to use.

1. Low Voltage (LV) Gloves

- LV gloves must be inspected prior to use to ensure they are within 12 months of issue, free of holes and are clean.
- LV gloves must be worn until the completion of the task.

2. Bonding Straps

- Bonding strap must be within its current test and tag date.
- Ensure attachment points are clean and free of rust, scale, paint and oxidisation prior to attachment.
- Ensure clamp is tightly secured at the point of attachment.
- Cease work and contact supervisor if evidence of electrical current is identified.
- Bonding strap must remain in place until the completion of the task.



Safe Work Method Statement Control Page

Flammable Atmosphere and Pressurised Gas: Gas Transmission Network

Zinfra

Safety First

Risk

Working in a Potentially Gaseous Environment
Release of Stored Energy / Release of Gas

Conducting an Observation in a Potentially Gaseous Environment

Controls

1. Notifications

- Gain Permit To Work authorisation from the Control Room before work commences.
- Notify Control Room as per Permit to Work requirements.
- Assess the work site for third party impacts (gas, odour, noise etc.) and notify potentially impacted parties.

2. Permit to Work

- A Permit to Work must be fully completed prior to work commencing.
- Permit Issuer to verify all authorisations and licenses.
- Sequence of isolations and work instructions must be confirmed, documented and enacted prior to work commencing.
- All isolations must be identified, checked and recorded by the PI on the PTW. All members of the work party must Lock out, Tag out.
- All ignition sources, except those documented on the permit, must be removed.

3. Gas Monitoring

- Monitor the work area with in-test and bump-tested personal gas monitor.
- Ensure atmospheric testing equipment is within its calibration date and bump-tested before use.
- Atmospheric testing must be undertaken prior to the commencement of works and constantly monitored.

4. Fire Control / Evacuation

- Assess the work site and ensure fire controls are established and are able to be readily accessed / used.
- Confirm emergency exits and muster points are communicated and understood by all onsite personnel.

5. PPE

- Additional to standard mandatory PPE, fit-for-purpose task-specific PPE must also be worn.

6. Monitor Weather Conditions

- Monitor weather to prepare for adverse weather conditions.
- Consider the threat of lightning and cease works when lightning within 50km.

7. Safety Watch

- Assign a Safety Watch as identified in Permit to Work process.

8. Establish Exclusion Zone

- Exclusion zone to be identified as per site/task assessment and Permit to Work process and controlled by the Safety Watch.

1. Notifications

- Notify Control Room of entry and exit of the station.

2. Site Assessment

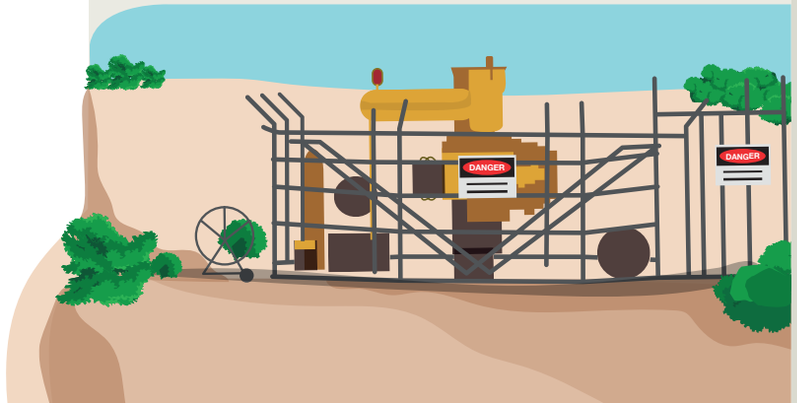
- Conduct visual and audible assessment of the site prior to commencing observation.

3. Gas Monitoring

- Monitor the area with in-test and bump-tested personal gas monitor.
- Ensure atmospheric testing equipment is within its calibration date and bump-tested before use.
- Atmospheric testing must be undertaken prior to the commencement of observation and constantly monitored.

4. Change in Conditions

- If observation at any time identifies issues or requires work to be conducted, the SWMS must be reassessed for the identified work task.



Zinfra

Safety First

Flammable Atmosphere and Pressurised Gas: Gas Transmission Network

Safe Work Method Statement Control Page

Working with Electricity:
Electricity Distribution Network

Zinfra
Safety First

Risk

Contact with Electricity when Working on or near Live Electricity

Controls

1. Authorised to work on the Electricity Network

- Personnel must be trained, authorised (or under instruction), inducted and competent to work on the Zinfra Electricity Network.

2. Notify Control Room

- Assess the work task and the electrical environment to determine whether the Control Room needs to be contacted.
- When working on HV, ensure live line sequence has been enabled or auto-re close has been suppressed.

3. Confirm it is Safe to Work

- To confirm that it is safe to work, assess and understand the:
  - » working environment;
  - » voltage;
  - » phase;
  - » circuit;
  - » direction of supply; and
  - » mechanical condition of the electrical apparatus.

4. Maintain Safe Approach Distances

- Identify the safe approach distance by assessing the voltage, task and authorisation of the personnel involved.
- Safe approach distances must not be breached.
- Assess the opportunities to implement exclusion zones (including signs and barriers) to ensure safe approach distances are not breached.

5. Safety Observer

- A Safety Observer must be appointed where personnel, equipment or plant may inadvertently breach safe approach distances.
- Where a designated safety observer is required and not present, all work must cease and all personnel must remove themselves from the contact zone.

6. Emergency Response

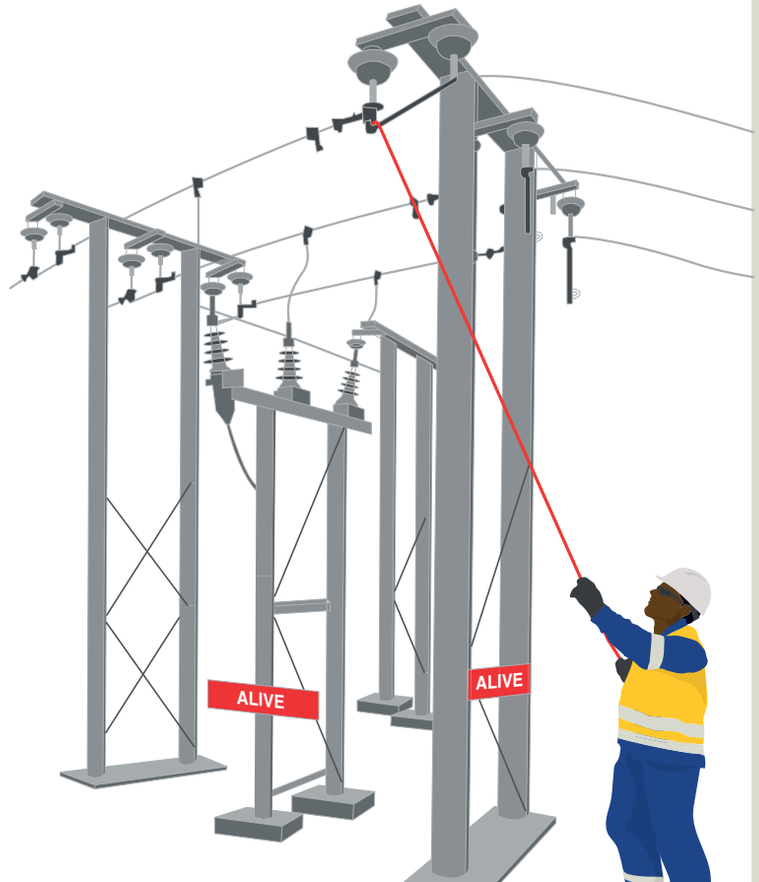
- Assess the work task to identify the type of rescue kit required.
- The rescue kit must be available where the work is being conducted.

7. Insulated Mats, Covers, Sticks and Testing Equipment

- Insulated mats must be used to cover all potential second points of contact within reach.
- HV insulated mats, covers, sticks and equipment must be appropriately rated, within test date and visually inspected prior to use to ensure they are suitable for use and clean.
- Double insulation required for live HV work.
- LV insulated mats and covers must be visually inspected prior to use to ensure they are suitable for use and clean.
- A visual inspection must be conducted to ensure operating equipment is free of defects and within current test date.
- Testing equipment must be within test date and calibrated.
- Use insulated tools when working on live switchboards or underground systems.

8. PPE

- Safety glasses must be worn when working live.
- Gloves (and sleeves when working on HV) must be appropriately rated for the task, inspected prior to use, clean, within test date and worn while undertaking the task.



Safe Work Method Statement Control Page

Working with Electricity:
Electricity Distribution Network

Zinfra
Safety First

Risk

Contact with Electricity when Working with Plant & Equipment

Contact with Electricity when Working under Access Authority

Controls

1. Earth Protection

- Mobile plant must be effectively earthed and bonded.
- When using an insulated Elevated Work Platform confirm it is the appropriate voltage for the work environment.

2. Safe Approach Distance

- Identify the safe approach distance by assessing the voltage, task and authorisation of the personnel involved.
- Safe approach distances must not be breached.
- Assess the opportunities to implement exclusion zones (including signs and barriers) to ensure safe approach distances are not breached.

3. Safety Observer

- A Safety Observer must be appointed where plant may inadvertently breach safe approach distances.
- Where a designated safety observer is required, all work must cease and all personnel and plant must be removed from the contact zone when the safety observer is not present.

4. Vicinity Access (VA) when Working in a Zone Substation

- A VA must be on issue when work is to be performed adjacent to exposed live apparatus.
- All conditions of the VA must be in place.
- A VA must only be issued to a VESI employee.

1. Access Authorities

- The appropriate Access Authority must be on issue when working on electrical apparatus on the Zinfra Electricity Network.
- A SFT and EAP shall not be on issue on the same apparatus at the same time.
- Authorised Person is to:
  - » assess the site and apparatus condition
  - » assess the task
  - » verify and/or carry-out all isolations
  - » confirm the electrical status by test, visual inspection or enquiry
  - » apply earthing and/or bonding
  - » confirm that the controls documented on the access authority are in place
  - » understand the limits of the Access Authority, precautions taken and awareness of the nearest live electrical apparatus; and
  - » maintain safe approach distances

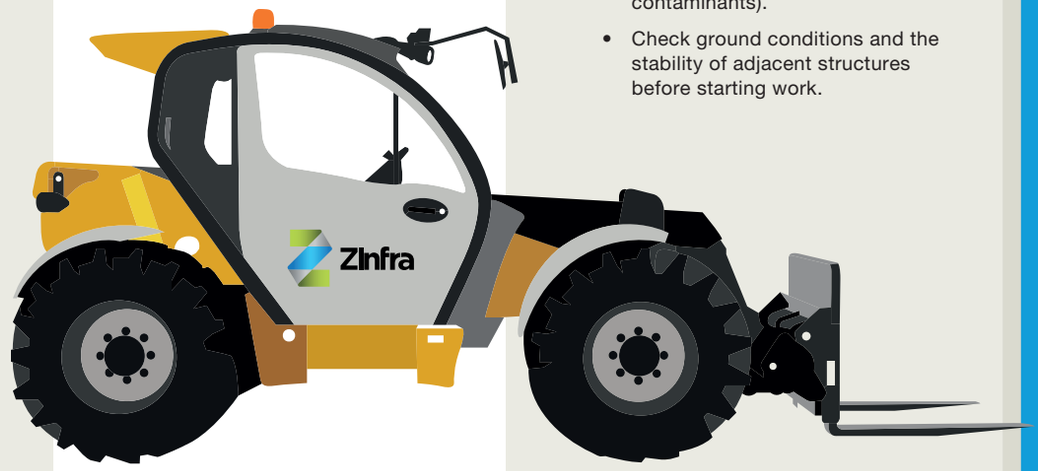
Safe Work Method Statement Control Page

Mobile Powered Plant and Excavation

Zinfra

Safety First

Risk	Plant Rollover	Plant Striking Person	Entangled or Crushed by Plant	Engulfment
Controls	**1. Operator to Wear Seatbelt** • Where a seat belt is factory fitted, it must be fastened when the plant is in operation. **2. Plant Working Limits** • Operator must assess the stability of the ground prior to commencing work. • Operator must understand and stay within all working limits of the plant, including maximum angles of slopes. • When utilising plant to lift, the operator: » must identify the weight of the load; and » ensure the load is within the rated capacity of the plant. **3. Lift Plans** • A lift plan must be in place and documented for the following lifts: » multi-crane lifts; and » loads in excess of 80% of the plant's lifting capacity.	**1. Assess Plant Movements** • Assess opportunities to restrict personnel from areas where plant is moving / operating. • Where personnel cannot be isolated from operating plant, a Spotter must be present. • Spotter must maintain visual and verbal contact with the plant operator. • Plant operations must cease at the Spotter's direction and when the Spotter is not present. • Do not use mobile phone devices (e.g. phone, smart watch, tablet) in the high risk plant operating exclusion zone. **2. Warning Device** • The plant must have an operating warning device (visual or audible) to alert personnel in the vicinity. **3. Exclusion Zone** • Personnel not directly involved in the work task must not enter the working area while plant is in operation. **4. PPE** • Personnel must comply with the requirements of Zinfra field PPE and a hard hat must be worn.	**1. Barriers and Guards** • Plant must not be modified from the manufacturer's design. • Plant must not be operated if manufactured barriers or guards are missing or in poor condition. • Operator to verbally communicate pinch points of the plant to personnel interacting with the plant. • Pinch points must have notification labels in good condition.	**1. Bench, Batter or Shore Excavations** • All trenches / excavations deeper than 1.5m must be benched, battered or shored. • If the benching or battering angle of repose exceeds 45 deg or shoring is installed a suitably qualified person (e.g. Geotechnical engineer), must approve the design. **2. Exclusion Zone** • At the top of the trench / excavation, maintain a 1m exclusion zone where material cannot be stockpiled. **3. Confined Space Assessment** • Assess all excavations deeper than 1.5m to determine if it's a confined space (engulfment or atmospheric contaminants). • Check ground conditions and the stability of adjacent structures before starting work.



Safe Work Method Statement Control Page

Mobile Powered Plant and Excavation

Zinfra

Safety First

Mobile Powered Plant and Excavation

Risk	Release of Stored Energy / Dropped Load	Inadvertent Contact with an Underground Service	Inadvertent Contact or Flash Over with Overhead Cables	Falling into an Excavation
Controls	**1. Exclusion Zone** • Assess the work site and task and verbally communicate the potential trajectory of plant components or loads if suddenly released. • Personnel are to remain outside the zone of potential trajectory. Opportunities to install exclusion zone barricading must be assessed. • Operators must not lift loads over people. **2. Visual inspection & equipment** • All rigging / lifting equipment must be visually inspected and within its test date. • Where a tag line is required (as determined by the dogger/rigger), it must be approved & ≥16mm diameter and body parts kept away from pinch/crush points. **3. Lift Plans** • A lift plan must be in place and documented for the following lifts: » multi-crane lifts; » loads which are hazardous or dangerous goods; » loads in excess of 80% of the plant's lifting capacity; and » lifting over gas transmission infrastructure.	**1. Service Locating and Exclusion: Planned Works** • Prior to undertaking mechanical excavation, service locations and depths must be verified by either: » non-destructive digging; » potholing; » hand digging; or » service locating and marking. **2. Emergency Works** • An above-ground visual inspection must be undertaken to approximate service locations. • Non-mechanical excavation or mud buckets must be used at all times. **3. Dial Before You Dig (DBYD) Plans** • A copy of the DBYD plans must be on-site and within its current review period for all planned work. **4. Service Exclusion Zone** • Identify the exclusion zones applicable to the services present. • When using mechanical excavation methods maintain a minimum clearance of 300mm from services crossing the excavation. • No mechanical excavation to be used within service exclusion zones. **5. Spotter** • When conducting mechanicalexcavation, a designated Spotter must be in place. • Plant operations must cease at the Spotter's direction and when the Spotter is not present. **6. Directional drilling** • Implement and follow an approved drilling profile during drilling works.	**1. Exclusion Zone** • Identify and verbally communicate the exclusion zone / safe approach distance requirements to all on-site personnel. • Ensure all plant, equipment and personnel do not breach the exclusion zone / safe approach distance. **2. Spotter** • A Spotter must be used at all times to ensure plant does not breach exclusion / safe approach distances. • Plant operations must cease at the Spotter's direction and when the Spotter is not present. **3. Isolation and Barriers** • Where exclusion zone / safe approach distances cannot be maintained the work must stop. • Isolations and / or barriers must be implemented in consultation with the asset owner.	**1. Entry and Exit Points** • Assess the trench / excavation to ensure that a safe means of entry and exit is established. **2. Barricading** • During operational hours, barricading is required when work is not occurring on or in the trench / excavation. **3. Site Security** • Trenches and excavations must be backfilled, covered with solid material or isolated with a hard barricade out of work hours.

Safe Work Method Statement Control Page

Working at Height

Zinfra

Safety First

Risk

Person Falling More than 1.5m

(Select a minimum of one control below, preferencing from higher order control 1 - lower order control 6)

Controls

1. Elevated Work Platforms

- Conduct a prestart assessment relative to the EWP in use.
- Conduct a visual inspection on safety harnesses and lanyards to ensure there is no damage and they are within the tag and test date.
- When exiting an EWP to access an alternate structure, continuous connection must be maintained.
- Assess the stability of ground conditions relative to the EWP.
- Safety harnesses with lanyard connection must be used for travel towers, boom lifts and cherry pickers.
- Hard hats must be worn when working in an EWP.

2. Scaffold

- Prefabricated scaffolds must be of the same make and model (no mixing of components).
- Where there is a risk of falling greater than four metres, all scaffolding must be installed and inspected monthly by a licensed scaffolder and have a scaff tag attached.
- Safe means of entry, exit and movement between levels must be provided. When this is provided by a ladder, it must be secured.
- All exposed edges must be protected with hand rails, mid rails and kick boards.

3. Guard Rails

- Where permanent guard rails are not present, temporary guard rails must incorporate a top rail (between 900mm and 1100mm above the working surface) and a mid rail at all exposed edges.

4. Fall Restraint

- Conduct a visual inspection on safety harnesses and lanyards to ensure there is no damage and they are within the tag and test date.
- Ensure the fall restraint system is established to prevent access to any exposed edge.
- Identify areas of potential concern regarding anchor points. Where concerns are identified, work is to cease immediately.

5. Fall Arrest

- Use a Working at Height permit if fall arrest equipment is used as the main safety control.
- Conduct a visual inspection on safety harnesses and lanyards to ensure there is no damage and they are within the tag and test date.
- Identify areas of potential concern regarding anchor points. Where concerns are identified, work is to cease immediately.
- Assess the site and the potential to fall to ensure the fall arrest system prevents impact with the ground, structures or other objects.
- Continuous connection must be in place which may require dual lanyards.
- Communicate an established rescue plan to the work crew.

6. Ladders

- Assess the work task to select the most suitable ladder.
- Ensure access ladders are stabilised/secured top and / or bottom.
- Work can only be conducted from a ladder where:
  - » it is platform ladder, or
  - » straight or step ladders only if
    - three points of contact can be maintained; or
    - (for overhead electrical network activities only) you are trained as a electrical supply industry worker or a pole belt is utilised.

Safe Work Method Statement Control Page

Working at Height

Zinfra

Safety First

Risk

Person Falling Less than 1.5m

Struck by Dropped Object

Controls

1. Manage Site Conditions

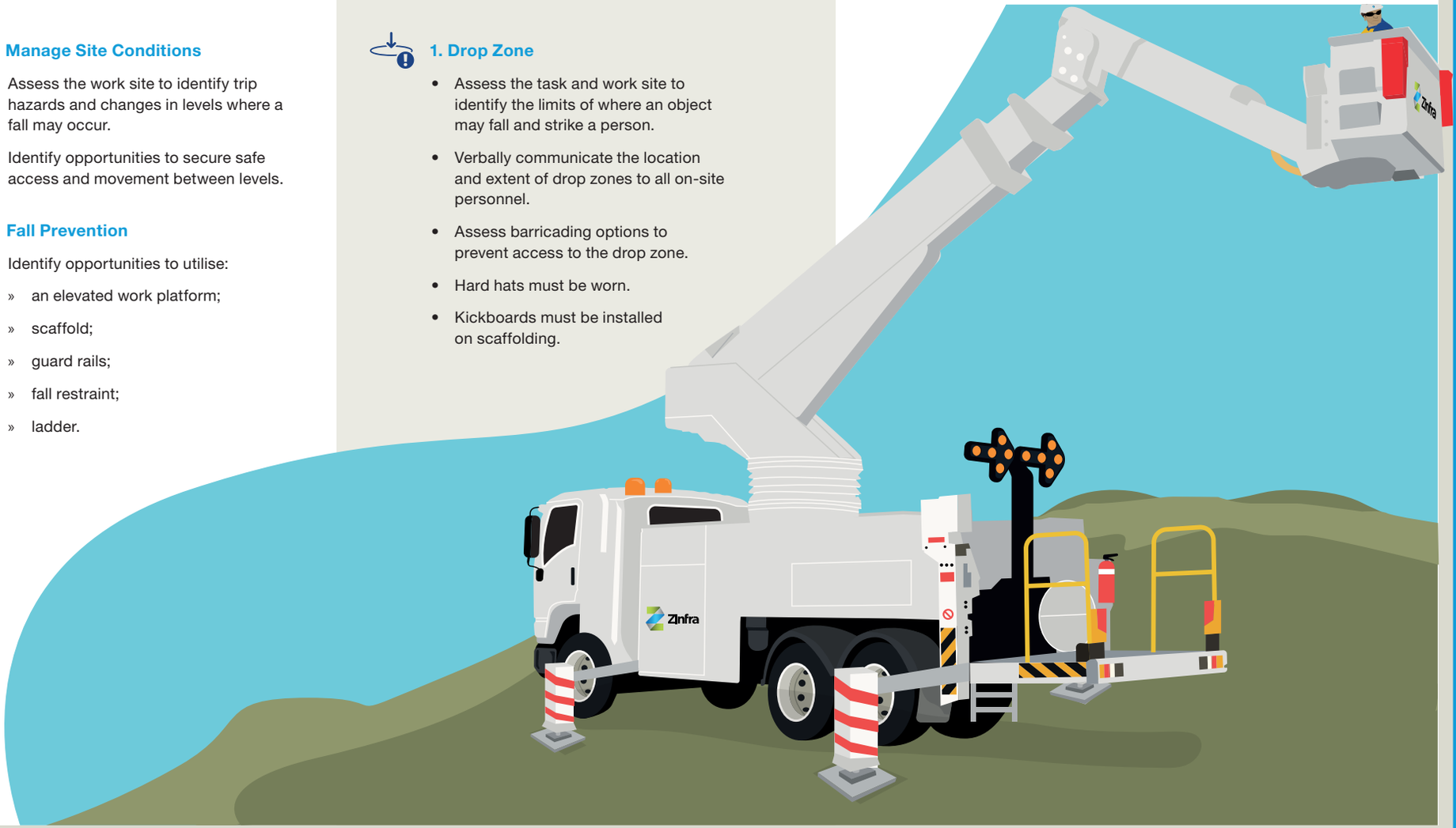
- Assess the work site to identify trip hazards and changes in levels where a fall may occur.
- Identify opportunities to secure safe access and movement between levels.

2. Fall Prevention

- Identify opportunities to utilise:
  - » an elevated work platform;
  - » scaffold;
  - » guard rails;
  - » fall restraint;
  - » ladder.

1. Drop Zone

- Assess the task and work site to identify the limits of where an object may fall and strike a person.
- Verbally communicate the location and extent of drop zones to all on-site personnel.
- Assess barricading options to prevent access to the drop zone.
- Hard hats must be worn.
- Kickboards must be installed on scaffolding.



Safe Work Method Statement Control Page

Working on or near Road or Rail Corridors

Zinfra

Safety First

Risk	Struck by Vehicle: Conducting Work	Struck by Train	Struck by Vehicle: Conducting an Inspection	Injury to Pedestrian
Controls	**1. Training** • Employees implementing traffic management plans must be trained to do so. **2. Traffic Management Plan** • Ensure a site specific traffic management plan is in place. • Traffic management controls must be installed as per the documented traffic management plan (TMP) prior to work commencing. • Watch for potential changes in visibility or blind spots and adjust the TMP accordingly. **3. Flashing Beacons** • All vehicles utilised in setting up or maintaining a traffic management plan must have a flashing beacon in operation. **4. PPE** • Personnel must comply with the requirements of Zinfra field PPE.	**1. Authorisation** • Prior to entering a rail corridor, obtain written approval from the Rail Operator. • A copy of the written approval and associated requirements must be present on-site. • All requirements of the Rail Operator must be complied with. • No work to be conducted without the presence of a Rail Operator Spotter. **2. PPE** • PPE must be worn as mandated by the Rail Operator.	**1. PPE** • Personnel must comply with the requirements of Zinfra field PPE. **2. Flashing Beacons** • Vehicles in the proximity of the inspection must have a flashing beacon or hazard lights in operation. 	**1. Pedestrian Management** • Barricading and signage must be installed to prevent pedestrians entering the work site. • Assess site conditions to ensure pedestrians are provided with an alternative means of safe passage. • Assess parking location to ensure vehicles do not introduce a hazard.

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Safety First

Working on or Near Road or Rail Corridors

Safe Work Method Statement Control Page

Asbestos

Zinfra

Safety First

Risk

Controls

Working with and Disposing of Asbestos

1. Trained

- Must have completed Zinfra approved asbestos awareness and handling training.

2. Exclusion Zone

- Notify all on-site personnel that asbestos work is to be conducted.
- Establish a barricade to exclude non-essential personnel from the work site.

3. Working Threshold

- In the event that friable asbestos is identified or more than 10m^2 of non-friable asbestos requires removal, the exclusion zone is to be maintained to prevent pedestrian and third party access.
- All on-site personnel are to be notified and removed from the exclusion zone.
- Work must immediately cease and must not recommence until a clearance certificate is issued.
- The Control Room must be notified.
- Must develop an Asbestos Management Plan.

4. PPE

- Zinfra approved asbestos PPE must be worn.

5. Control Asbestos Waste

- All asbestos waste must be double bagged utilising the Zinfra asbestos kit.
- Asbestos PPE must be removed (mask last) and placed in the waste bags.
- Waste bags to be sealed and marked as “Asbestos Waste”.

6. Disposal

- Waste bags must be disposed of at an approved location.

Working near Asbestos

1. Trained

- Must have completed Zinfra approved asbestos awareness training.

2. Assess Work Site for Asbestos

- Assess the work site to identify any material that potentially contains asbestos.
- Verbally communicate location of potential asbestos to all on-site personnel.
- Must have an up to date Asbestos Register.

3. Assess Work Site for Friable Asbestos

- Assess the work site to identify any asbestos that is friable.
- In the event that friable asbestos is identified, establish and maintain an exclusion zone to prevent pedestrian and third party access.
- All on-site personnel are to be notified and removed from the exclusion zone.
- Work must immediately cease and must not recommence until a clearance certificate is issued.
- The Control Room must be notified.

4. Maintain Condition of Asbestos

- Ensure work activities do not damage the asbestos or create airborne fibers.

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Asbestos

Safe Work Method Statement Control Page

Confined Space Entry

Zinfra

Safety First

Risk

Entry into a Confined Space

Controls

1. Assessment

- Potential confined spaces must be assessed against the confined space criteria. Refer to criteria on the next page.

2. Confined Space Entry Permit

- A confined space entry permit must be completed by a trained and authorised Permit Issuer.

3. Monitoring

- Ensure atmospheric testing equipment is within its calibration date and bump tested before use.
- Atmospheric testing must be undertaken at various levels of the space and continuously monitored.
- Changes in atmospheric conditions must be documented on the permit.
- Changes in site / environmental conditions which may impact the confined space must be continuously monitored.

4. Emergency Response

- A recovery plan must be documented on the permit inclusive of required equipment and means of entrant rescue.
- Where a recovery plan requires a crew member to enter the confined space to enact a rescue, this person cannot be the standby person. This will result in a three-person team minimum.
- Use tested & certified safety equipment.

5. Resourcing

- On-site assessment must be completed to determine the resources required to complete the task.
- At a minimum, a two-person team is required.

a) **Standby Person:**

- Ensures all conditions of the permit are met;
- Must stay at the point of entry;
- Must be able to initiate the recovery plan;
- Must have a means of audible communication with the entrant;
- Must not have other work duties; and
- Must not enter the confined space.

b) **Entrant:**

- Must operate in accordance with the entry permit.

6. Access Control

- An exclusion zone and signage must be established when work is undertaken in a confined space.
- Confined space entry point must be secured once the work is completed.
- Potential ‘fall from height’ hazards into a confined space must be assessed and controlled with either fall prevention or hard barriers.

Engulfment

1. Visual Inspection

- Assess present and recent weather conditions and cease work when there is the
  - » ensure any soil walls are battered, benched or shored if greater than 1.5m deep; and
  - » identify areas of potential concern regarding constructed walls. Where concerns are identified, work is to cease immediately and the Control Room notified.

2. Assess Weather Conditions

- Assess present and recent weather conditions and cease work when there is the potential for flash flooding.

Safe Work Method Statement Control Page

Confined Space Entry

Zinfra
Safety First

Risk

Exposure to an Unsafe Atmosphere

Controls

1. Monitoring

- Ensure atmospheric testing equipment is within its calibration date and bump tested before use.
- Atmospheric testing must be undertaken at various levels of the space and continuously monitored.
- Changes in atmospheric conditions must be documented on the permit.
- Changes in site / environmental conditions which may impact the confined space must be continuously monitored.

2. Control the Atmospheric Environment

- Identify opportunities to create a safe atmosphere through isolation, natural and / or mechanical ventilation or purging.
- Potential sources of ignition are to be assessed and eliminated or controlled.

3. Fire Extinguishers

- A fire extinguisher must be located in the immediate vicinity of the confined space entry point.

4. Access Restrictions

- No work to commence if a safe atmosphere cannot be achieved.
- No work to commence if oxygen levels are not within 19.5% - 23.5% of air content. Work to cease if oxygen levels are no longer within this range.
- No work to commence if Lower Explosive Limit (LEL) exceeds 5%. Work to cease if LEL exceeds 10%.
- If a safe atmosphere cannot be maintained, work to cease immediately.

Confined Space Assessment

To be a confined space all three of the following criteria must apply:

1. **Enclosed or partially enclosed** →
2. **Not designed or intended to be occupied by a person** →
3. **Designed or intended to be at normal atmospheric pressure while a person is in the space**

and at least one of the following risks is likely to be present:

- **Unsafe oxygen level i.e. outside 19.5% - 23.5% of the atmosphere**
- **Harmful concentrations of atmospheric contaminants that may cause asphyxiation**
- **Atmospheric contaminants that may cause fire or explosion**
- **Risk of engulfment by liquid or solids**

Safe Work Method Statement Control Page

Working with Electricity: Electrical Installations

Zinfra

Safety First

Risk

Controls

Working on Isolated Electrical Installations

1. Isolations

- All persons conducting planned isolations must be licensed or qualified to do so.
- All exposed live points within proximity of the work site must be identified.
- Verbally communicate live points and isolations to all personnel engaged in the work.
- Isolated equipment must be tagged out and tested to confirm status.
- Only remove another person's lock or tag after written authorisation from the relevant field manager or delegate.

2. Test Before Touch

- The integrity of electrical testing equipment must be verified prior to and after use.
- Prior to commencing work, test electrical equipment to confirm status of isolations.

Working on or near Live Electrical Installations

1. Electrical Worker

- All persons working on or near live electrical installations must be licensed or qualified to do so.

2. Electrical Environment Assessment

- ID and assess the location of all exposed live electrical installations.
- Assess the work method, tools and equipment for the task.

3. Isolations and Barriers

- Assess opportunities to isolate or install barriers on exposed live electrical equipment adjacent to or near the work.
- Isolated equipment must be tagged out and tested to confirm status.
- Only work on a live system after written authorisation or open a critical work permit.

4. PPE

- Complete a visual inspection of Low Voltage (LV) gloves and air-test prior to use.
- Low Voltage (LV) gloves must be worn until the completion of the task.
- Protective eyewear/faceshield if there is a risk of flashover.

5. Emergency Controls

- An LV rescue kit must be available where the work is being conducted.
- Minimum two-person team required to conduct the work.

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Safety First

Safe Work Method Statement Control Page

Environmental Management

Zinfra

Safety First

Risk	Spread of Noxious Weeds	Negative Community Impacts	Inappropriate Waste Management	Spill to Land	Harm to Animals
Controls	**1. Visual Assessment** • Assess tracks and easements and drive around identified noxious weeds if safe to do so. **2. Vehicle Clean Down** • Vehicles are to be cleaned down to remove all plant material and mud as per requirements of local jurisdictions.	**1. Water Suppression** • Assess the risk of dust leaving the work site and spray water to ensure third parties are not negatively impacted. **2. Access to Land** • Assess landholder requirements for entry and leave gates as found. **3. Notification** • Assess the work site for community impacts (odour and noise) and notify parties potentially impacted.	**1. Waste Disposal** • All waste to be removed from site. • Waste must not be buried on site. • The classification of all waste must be identified to ensure correct handling and disposal. **2. Liquid Waste Disposal** • Liquid waste must not be disposed of to storm water or waterways. • Liquid waste must not be disposed of to ground with the exception of muddy or grey water. • All liquid waste potentially containing oil or chemicals must be removed by a licensed contractor and not released to ground, storm water or waterways. **3. Prevention of Loss** • Secure loads of waste including soil when transporting. • Ensure waste storage does not allow for waste to be lost by wind or water.	**1. Spill Kit** • A spill kit suitable for the work must be in the immediate vicinity. **2. Block Waterway Entry Points** • Assess potential waterway entry points (including storm water) that a spill may access. • Prior to commencing work, apply temporary bunds to all identified entry points.	**1. Animal Control** • Do not touch, harm or kill animals including snakes. • Engage a licensed handler should animal or snake removal be required. • Contact the local council or wildlife assistance group to report injured animals.

Zinfra

Safety First

Environmental Management

Safe Work Method Statement Control Page

Working in Remote Areas

Zinfra

Safety First

Risk

Working in Remote Areas

Controls

1. Planned Journey

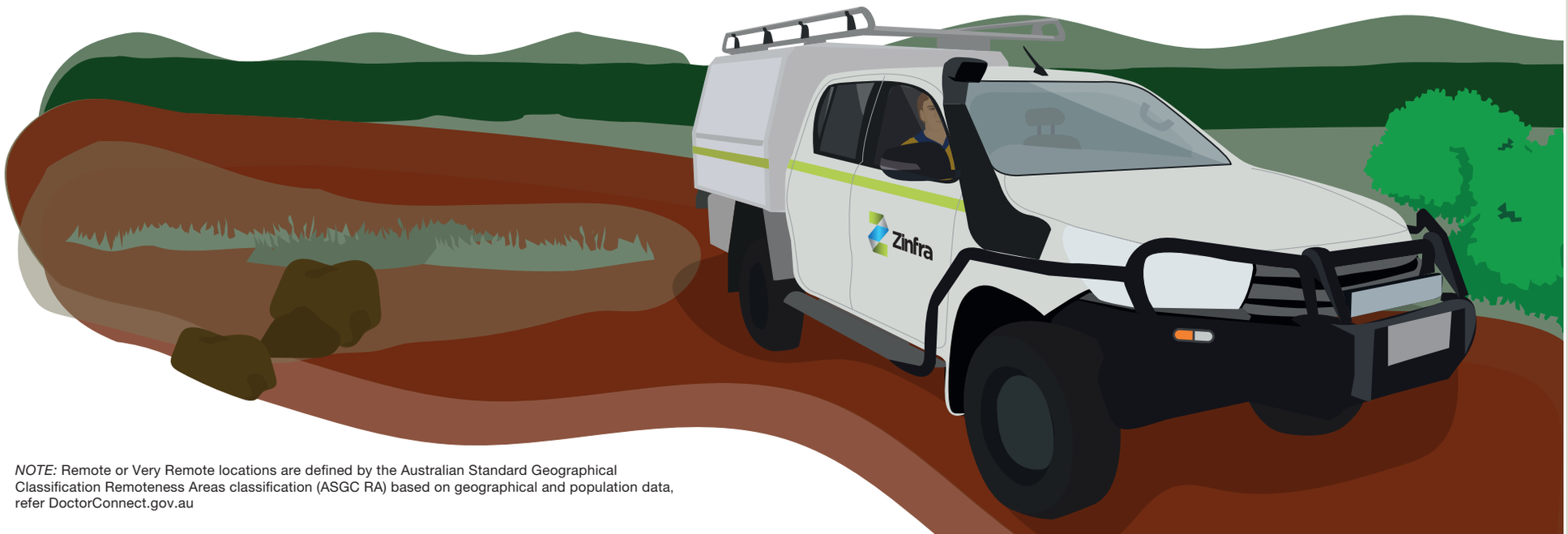
- Notify the depot or Control Room and inform them of the intended journey, proposed route and estimated time of arrival.
- Maintain contact with the depot or Control Room every two hours (or as agreed) until the journey is completed.
- Ensure vehicle is appropriately maintained and equipped prior to commencement of journey.

2. Communication Devices

- Assess the coverage of appropriate communication devices against the location of travel and works.
- Equip vehicles with devices to limit the time spent in communication black spots.

3. Maintain Contact

- When working alone, maintain contact with the depot or Control Room every two hours (or as agreed).
- Satellite telephones must be provided to field personnel travelling to and working at remote or very remote locations where mobile phone or Two-way Radio coverage is potentially poor.
- Certain high risk activities must not be conducted alone. These include, but are not limited to:
  - confined space entry;
  - working with or around High Risk Plant;
  - working at heights; or
  - any other place or situation where there is a high risk of injury;
  - vehicles fit for purpose, inspected and maintained.



NOTE: Remote or Very Remote locations are defined by the Australian Standard Geographical Classification Remoteness Areas classification (ASGC RA) based on geographical and population data, refer DoctorConnect.gov.au

Zinfra

Safety First

Working in Remote Areas

Safe Work Method Statement Control Page

Working on or Above Water

Zinfra

Safety First

Risk

Working on Water

1. Licensed to Operate Vessel

- Person in control of the vessel must hold a valid license.

2. Life Jackets

- Where a harness is not required for fall prevention, a personal flotation device must be worn.

3. Communication Devices

- Assess the coverage of communication devices against the location of travel and works.
- Equip vessels with devices to limit the time spent in communication black spots.

4. Emergency Response Plan

- An emergency response plan must be prepared and communicated to all work crew members.
- The resources and equipment required to rescue an individual from the water must be available in the vessel.

Working Above Water

1. Fall Prevention

- A site assessment must be conducted to ensure at least one of the following fall prevention controls is applied:
  - » EWP;
  - » scaffold;
  - » fall restraint;
  - » rope access system; or
  - » fall arrest.

2. Life Jackets

- Where a harness is not required for fall prevention, a personal flotation device must be worn.

3. Emergency Response Plan

- An emergency response plan must be prepared and communicated to all work crew members.
- The resources and equipment required to rescue an individual from the water must be available on site.

Controls

Zinfra

Safety First

Working on or Above Water

Safe Work Method Statement Control Page

Working near a Telecom Antenna

Zinfra

Safety First

Risk

Exposure to Electromagnetic Energy (EME)

Controls

1. Assess the Work Site

- Assess the work site and identify sources of EME (Telecommunication Towers, Antennas and Infrastructure).

2. Asset Owner Communication

- No work is to be conducted in proximity of potential EME without isolating or confirming the appropriate exclusion zone.

3. Exclusion Zone

- Establish an exclusion zone as per asset owner requirements.
- No personnel are to enter the exclusion zone.

Zinfra

Safety First

Working Near a Telecom Antenna

1. Job Details

When required to take action under the direction of Emergency Services, the Zinfra Emergency Manager or there is an imminent threat to public safety, the site is to be made safe prior to completing the SWMS. At a minimum, the SWMS must be prepared daily. For all work sites, the completed SWMS must accurately describe the risks and controls.

Job Description: _____

Scope/
WO Number: _____

_____

_____

_____

_____

_____

Location: _____

_____

Date: _____

Evacuation Point: _____

Prepared By: _____

Controls
Monitored By: _____

Plan/Permit Type	Reference

Job Description:

Date:

Zinfra

Zinfra Pty Ltd
ABN: 98 156 517 305
Lvl Level 16, 567 Collins St,
Melbourne, VIC, 3000

2. Identify the Risk

Identify the high risk work activities encountered (blue text) and select the risks that are present (blue check box). Confirm all controls will be implemented for the selected risks (green check box).

Flammable Atmosphere and Pressurised Gas: Gas Distribution Network

- ☐ Exposure to a Suspected Gaseous Environment: Planned Works
- ☐ Release of Stored Energy
- ☐ Exposure to Stray Current
- ☐ Live Uncontrolled Gas Release

☐ All controls will be implemented for the selected risks

Flammable Atmosphere and Pressurised Gas: Gas Transmission Network

- ☐ Working in a Potentially Gaseous Environment
- ☐ Conducting an Observation in a Potentially Gaseous Environment

☐ All controls will be implemented for the selected risks

Working with Electricity: Electricity Distribution Network

- ☐ Contact with Electricity when Working on or near Live Electricity
- ☐ Contact with Electricity when Working with Plant & Equipment
- ☐ Contact with Electricity when Working under Access Authority

☐ All controls will be implemented for the selected risks

Mobile Powered Plant and Excavation

- ☐ Plant Rollover
- ☐ Plant Striking Person
- ☐ Entangled or Crushed by Plant
- ☐ Engulfment
- ☐ Release of Stored Energy / Dropped Load
- ☐ Inadvertent Contact with an Underground Service
- ☐ Inadvertent Contact or Flash Over with Overhead Cables
- ☐ Falling into an Excavation

☐ All controls will be implemented for the selected risks

Work at Height

- ☐ Person Falling More than 1.5m

Controls implemented:
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

- ☐ Person Falling Less than 1.5m
- ☐ Struck by Dropped Object

☐ All controls will be implemented for the selected risks

Working on or near Road or Rail Corridors

- ☐ Struck by Vehicle: Conducting Work
- ☐ Struck by Train
- ☐ Struck by Vehicle: Conducting an Inspection
- ☐ Injury to Pedestrian

☐ All controls will be implemented for the selected risks

Asbestos

- ☐ Working with and Disposing of Asbestos
- ☐ Working near Asbestos

☐ All controls will be implemented for the selected risks

Confined Space Entry

- ☐ Entry into a Confined Space
- ☐ Engulfment
- ☐ Exposure to an Unsafe Atmosphere

☐ All controls will be implemented for the selected risks

2. Identify the Risk

Working with Electricity: Electrical Installations

- ☐ Working on Isolated Electrical Installations
- ☐ Working on or near Live Electrical Installations

☐ All controls will be implemented for the selected risks

Environmental Management

- ☐ Spread of Noxious Weeds
- ☐ Negative Community Impacts
- ☐ Inappropriate Waste Management
- ☐ Spill to Land
- ☐ Harm to Animals

☐ All controls will be implemented for the selected risks

Working in Remote Areas

- ☐ Working in Remote Areas

☐ All controls will be implemented for the selected risks

Working on or Above Water

- ☐ Working on Water
- ☐ Working Above Water

☐ All controls will be implemented for the selected risk

Working near a Telecom Antenna

- ☐ Exposure to Electromagnetic Energy (EME)

☐ All controls will be implemented for the selected risks

Control Deviation

Note any controls that cannot be implemented as documented:

Describe the agreed alternate safe work method:

Name of Team Leader or Manager who has agreed to the alternate safe work method:

3. Other Risks

What else could go wrong?	Further controls required?

I understand the risks associated with the work and the controls that must be implemented:

Name	Signature	Name	Signature	Name	Signature

Apprentice to mark name with brackets [First name Last name]
Has a copy of the SWMS been provided to the Principal Contractor prior to work commencing? Y ☐ N ☐ NA ☐

SWMS Supplementary Sheet

Job Description: _____ Date: _____

What else could go wrong?	Further controls required?

Name	Signature	Name	Signature	Name	Signature

Appendix C – Incident Management Procedure

Contents

1 Purpose

The purpose of this procedure is to define a common approach for incident management across Zinfra to implement G-HS-ST-00014 HSE Incident, Emergency and Crisis Management Standard to ensure that all incidents are adequately investigated so that actions can be taken to prevent their re-occurrence.

It is expected that individual Business Units and their Projects / Contracts procedures (including management plans and inductions) relating to incident management will, where necessary, be developed and amended to reflect the requirements set out in this group-wide procedural document.

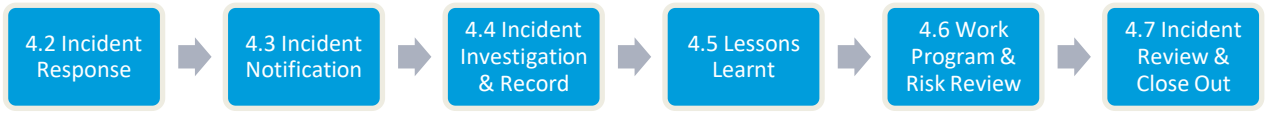
This procedure supports all crisis management plans and emergency response plans within Zinfra.

2 Scope

This procedure applies to all Zinfra employees and subcontractors and on all Zinfra managed work sites unless alternative arrangements have been formally agreed to with the client and documented accordingly.

This procedure applies to all events which cause or have the potential to cause injury, illness, damage or loss to company assets, damage to the environment or harm to the public. Incident types covered by this procedure include injury/illness, environment, motor vehicle, plant/equipment/asset damage, security and near miss.

The incident management process is summarised below.



The process is semi-automated i.e. parts of the process are managed electronically using ASPIRE. This proceduce provides some guidance on how to record and manage information with ASPIRE.

Any deviation from this procedure must be approved by Group HSE Manager.

3 Responsibilities

Role	Responsibility
Employees / Contractors	• Timely report incidents to their Manager/Supervisor and participate in investigations as required.
Zinfra On-Site Representative (Supervisor/Team Leader/Crew Leader)	• Manage emergency situations, ensuring employees report incidents, notifying incidents to relevant internal parties, completing incident investigation report and undertaking/participating in incident investigations.
Project Manager / Contract Manager	• Establish complementary processes to implement this procedure at Project / Contract level. • Participate in incident investigations when required, ensure identified controls are implemented within the timeframes documented and approving release of information in accordance with this procedure.

Business Unit Operation Manager	• Establish complementary processes to implement this procedure at Business Unit level. • Participate in incident investigations when required, ensure identified controls are implemented within the timeframes documented and approving release of information in accordance with this procedure.
Business Unit General Manager	• Accountable for the implementation of this procedure. • Provide competent resources to implement this procedure in their respective Business Unit, and approving release of information in accordance with this procedure.
Business Unit / Project / Contract HSEQ Manager	• Facilitate and monitor the application of this procedure. • Provide technical HSE advice and support to the process within their respective Business Units. • Report incidents to external authorities as required by legislation. • Keep the corporate section of G-HS-FM-00678 Incident Management Responsibility Matrix up to date.
Group HSE/ Environment and Sustainability (ES) Manager	• Facilitate and monitor the application of this procedure. • Review the investigation requirements of level 3 incidents or above and any investigation involving a notifiable incident. • Ensure the lead investigator has the appropriate capability and knowledge to lead major investigations and that the assembled investigation team consists of appropriate SMEs. • Review, approve and issue Significant Incident Alert and Lessons Learnt.
Group HSE Strategy, Systems and Analytics Manager	• Ensure compliance to this procedure is verified through the corporate/Group auditing programme. • Ensure this procedure remains current and relevant to the business operations.

Further details on responsibilities and timelines for incident management activities are summarised on G-HS-FM-00678 HSEQ Incident Management Responsibility Matrix. The above describe roles and not job titles. Depending on the organisation structure in some instances two or more of the above roles could be held by a single person, especially in small project / site.

4 Procedure

4.1 Develop Incident Management Responsibility Matrix

4.1.1 Develop Business Unit Incident Management Responsibility Matrix Template

Responsibility: Business Unit / Contract/Project HSEQ Manager

Each Business Unit is responsible to customise and keep current its respective section (including local authority notification / reporting requirements) of G-HS-FM-00678 Incident Management Responsibility Matrix; and document control accordingly. The relevant information on the matrix must be communicated during BU induction.

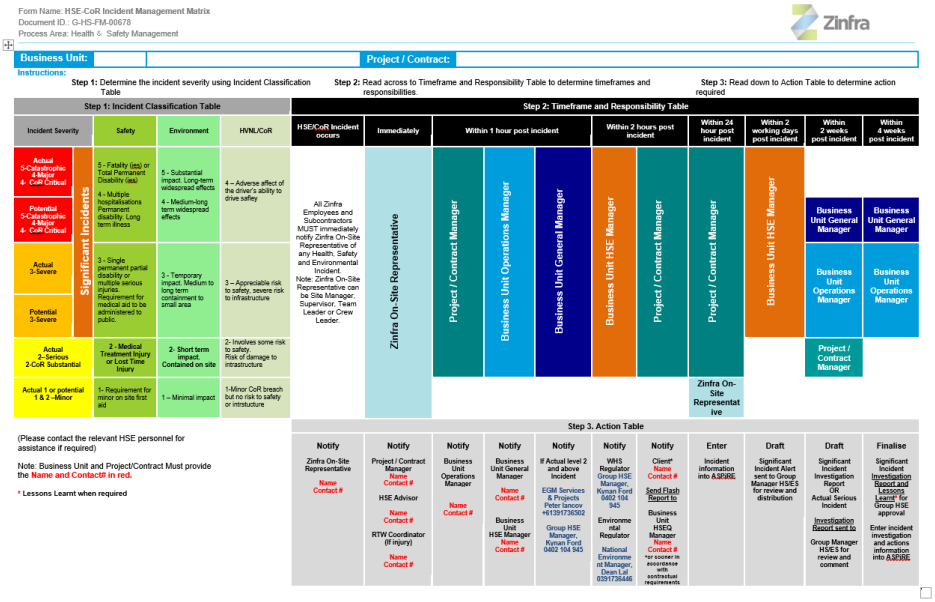
4.1.2 Develop Project / Contract / Site Incident Management Responsibility Matrix

Responsibility: Project / Contract Manager

Each Project/Contract/Site must customise and keep current its respective section (including client's requirements) of the matrix using the matrix customised by the relevant Business Unit; and displayed. The relevant information on the matrix must be communicated during site/project induction.

Client notification is required to be made within 4 hours of significant incidents or as specified in the contract agreement.

Note: For smaller projects from a regular client, it is advisable to develop one matrix per client for these projects.



4.2 Incident Response

Responsibility: Zinfra On-Site Representative

- Take immediate actions to minimise the damage and initiate recovery from the incident to contain the effects of the incident and/or make safe the plant, equipment or building where the incident occurred. This must also apply to incidents which have not resulted in actual damage, where the immediate action (where appropriate) must be aimed at mitigating the risk to personnel or the environment.
- Initiate the emergency response in accordance with Project / Site Specific Emergency Plans and document the emergency response actions.
- Secure and preserve the incident scene for the investigation. If the incident is notifiable to the authority (see definitions), the area where the incident has occurred must not be disturbed until an inspector (or equivalent) arrives at the site or prior to directions from the inspector.
- Record the scene: video, photos, sketches, measurements, and identify potential witnesses. Obtain witness statement, using G-HS-FM-00783 Witness Statement Form.
- For any incident which results in or has the potential for fatality or serious injury of members of the public, or attracts media attention, refer to the relevant Emergency and Crisis Management Plans.
- In the case of traumatic events, *Zinfra On-Site Representative* in consultation with the site Incident/ Emergency Management Team will ensure people who may be emotionally affected are given the earliest possible professional support.
- If there is a risk of a similar incident occurring, suspend work in the area where the incident has occurred, or similar work, until the investigation has been completed.
- Arrange to have 'show cause' Drug and Alcohol testing as applicable (refer to G-HS-PR-00031 Drug and Alcohol Procedure).
- Where an environment incident has occurred, initiate the emergency response in accordance with Project / Site Specific Emergency/Environmental Management Plans and document the emergency response actions.

4.3 Incident Notification

4.3.1 Determine Incident Severity

Responsibility: Zinfra Site HSE Representative

Zinfra Incident Management Process is a severity based process that means the process requirements are determined by the potential consequences / severity of the incident.

If an event has more than one incident type, the severity of each incident type may be different therefore the highest incident type potential consequences is taken to determine the incident severity.

Note: Consequences other than HSE should also be considered to determine the overall incident severity/impact: e.g. Reputational/Image and Regulatory/Compliance consequences per-Consequence Materiality Table -G-RM-MN-48001

Table 2: HSE Incident Severity Definitions

Incident Classification Table				
Incident Severity		**Safety**	**Environment**	**HVNL/CoR**
Actual **5 - Catastrophic** **4 - Major** **4 - CoR Critical**	**Significant Incidents**	5 - Fatality (ies) or Total Permanent Disability (ies) 4 - Multiple hospitalisations Permanent disability. Long term illness	5 - Substantial impact. Long-term widespread effects 4 - Medium-long term widespread effects	4 – Adverse affect of the driver's ability to drive safley
Potential **5 - Catastrophic** **4 - Major** **4 - CoR Critical**				
Actual **3 - Severe**		3 - Single permanent partial disability or multiple serious injuries. Requirement for medical aid to be administered to public.	3 - Temporary impact. Medium to long term containment to small area	3 – Appreciable risk to safety, severe risk to infrastructure
Potential **3 - Severe**				
Actual / Potential **2 - Serious** **2 - CoR Substantial**		2 - Medical Treatment Injury or Lost Time Injury	2- Short term impact. Contained on site	2- Involves some risk to safety. Risk of damage to intrastructure
Actual 1 / Potential **1 & 2 –Minor**		1- Requirement for minor on site first aid	1 - Minimal impact	1- Minor CoR breach but no risk to safety or intrstucture

Incident Classification Table from G-HS-PR-00678 Incident Management Matrix

Further information for classifying injuries i.e. first aid, medical treatment and lost time injury is provided in Appendix 1: Injury Classification Definitions.

For all **Significant Incidents (Potential/Actual Level 3/4/5),** Zinfra On-Site Representative must determine and confirm the incident severity as soon as practicable immediately after the incident in consultation with the relevant HSE Manager/Advisor.

Note: The potential severity of any incident is always higher than or equal to its actual severity.

4.3.2 Notification Requirements

Responsibility: Nominated personnel on the Incident Management Matrix

4.3.2.1 General Notification Requirements

- All incidents must be reported to *Zinfra On-Site Representative* immediately or as soon as practicable.
- Execute internal notification as per the Incident Management Matrix developed for the Project / Contract.
- All external notification / reporting must be undertaken in line with local regulatory requirements.
- For all Actual Significant Incidents, the Legal Counsel must be notified and sought advice on the use of legal and professional privilege where required.
- All initial notifications must be done verbally (in person or via telephone).
- All incidents must be recorded in ASPiRE within 24 hours.

Note: Recording details directly into the ASPiRE Incident Management System or sending an email without follow up in person or by phone DOES NOT constitute notification.

4.3.2.2 Specific Notification Requirements

Incident Flash Report

For all significant and actual serious incident, following the initial verbal notification as per the Incident Management Matrix, a written flash report is to be drafted using G-HS-FM-50235 Incident Flash Report Template, detailing the known facts at the time and provided within two (2) hours of the incident occurring to the, Business Unit HSE Manager for distribution to the Business Unit General Manager, HSE General Manager, Group HSE/ES Manager, and relevant BU Operational Managers.

Legal Professional Privilege

Prior to commencement of the investigation of Actual Significant Incidents occurring on sites that are under Zinfra control or that involve Zinfra people or Zinfra Contractor at other work sites, Legal Counsel is to be contacted for advice or to document any notes or emails in relation to the incident. The LegalTeam will provide advice as to if in-house legal privilege can be applied or if the external legal firms are required to be contacted. Until advice is obtained, legal privilege is to be assumed.

Legal Professional Privilege refers to the ability to prevent documentation pertaining to an event or legal case from discovery or release to other third parties. Situations where privilege may be sought are confidential communications for the dominant purpose of seeking, giving or receiving legal advice; or use in anticipated litigation or like proceedings. On incident management, this primarily applies to documents which are generated for the sole purpose of obtaining legal advice. Documentation (emails, incident investigation reports etc.) should only be created in relation to the incident under the direction of a legal professional.

Notification to Office of the Federal Safety Commissioner

Zinfra is an accredited contractor with the Office of the Federal Safety Commissioner (OFSC) and applies to most construction projects within the Project and Services Business. An OFSC Incident report must be completed

Notification to the OFSC is made by the Group HSE Manager or delegate in consultation with the Incident Manager.

OFSC Definition and Reporting Guidance Table

	Dangerous Occurrence	Medical Treated Injury (MTI)	Lost Time Injury (LTI)	Fatality

What kind of incident is it?	An incident where no person is injured, but could have been injured, resulting in serious personal injury (which requires a week or more away from work), incapacity or death. Only Dangerous Occurrences that are required to be reported under the relevant WHS legislation in the jurisdiction the project is being undertaken are required to be reported to the OFSC.	A work-related occurrence that results in treatment by, or under the order of, a qualified medical practitioner, or any injury that could be considered as being one that would normally be treated by a medical practitioner but does not result in the loss of a full day/shift.	A work-related occurrence that results in a permanent disability or injury resulting in time lost from work of one day/shift or more.	A work-related occurrence that results directly or indirectly in the death of a person (including deaths due to natural causes that occur on the project site).
Do I need to report them for Scheme projects?	If notifiable to the local jurisdiction report to OFSC within 48 hours. Those not notifiable to the jurisdiction do NOT need to be reported to the OFSC.	If notifiable to the local jurisdiction report to OFSC within 48 hours. Otherwise report within 3 weeks.	If notifiable to the local jurisdiction report to OFSC within 48 hours, otherwise report to the OFSC within 3 weeks.	Phone OFSC immediately on 1800652 500, provide report to OFSC within 48 hours.
Do I need to report them for non-Scheme projects?	Do NOT need to be reported to the OFSC.	Do NOT need to be reported to the OFSC.	Only report to OFSC for non-Scheme projects valued over $4 million. If notifiable to the local jurisdiction report to OFSC within 48 hours, otherwise report to the OFSC within 3 weeks.	Phone OFSC immediately on 1800 652 500, provide report to OFSC within 48 hours.
Delayed reporting to the OFSC may affect the risk rating of your company				

Notify Zinfra Board

In the event of an Actual Level 3/4/5 Incident, the Managing Director (MD) will advise the Zinfra Board. A report will be provided in a timely manner to the Board of Directors by the MD.

4.3.3 Work Suspension

Responsibility: Managing Director

In the event of an Actual Significant Incident, where there is a risk of a similar incident occurring on the incident site or other Zinfra site(s), the Managing Director in consultation with Group HSE Manager and General Manager HSE & BE may suspend work on the site(s) until the risk is mitigated to an acceptable level.

4.3.4 Media Enquiries

No Zinfra personnel or subcontractor is authorised to make public comment on behalf of the company without explicit approval from The Zinfra Managing Director.

All Zinfra personnel and subcontractors with knowledge of an incident must refrain from providing comment or information in any form to media outlets, including social media formats.

All media outlets or others seeking comment must be directed to the Zinfra Marketing and Communications Manager. The relevant supervisor and/or manager should be notified of the enquiry.

4.3.5 Significant Incident Alert (SIA)

Responsibility: Business Unit / Contract / Project HSE Manager

An initial draft Significant Incident Alert is to be developed by the BU HSEQ Manager with assistance from the relevant BU Operations Manager within two (2) working days of the incident occurring.

This draft Incident Alert must be sent to the Group HSE/ES Manager for review, and company-wide distribution within five (5) working days of the incident occurring.

The G-HS-FM-00782 Significant Incident Alert will contain a brief description of the incident, details of any injury or damage and any contributing factor (subject to investigation results) with any immediate action that can be noted to minimise the risk of a reoccurrence.

The purpose of the Incident Alert is to provide initial information on the incident to a range of internal stakeholders. This is of particular importance if the circumstances of the incident warrant some immediate action by people doing similar work.

4.4 Incident Investigation

Responsibility: Nominated Investigator

All reported incidents will be analysed to determine the appropriate investigation method to be applied based on the risk ranking of the event. This process will be subject to Group HSE / ES Manager evaluation and in consultation with the Incident Owner/Manager.

4.4.1 Investigation Methodology, Responsibility and Participants

Responsibility: Investigation Responsible Manager

All incident investigations must commence as soon as practicable after the incident (within 24hrs of the event occurring).The type of investigation required and those responsible for coordinating, conducting and participating in the investigation is dependent of the potential severity rating of the incident. The requirements are summarised in the table below.

Table 3: Investigation Requirements

Severity		Methodology	Incident Manager	Participants
Actual Level 1	**Minor**	Five Why's as per ASPiRE process.	*Zinfra Group On-Site Representative*	*Zinfra Group On-Site Representative* in consultation with project/contract HSE advisor determines who is to coordinate and participate.
Potential / Actual Level 2	**Serious**	ICAM investigation methodology	Project/Contract Manager	Project/Contract Manager in consultation with BU HSE Manager determines who is to coordinate and participate.
Potential Level 3	**Significant**	ICAM Mandatory	Operations Manager	Operations Manager in consultation with BU HSE Manager determines who is to lead, coordinate and participate.
Actual Level 3	**Significant**	ICAM Mandatory	Operations Manager	Operations Manager in consultation with Group BU HSE Manager determines who is to lead, coordinate and participate.
Potential / Actual Level 4/5	**Significant**	ICAM Mandatory	BU General Manager	BU General Manager in consultation with General Manager HSE nominates lead investigator and determine appropriate investigation team participants.

4.4.2 Investigation Team Requirements for Level 2 and Above

A suitable investigation team must be formed dependent on the level and nature of the incident. The investigation team requirements are:

- At least one member of the investigation team must have completed ICAM Basic Investigator training or equivalent;
- Investigation team leaders for Significant Incidents must have completed ICAM Lead Investigator training ;
- Investigation team leaders for Actual Level 3/4/5 Incidents must be independent of the project;
- Investigation team leaders for Actual Level 3/4/5 incidents may be external to Zinfra; and
- Subject matter experts must be considered for all Significant Incidents.

4.4.3 Identify Corrective Actions

Each contributing factor must have at least one corrective action, which should be:

- Actionable - is it clear what to do?
- Achievable – is it feasible to complete the action in a timely fashion?
- Appropriate - does it address the cause rather than the condition?
- Agreed - do we all support this?

All actions arising from an incident investigation need to have a clear link to the findings of the incident and be appropriate to address the contributing factor.

4.4.4 Prepare Investigation Report

Responsibility: Investigation Responsible Manager

For all potential and actual significant and serious incidents.

A draft report, using the appropriate investigation report template, must be prepared by the Lead Investigator/Team in consultation with the relevant HSE Manager. An interim review of the draft report is to be made by the Investigation Responsible Manager and relevant HSE/ES Manager before the report is to be finalised (see Table 3).

G-HS-FM-00163 Significant Incident Investigation Report Template

G-HS-FM-50726 Serious Incident Investigation Report Template

Where further investigation fact-finding, root cause analysis and consultation is required, the Investigation Team may request a reasonable time extension, in writing, to the relevant HSE/ES Manager and Incident Manager (see Table 3) to finalise the investigation report.

Draft reports can only be distributed outside of the investigation team with the consent from the Investigation Manager and Group HSE / ES Manager.

The final report is to be reviewed and approved by the Incident Manager, BU HSEQ Manager and Group HSE /ES Manager accordingly to the incident severity level.

For all actual minor incidents

A Five Why's report available directly in ASPiRE shall be completed if deemed appropriate after consultation with the BU HSEQ Manager.

All report must be finalised within four(4) weeks (20 working days) of the initial investigation.

Client/Contract Requirements

Potential Client HSE contractual requirement and schedule for incident reporting and investigation report timeframe should be considered and, where required, consult with the Incident/Contract Manager, HSE Manager and Client representatives.

4.4.4.1 Reporting to Regulatory Authorities and Client

Any reports being provided to a regulator or authority must be reviewed by Group Health and Safety or Environment and Sustainability Manager before they are issued.

Any reports being provided to a Client on request must be reviewed by the BU HSE Manager before they are issued.

4.4.5 Investigation Records

Responsibility: Business Unit / Project HSE Manager

Records of notifiable incidents are required by law to be kept for a minimum of 5 years.

All reports must be uploaded into ASPIRE for future reference. Where the investigation is sensitive in nature then records can be managed on file with the approval of the Group HSE/ES Manager and GM HSE and BE.

Where health monitoring is required as part of the response to an incident, health monitoring records must be kept for at least 30 years (or as specified by the local legislative requirements) after the record is made even if the worker no longer works at Zinfra. For asbestos health monitoring records must be kept for at least 40 years, due to the long period of time it can take for asbestos-related disorders to develop.

4.4.6 Action Recording

Responsibility: Investigation Responsible Manager (see Table 3)

In accordance with G-QM-PR-00571 Manage Non-Conformance and Actions Procedure, all agreed corrective actions, timeframes and assigned owners must be recorded in ASPIRE. In the situation where work is required to be completed by an external party such as a subcontractor or supplier, the corrective action must be allocated to a Zinfra employee who will be responsible for liaising with the external party to ensure the work is completed and the results are documented within ASPIRE.

4.4.7 Action Monitoring and Close Out

Responsibility: Business Unit / Contract/ Project HSE Manager

As corrective actions are completed, the relevant details and action status must be updated on the Incident record within ASPIRE until all corrective actions are closed out.

Evidence of action closeout must be uploaded in ASPiRE

All outstanding actions must be tracked to identify overdue actions and to prompt the action owners to complete and close them.

4.4.8 Safety Non-Negotiables Non-Conformance

During the investigation of a significant incident, individual / team actions contributing to the incident should be reviewed to decide whether personnel have failed to comply with Zinfra's Safety Non-Negotiables.

The requirements stipulated within Zinfra's Safety Non-Negotiables are considered life–saving control measures that must be implemented by all personnel. Any breach or failure to implement these controls is considered a significant incident.

To ensure the individuals involvement is assessed in a clear, fair and consistent manner, the HSEQ Fair Treatment Procedure G-HS-PR-51042 is to be used.

The HSEQ Fair Treatment Process is provided in Appendix 2.

4.5 Issue Lessons Learnt

Responsibility: Business Unit / Contract/ Project HSE Manager

Lessons Learnt documents (G-HS-FM-00784 Lessons Learnt) is the format used to distribute information regarding an incident following the outcome of the incident investigation.

A Lessons Learnt document will contain a concise description of the Incident, details of the injury/illness and any damage to the environment, plant/equipment or assets. It will detail the identified contributing factors and the actions to be implemented to prevent a reoccurrence.

When the Group HSE / ES Manager determines the incident meets the requirement for a Lessons Learnt, a draft lessons learnt must accompany the draft incident report approved by the Investigation Responsible Manager (see Table 3) and the BU HSE Manager within two (2) weeks of the incident occurring and sent to the Group HSE /ES Manager for review. **The Lessons Learnt must be finalised within one (1) month of the incident occurring for distribution.**

The distribution of the Lesson Learnt to any external stakeholder is only permitted following consultation and approval by the BU HSE Manager.

4.6 Review Program/System of Work & HSE Risk Register

Responsibility: Operational Manager and or BU HSE Manager

Upon receiving a Lesson Learnt, a review of the respective BU/Site/Project program/system of work and the HSE risk registers must be conducted to ensure that all hazards or risks identified as a result of the incident investigation are documented. Existing controls must be reviewed and/or new controls must be identified, documented and implemented as required.

4.7 Incident Review and Close Out

Responsibility: Business Unit / Contract / Project HSE Manager

All open incidents must be regularly reviewed, and relevant stakeholders, including project/contract management and the HSE/WHS Committee are consulted to ensure timely completion of the corrective actions. As corrective actions are completed, the details on the ASPiRE record need to be updated. An incident remains open until the final action is completed and closed out.

All incidents must be completed and closed out within 90 days of the incident occurring, an extension of this timeframe may be requested in writing. It must be authorised by the Incident Manager in consultation with the Group HSE/ES Manager.

Monitoring Incident Actions

Incident progress is tracked through Business Objects Report. which produce the following reports:

- Incident information
- Investigation information
- Injury information
- Open action information

(http://launchpad.alinta.net.int:8080/BOE/BI)

4.7.1 MD Incident Investigation Presentation

At the Zinfra MDs discretion, an incident investigation presentation must be prepared, completed and be presented by BU GM (assisted by Project / Contract Manager and relevant HSE Manager). During this presentation, the BU GM will present the details of the incident and the investigation findings to the Zinfra MD.

4.8 Training Requirements

Responsibility: Business Unit / Project / Contract HSE Manager

Ongoing training is provided to all relevant personnel to sustain the implementation of this procedure.

5 Related Documents and Compliance Requirements

Documents, Standards and reference material associated with this document include:

Document Number/Ref	Document Title
G-HS-ST-00014	Incident, Emergency and Crisis Management Standard
G-HS-FM-00163	Significant Incident Investigation Report
G-HS-FM-50726	Serious Incident Investigation Report
G-HS-FM-00782	Significant Incident Alert
G-HS-FM-00784	Lessons Learnt
G-HS-FM-00678	HSEQ Incident Management Responsibility Matrix
G-QM-PR-00571	Manage Non-Conformance and Actions Procedure
G-HS-PR-00031	Drug and Alcohol
G-HS-PR-51042	HSEQ Fair Treatment Process Procedure
G-HS-PR-000783	Witness Statement Form
G-HS-FM-00803	HSE Incident Management Procedure Process Training Assessment
G-HS-FM-50158	Written Warning Notice – HSE
G-HS-FM-50235	Incident Flash Report
G-RM-MN-48001	Risk Management Framework
TP-00001	ASPiRE Reference Guide
TP-00003	ASPiRE Training - Incident Manager
TP-00006	ASPiRE Quick Guide for adding an Investigation
TP-00007	ASPiRE Quick Guide to enter incidents
TP-00008	ASPiRE Quick Guide to enter Injured Person Details
TP-00009	ASPiRE Quick Guide to raise, close or reject actions

6 Definitions

Term	Definition
ASPIRE	Means the electronic incident management database approved by Zinfra HSEQ.
BU	Means Business Unit.
ES	Means Environment and Sustainability
CoR	Means Chain Of Responsibility
GM	Means General Manager
HSE	Means Health, Safety and Environment
HS	Means Health and Safety
HVNL	Means Heavy Vehicle National Law

Term	Definition
ICAM	Means Incident Cause Analysis Method.
ICAM Lead Investigator	Means a person who has successfully completed the Incident Cause Analysis Method (ICAM) Lead Investigator Training Course and holds a Certificate of Attainment.
Incident	Means any event which causes, or has the potential to cause injury, illness, disease, damage or loss.
MD	Means Zinfra Managing Director.
Must	Means a mandatory requirement. Any non-conformance requires the relevant management documented approval.
Near Miss	A *near miss*, "close call", or "nearly a collision" is an unplanned event that has the potential to cause, but does not actually result in human injury, environmental or equipment damage, or an interruption to normal operation.
Office of the Federal Safety Commissioner (OFSC)	Means, subject to certain financial thresholds, only builders who are accredited under the OFSC Accreditation Scheme can enter into head contracts for building work that is funded directly or indirectly by the Australian Government. Zinfra is accredited under this scheme.
Regulatory Notifiable Incident	Means incidents defined as notifiable in the relevant State /Territory legislation.
Should	Means a guideline or recommendation whenever noncompliance with the specification is permissible.
Significant Incident	Means any incident, or near miss, that results in or has the potential to be Severe (Level 3), Major (Level 4) or Catastrophic (Level 5).
Specific Injury	Means an injury which is related to a specific work related incident.
Zinfra On-Site Representative	Means the person on a Zinfra managed work site that takes control in the event of an incident. This may be the Supervisor, Team Leader, Crew Leader or an alternative Zinfra employee or subcontractor who initiates incident response and takes control of the site following the incident.

7 Appendix 1 – Injury Classification Definitions

The determination of the severity of injuries should be based on the treating doctor's medical report, discussion with the injured employee and treating First Aid Officer. The determination is independent of who provided the treatment.

Severity of Injury	Description
Fatality	Incident results in the death of one or more persons
Lost Time Injury (LTI)	– A work-related injury or occupational illness that results in the loss of ONE or MORE COMPLETE SHIFTS any time after the day or shift on which the injury or illness occurred.

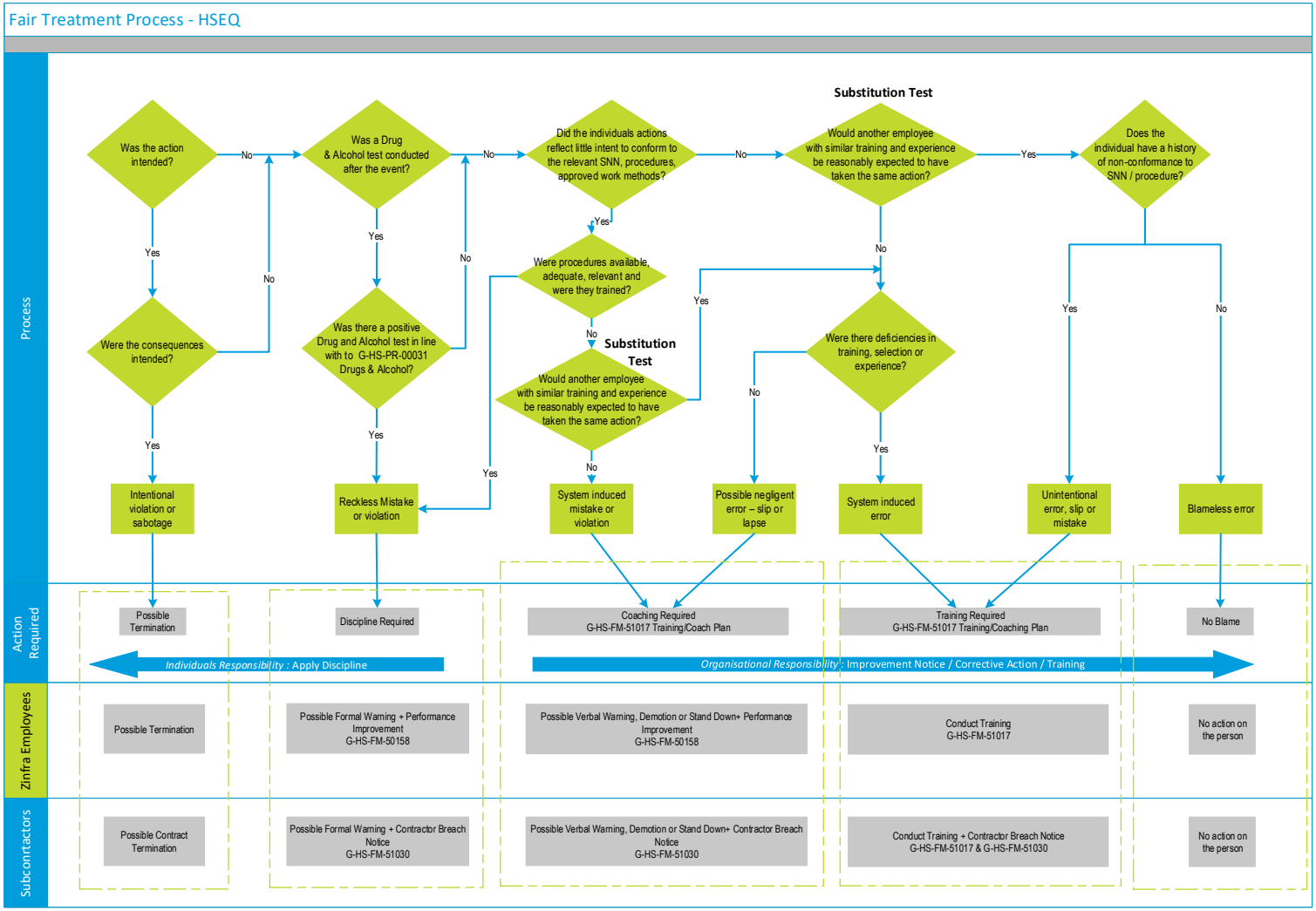
	– A Medical Practitioner must certify the injured person as being "TOTALLY UNFIT" to perform any duties for an injury to be classified as an LTI. – In the case of part-time workers, if a person is away from work for one whole shift, irrespective of the number of hours that constitute that shift, they must be considered to be an LTI. – An LTI is not recorded where the lost time is for travel to allow a medical assessment to be conducted and the person is assessed as fit to immediately resume normal or alternative duties. – Any injury which results in lost time, but is not deemed to be an LTI is to be reported to the Group Manager HSE for verification.
Medical Treatment Injury (MTI)	Injuries that do not result in lost work days but require medical treatment. Examples of injury types that are normally considered as MTIs: – Treatment of INFECTION – Application of ANTISEPTICS during second or subsequent visit to medical personnel – Treatment of SECOND OR THIRD DEGREE BURN(S) – Application of SUTURES (stitches) - Closure of a wound by other means (I.e. glue, strips or staples) by a medical practitioner is to be reported to the Group HSE Manager for verification of an MTI classification)Removal of FOREIGN BODIES EMBEDDED IN EYE – Removal of FOREIGN BODIES FROM WOUND; if procedure is COMPLICATED because of depth of embedment; size or location – Use of PRESCRIPTION MEDICATION (except a single dose administered on first visit for minor injury or precautionary/discomfort) – Use of hot or cold SOAKING THERAPY during second or subsequent visit to medical personnel – Use of hot or cold COMPRESS(ES) during second or subsequent visit to medical personnel – CUTTING AWAY DEAD SKIN (surgical debridement) – Application of HEAT THERAPY during second or subsequent visit to medical personnel – Use of WHIRLPOOL BATH THERAPY during second or subsequent visit to medical personnel – POSITIVE DIAGNOSTIC procedure (X-Ray, ECG, Laboratory analysis etc.) taken to confirm the existence of a DIAGNOSED condition – ADMISSION TO A HOSPITAL or equivalent medical facility FOR TREATMENT – Injuries which result in LOSS OF CONSCIOUSNESS or diagnosed CONCUSSION – Surgical treatment of bruises by DRAINAGE – Treatment of abrasions at GREATER THAN FULL SKIN DEPTH – Treatment (diagnosis and evaluation) by a Psychiatrist for mental illness or stress as a result of a workplace occurrence **Note:** The following on their own would not normally be considered medical treatment; – Administration of tetanus shot or boosters – Physiotherapy – Diagnostic procedure such as X-rays or laboratory analysis, unless they lead to further treatment

	– Referral to/treatment by a Psychiatrist where the diagnosis is not a result of a workplace occurrence
First Aid Injury (FAI)	An injury that requires first aid treatment only. The injured employee would typically return immediately to their normal duties. Such treatment is considered first aid even if it is administered by a Medical Practitioner. Examples of injury types normally considered FAIs: – Application of ANTISEPTICS during first visit to medical personnel – Treatment of FIRST DEGREE BURN(S) – Application of BUTTERFLY ADHESIVE DRESSING(S) or STERI STRIP(S) or Glue in lieu of sutures, by a medical practitioner – Closure of a wound using glue, strips or staples by a first responder or medical practitioner (as per MTI classification, this is to be reported to the Group HSE Manager for verification if an MTI classification – Application of BANDAGE(S) during any visit to medical personnel – Use of ELASTIC BANDAGE(S) during first visit to medical personnel – Removal of FOREIGN BODIES (NOT EMBEDDED) IN EYE if only irrigation is required – Removal of FOREIGN BODIES FROM WOUND; if procedure is UNCOMPLICATED and is, for example, by tweezers or other simple technique – Use of NON-PRESCRIPTION MEDICATION or administration of single dose of PRESCRIPTION MEDICATION on first visit for minor injury or discomfort or for diagnostic purposes (eye drops to dilate pupils) – Physiotherapy – Use of hot or cold SOAKING THERAPY on initial visit to medical personnel or removal of bandages by SOAKING – Use of hot or cold COMPRESS(ES) on initial visit to medical personnel – Application of HEAT THERAPY on initial visit to medical personnel – Application of OINTMENTS to abrasions to prevent drying or cracking – Use of WHIRLPOOL BATH THERAPY on initial visit to medical personnel – Diagnostic procedure such as X-ray or Laboratory analysis , unless they lead to positive diagnosis further treatment – NEGATIVE DIAGNOSTIC TEST (X-Ray, ECG etc.) taken to confirm the existence of a DIAGNOSED condition – OBSERVATION of injury during visit to medical personnel – TETANUS INJECTION or PRECAUTIONARY antibiotics in case of infection – One to Five PHYSIOTHERAPY OR CHIROPRACTIC TREATMENTS under the supervision of a treating medical practitioner, or any number of treatments where not under the supervision of a treating medical practitioner – One time ADMINISTRATION OF OXYGEN after exposure to toxic atmospheres – DRILLING OF FINGER OR TOE NAILS to relieve pressure or draining fluid from a blister – DRINKING FLUIDS for relief of heat stress
Outcome of Injury	**Description**
Restricted Work	Injuries that result in restrictions to work type or duration that the injured party can perform. Restriction in place for at least one ***full*** shift after the day on which the injury occurred, or after the injured party returns to work from Lost Time.

Normal Duties	Injuries that result in **no** restrictions to work type or duration, that the injured party can perform

8 Appendix 2 – HSEQ Fair Treatment Process

Refer to HSEQ Fair Treatment Procedure G-HS-PR-51042



9 Appendix 3 – Regulatory Notifiable Incident

The information below is based on the Safe Work Australia information for further specific local regulators requirement contact your local regulator – detail below

9.1 What is a 'notifiable incident'

- the death of a person
- a 'serious injury or illness', or
- a 'dangerous incident'

arising out of the conduct of a business or undertaking at a workplace.

'Notifiable incidents' may relate to any person—whether an employee, contractor or member of the public.

9.2 Serious injury or illness

Only the most serious health or safety incidents are notifiable, and only if they are work-related. They trigger requirements to preserve the incident site pending further direction from the regulator.

Serious injury or illness must be notified if the person requires any of the types of treatment in the following table:

Types of Treatments	Example
Immediate treatment as an in-patient in a hospital	Admission into a hospital as an in-patient for any duration, even if the stay is not overnight or longer. **It does not include:** • Out-patient treatment provided by the emergency section of a hospital (i.e. not requiring admission as an in-patient) Admission for corrective surgery which does not immediately follow the injury (e.g. to fix a fractured nose).
Immediate treatment for the amputation of any part of the body	Amputation of a limb such as arm or leg, body part such as hand, foot or the tip of a finger, toe, nose or ear.
Immediate treatment for a serious head injury	• Fractured skull, loss of consciousness, blood clot or bleeding in the brain, damage to the skull to the extent that it is likely to affect organ/face function. • Head injuries resulting in temporary or permanent amnesia. **It does not include:** A bump to the head resulting in a minor contusion or headache.
Immediate treatment for a serious eye injury	• Injury that results in or is likely to result in the loss of the eye or total or partial loss of vision. • Injury that involves an object penetrating the eye (for example metal fragment, wood chip). • Exposure of the eye to a substance which poses a risk of serious eye damage. **It does not include:** Eye exposure to a substance that merely causes irritation.

Types of Treatments	Example
Immediate treatment for a serious burn	A burn requiring intensive care or critical care which could require compression garment or a skin graft. **It does not include:** A burn that merely requires washing the wound and applying a dressing.
Immediate treatment for the separation of skin from an underlying tissue (such as de-gloving or scalping)	Separation of skin from an underlying tissue such that tendon, bone or muscles are exposed (de-gloving or scalping). **It does not include:** Minor lacerations.
Immediate treatment for a spinal injury	Injury to the cervical, thoracic, lumbar or sacral vertebrae including the discs and spinal cord. **It does not include:** Acute back strain.
Immediate treatment for the loss of a bodily function	Loss of consciousness, loss of movement of a limb or loss of the sense of smell, taste, sight or hearing, or loss of function of an internal organ. **It does not include:** • Mere fainting A sprain or strain.
Immediate treatment for serious lacerations	• Deep or extensive cuts that cause muscle, tendon, nerve or blood vessel damage or permanent impairment. • Deep puncture wounds. Tears of wounds to the flesh or tissues—this may include stitching to prevent loss of blood and/or other treatment to prevent loss of bodily function and/or infection.
Medical treatment within 48 hours of exposure to a substance	'Medical treatment' is treatment provided by a doctor. Exposure to a substance includes exposure to chemicals, airborne contaminants and exposure to human and/or animal blood and body substances.

9.3 Dangerous incidents including 'near misses'

Some types of work-related dangerous incidents must be notified even if no-one is injured.
The regulator must be notified of any incident in relation to a workplace that exposes any person to a serious risk resulting from an immediate or imminent exposure to:

- an uncontrolled escape, spillage or leakage of a substance
- an uncontrolled implosion, explosion or fire
- an uncontrolled escape of gas or steam
- an uncontrolled escape of a pressurised substance
- electric shock:
    - examples of electrical shock that are not notifiable
        - shock due to static electricity

- ‘extra low voltage’ shock (i.e. arising from electrical equipment less than or equal to 50V AC and less than or equal to 120V DC)
- defibrillators are used deliberately to shock a person for first aid or medical reasons

- examples of electrical shocks that are notifiable
  - minor shock resulting from direct contact with exposed live electrical parts (other than ‘extra low voltage’) including shock from capacitive discharge

- the fall or release from a height of any plant, substance or thing
- the collapse, overturning, failure or malfunction of, or damage to, any plant that is required to be design or item registered under the Work Health and Safety Regulations, for example a collapsing crane
- the collapse or partial collapse of a structure
- the collapse or failure of an excavation or of any shoring supporting an excavation
- the inrush of water, mud or gas in workings, in an underground excavation or tunnel, or
- the interruption of the main system of ventilation in an underground excavation or tunnel.

A dangerous incident includes both immediate serious risks to health or safety, and also a risk from an immediate exposure to a substance which is likely to create a serious risk to health or safety in the future, for example asbestos or hazardous chemicals.

9.4 Contact details for Workplace Health & Safety and Environment Regulators

Jurisdiction	Regulator	Telephone	Health and Safety Website	Environment Website
New South Wales	SafeWork NSW	13 10 50	safework.nsw.gov.au	www.epa.nsw.gov.au www.health.nsw.gov.au www.fire.nsw.gov.au www.dlg.nsw.gov.au
Victoria	WorkSafe Victoria	1800 136 089	worksafe.vic.gov.au	www.epa.vic.gov.au
Queensland	WorkSafe Queensland	1300 362 128	worksafe.qld.gov.au	www.ehp.qld.gov.au www.dlg.qld.gov.au www.daff.qld.gov.au
South Australia	SafeWork SA	1800 777 209	safework.sa.gov.au	www.epa.sa.gov.au
Western Australia	WorkSafe WA	1300 307 877	commerce.wa.gov.au/WorkSafe/	www.epa.wa.gov.au www.der.wa.gov.au
Australian Capital Territory	WorkSafe ACT	02 6207 3000	www.worksafe.act.gov.au	www.environment.act.gov.au
Tasmania	WorkSafe Tasmania	1300 366 322 (Tas) 03 6166 4600 (External)	worksafe.tas.gov.au	www.epa.tas.gov.au www.dpac.tas.gov.au
Northern Territory	NT WorkSafe	1800 019 115	worksafe.nt.gov.au	www.ntepa.nt.gov.au
Commonwealth	Comcare	1300 366 979	comcare.gov.au	https://www.environment.gov.au/

10 Document Control

Approval

The following table lists personnel who are responsible for authorising the document:

	Title	Name
Approver:	Group HSE Strategy, Systems & Analytics	Nicole Miller

Document History

The following table lists the changes made to this document:

Version	Date	Amended by	Comments
12	31/07/20	Julie Dunn	General wording changes and alignment of existing processes to provide clarity. Updated Section 3 – clarity and realignment to HSE role tile and function; 4.3.2 Table 2 Incident Severity; 4.3.2.2 OFSC notification; 4.4.4 whole section reworded for simplification and clarity, removed requirement for draft report to be approval within 2 weeks; 4.7 added monitoring incident actions information; 4.6 merged program/system and risk register review into one section; updated WHS regulators table.

Appendix D – Zinfra's HSEQ Change Management Procedure

Contents

1 Purpose

The purpose of this procedure is to ensure that changes introduced into Zinfra business operations have safety risk managed to As Low As Reasonably Practicable, environment impact minimised and product quality maintained. This procedure describes the process to initiate, risk assess, plan, control, approve and sign off changes.

The procedure should be used in conjunction with the Project / Contract HSE Risk Management (HSE Risk Register).

It is expected that individual Business Unit and their Projects / Contracts procedures (including management plans and inductions) relating to this procedure will, where necessary, be developed and amended to reflect the requirements set out in this group-wide procedure document.

2 Scope

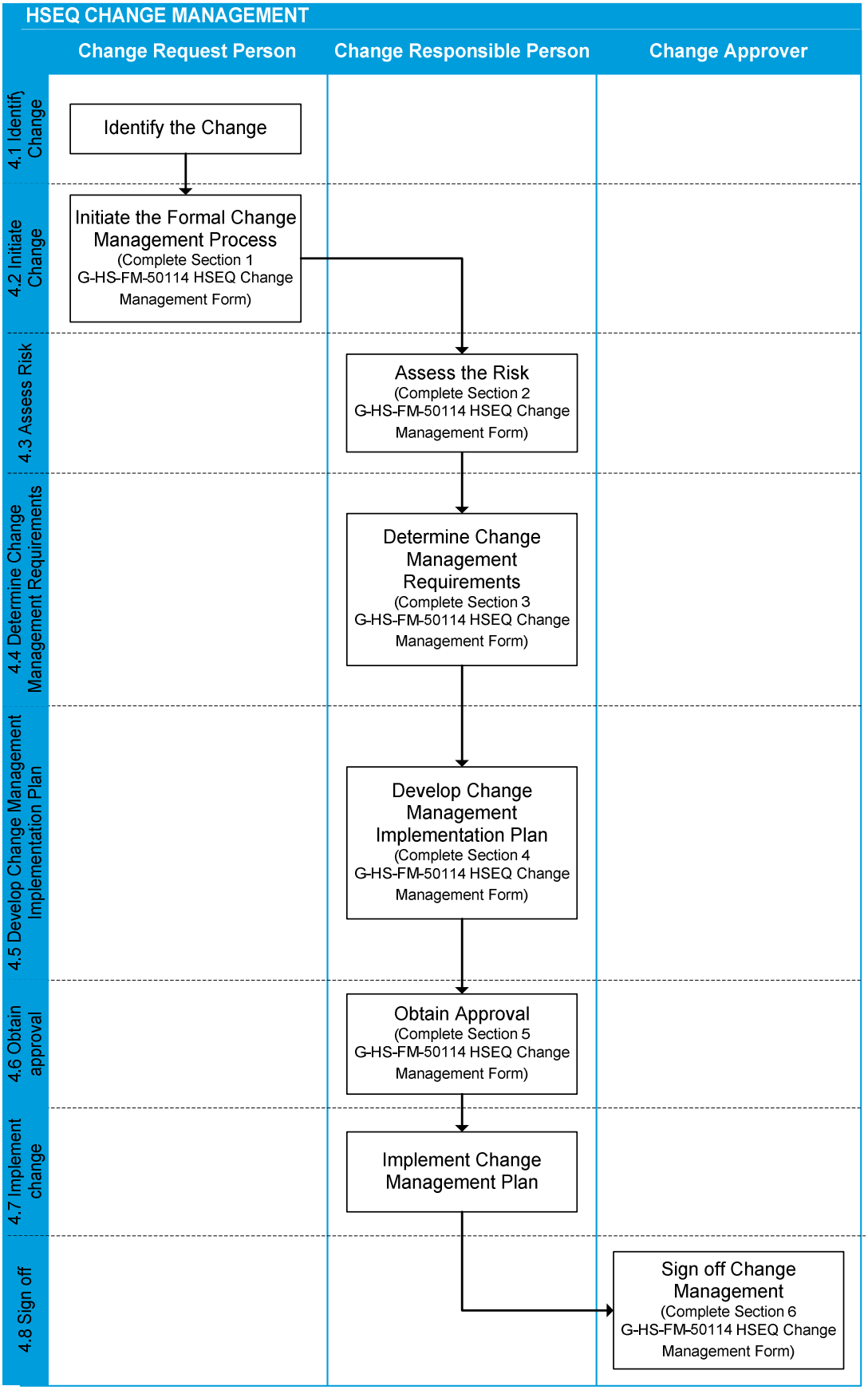
This document is intended to be adopted and applied consistently across Zinfra.

Any deviation from this procedure must be approved by Business Unit Operations Manager in consultation with the Business Unit / Project / Contract HSEQ Manager.

3 Responsibilities

Role	Accountability
Business Unit GM, Operations Manager	• Ensure this procedure is implemented in a timely manner in each respective Business Unit and that its effectiveness is monitored.
Group HSE Strategy, Systems and Analytics	• Ensure the currency and relevancy of this procedure to allow an effective application and implementation of HSEQ change management process at Zinfra. • Ensure practices are regularly audited to verify compliance to this procedure.
Project / Contract Manager	• Ensure the requirements of this procedure are implemented.

4 Process


HSEQ CHANGE MANAGEMENT
Change Request Person
Change Responsible Person
Change Approver
4.1 Identify Change
4.2 Initiate Change
4.3 Assess Risk
4.4 Determine Change Management Requirements
4.5 Develop Change Management Implementation Plan
4.6 Obtain approval
4.7 Implement change
4.8 Sign off
Identify the Change
Initiate the Formal Change Management Process (Complete Section 1 G-HS-FM-50114 HSEQ Change Management Form)
Assess the Risk (Complete Section 2 G-HS-FM-50114 HSEQ Change Management Form)
Determine Change Management Requirements (Complete Section 3 G-HS-FM-50114 HSEQ Change Management Form)
Develop Change Management Implementation Plan (Complete Section 4 G-HS-FM-50114 HSEQ Change Management Form)
Obtain Approval (Complete Section 5 G-HS-FM-50114 HSEQ Change Management Form)
Implement Change Management Plan
Sign off Change Management (Complete Section 6 G-HS-FM-50114 HSEQ Change Management Form)

4.1 Identify Change

Responsibility: Change Request Person

The person requesting the change must determine the scope and purpose of change in consultation with relevant stakeholders.

The formal change management process must be implemented if modifying the following:

- Process standards;
- HSEQ critical management plans or procedures;
- Communication strategy and protocol;
- Safety critical roles and responsibilities;
- Key personnel or organisational structure;
- Programmable electronic system software;
- Statutory, contractual, clients or company compliance requirements;
- A change to the system to accommodate circumstances that are isolated or happen rarely.

Change Is Not

- When the change already managed by a procedure.
- Change associated with day-to-day construction progress.
- A step in the evolutionary development of design.
- A modified work method to achieve the design intent.
- A variation to a contract to work that is within the scope of the project.

4.2 Initiate Change

Responsibility: Change Request Person

Initiate a formal request by completing Section 1 of the HSEQ Change Management Form. An overall responsible person for the proposed change i.e. Change Responsible Person must be identified and thoroughly briefed with the details of the change.

If required, the person requesting the change can direct the request to their direct supervisor, who must in turn identify and contact the person responsible for the change.

Note: The Change Request Person can also be Change Responsible Person.

4.3 Assess Risk

Responsibility: Change Responsible Person

An assessment must be undertaken to determine the risk associated with the proposed change. The assessment will be based on the determination of potential consequence using the Risk Matrix found in Section 2 of the HSEQ Change Management Form.

4.4 Determine Change Management Requirements

Responsibility: Change Responsible Person

With the potential consequence of the change identified, it is necessary to determine the actions required to effectively mitigate the risks associated with the change using the table available in Section 3 of the HSEQ Change Management Form to determine the following requirements:

- Risk Analysis
- Communication

- Approval
- Documentation

4.5 Develop Change Implementation Plan

Responsibility: Change Responsible Person

The elements that may influence or be affected by change include:

- People / Stakeholders / Interfaces
- Policies, Plan and/or Procedures (Work Practice)
- Legal and/or Client Compliances
- Plant, Equipment and/or Technology

The implementation plan for the change must be developed in Section 4 of the HSEQ Change Management Form, and the following steps need to be taken.

1. Section 4.1 Stakeholder Analysis, it is necessary to identify people / stakeholders impacted by the change and associated communication processes to ensure that they are timely notified and provided with an adequate level of information regarding the change.
2. Section 4.2 Change Management Actions, actions to adequately introduce the change are developed in consultation with the relevant people / stakeholders.
3. Section 4.3 Documentary Evidence, all documentary evidence required to execute the actions planned Section 4.2 need to be identified.

Note: Some changes may have impacts that go beyond the present stage of project / contract lifecycle; it therefore requires further analysis and planning.

4.5.1 Emergency or Temporary Change

Where a change is deemed to be immediately required, to protect persons, the environment or facility integrity, due to unplanned conditions, then in such circumstances, the decision for the change must be made on notice to the Change Responsible Person's supervisor and the approver of the change.

There must still be a basic requirement to complete an informal risk assessment or evaluation during the immediate emergency response, which must be consolidated later, as per the requirements of this procedure, if any significant change outcome is to be of a permanent nature.

4.6 Obtain Approval

Responsibility: Change Responsible Person

The completed HSEQ Change Management Form is submitted to the Change Approver for approval. The responsible Approver must complete Section 5 – Approval of the form.

A copy of HSEQ Change Management Form is to be submitted to the relevant HSEQ personnel for monitoring and follow up.

4.7 Implement Change

Responsibility: Change Responsible Person

Once approved, the Change Responsible Person must execute all communication actions, implement all actions and collect all documentary evidence in line with the change implementation plan detailed in Section 4 of the HSEQ Change Management Form. If there is any deviation from the plan, the Change Responsible Person must timely notify the Approver.

Upon completing introduction of a change, the Change Responsible Person must finalise the HSEQ Change Management Form and submit the form and associated documentary evidence to the original Change Approver for sign off.

4.8 Sign Off

Responsibility: Change Approver

Before signing off the HSEQ Change Management Form, the Change Approver must review the associated documentary evidence to ensure the change implementation plan has been executed effectively.

Upon securing sign off, the Change Responsible Person submits the HSEQ Change Management Form and associated documentary evidence to HSEQ Personnel for filing and document control.

4.9 Review and Monitor Change

Responsibility: HSEQ Personnel

The relevant HSEQ Personnel must register all approved changes on the HSEQ Change Management Register. A regular review of the register must be carried out to ensure the changes are adequately reviewed and monitored.

Some changes that modify the HSEQ risk profile of the operation, HSEQ Personnel must update the relevant HSEQ Risk Register, SWMS and procedure to reflect the changes.

5 Records

HSEQ Change Management Forms must be filed in line with the applicable document control procedure. The HSEQ Change Management Register must be regular reviewed and kept up to date to reflect the status of changes been / being introduced.

6 Related Documents and Compliance Requirements

6.1 Internal Documents

Document Number/Ref	Document Title
G-HS-FM-50114	HSEQ Change Management Form
G-HS-FM-50112	HSEQ Change Management Register
G-HS-PR-00733	Project / Contract HSE Risk Management (HSE Risk Register)

6.2 Compliance Requirements

Applicable	Document Title
ALL	AS/NZS ISO 31000Risk Management – Principles and guidelines
VIC	Occupational Health and Safety Act 2004
VIC	Occupational Health and Safety Regulations 2007
WA	Occupational Safety and Health Regulations 1996
NSW, QLD, ACT	Work Health and Safety Act 2011
NSW, QLD, ACT	Work Health and Safety Regulations 2017

Applicable	Document Title
SA, TAS	Work Health and Safety Act 2012
SA, TAS	Work Health and Safety Regulations 2012
TAS, NT, ACT, SA, NSW, QLD	How to manage work health and safety risks – Code of Practice 2011

7 Definitions

Term	Definition
Consequence	The outcome or impact of an event.
HSEQ	Health, Safety, Environment and Quality.
Must	A statement is mandatory.
Risk	The likelihood and Consequence of that injury or harm occurring.
Should	A recommendation.
SWMS	Safe Work Method Statement.

8 Document Control

Approval

The following table lists personnel who are responsible for authorising the document:

	Title	Name
Approver:	Group HSE Strategy, Systems and Analytics	Rose Pierce / Nicole Miller

Document History

The following table lists the changes made to this document:

Version	Date	Amended By	Comments
Note: Previous changes to this document has been captured electronically through the system version history.			
6	14/08/2020	Julie Dunn	Updated roles/responsibilities. Verified internal document references. Added document control section. Future review will cover related compliance requirements, which was not done in this update.

Appendix E – Commissioning HAZID Risk Register

Western Sydney Green Gas

Commissioning HAZID Risk Register and Close Out

Document Number: P2G-2099-RG-RM-006
Revision Number: 0
Revision Date: 4 March 2020

Jemena
bringing energy to life

Zinfra

An appropriate citation for this paper is:
WSGGP - Commissioning HAZID Risk Register and Close Out

Document Number: P2G-2099-RG-RM-006

Authorisation

Name	Job Title	Date
Reviewed by:		
David Hawks	HSE Business Partner – Gas Markets / Major Projects	25/02/2021
Rahul Dorairaj	HSE Business Partner – Gas Distribution	25/02/2021
Approved by:		
Jarrod Irving	Project Manager	26/02/2021

Rev No	Date	Description of changes	Author
A	12/02/2021	Issued prior to HAZID	Rahul Dorairaj
0	25/02/2021	Issued for use post HAZID	Rahul Dorairaj and David Hawks

Owning Functional Area

Business Function Owner:	Gas Distribution

Review Details

Review Period:	N/A - Commissioning Only
NEXT Review Due:	

Attendees

Name	Role
David Hawks	**HAZID Chair** - HSE Business Partner – Gas Markets / Major Projects
Rahul Dorairaj	HSE Business Partner – Gas Distribution
Frank Libri	Integration Manager
Jarrod Irving	Project Manager
Tom Breadon	Project Engineer
Mitchell Lowe	Project Engineer
Alistair Wardrope	Senior Engineer Renewable Gas
Nathan Tickle	Technical Officer
Paul Dixon	Technical Officer
Mick Arneill	Field Manager Transmission North
Adan Christian	Pipeline Operator/Technician
Andrew Hargrave	Wasco - Project Manager
Daniel Polityo	Wasco - Project Engineer
Nick Simonovski	ANT Snr Projects & Development Engineer
Aldo Pace	ANT Team Leader Project Management
Jason Dini	GPA - Senior Electrical Engineer

RISK MANAGEMENT GUIDE

Qualitative Risk Consequence Table

Rating	Description[1]			Operational	Health, Safety & Environment	Employee	Regulatory & Compliance	Brand / Reputation / Stakeholders
5 Catastrophic	Potential disastrous impact on SGSPAA strategies or operational activities. Widespread stakeholder concern / interest.	N/A	N/A	Loss of electricity supply to 2 Zone Substations >24 Hrs or >15% Customers (49,000) >24Hrs. Loss of gas supply to > 15% Customers (195,000). Business interruption for > 30 days (SGSPAA Assets).	1 or more fatalities (staff, contractors or member(s) of the public). Significant destruction of key internal asset or third party property. Harm to the natural environment and/or cultural heritage that cannot be remediated.[2]	Skill set / capability of >35% of business critical roles lost within a 6 month period	Major regulatory restrictions and/or govt. interventions. Possible loss of licence to operate. Frequent regulatory or policy violations / breaches. Major litigation, with a possibility of punitive damages. Significant fines, prosecutions and jail terms possible.	Sustained and hostile public campaign. Reputation impacted with majority of key stakeholders. Sustained and critical stakeholder criticism.
4 Major	Significant impact on SGSPAA strategies or operational activities. Significant stakeholder concern / interest.	N/A	N/A	Loss of electricity supply to > 2 % Customers (6,500) >24 Hrs. Loss of gas supply to > 1% Customers (13,000). Business interruption for 7 – 30 days (SGSPAA Assets).	Total permanent disability (staff or contractors). Multiple hospitalisations, permanent disability and/or life threatening injuries affecting member(s) of the public. Significant damage to internal assets or third party property. Harm to the natural environment and/or cultural heritage with remediation difficult (multi-year management).	Skill set / capability of 20 – 35% of business critical roles lost within a 6 month period	Regulatory investigations or govt. review. Some regulatory or policy violations / breaches. Litigation involving significant senior management time. Major fines or penalties and prosecutions possible.	Significant adverse public attention and/or heightened concern from stakeholders. Reputation impacted with significant number of stakeholders. Significant stakeholder criticism/negativity.
3 Severe	Moderate impact on SGSPAA strategies or operational activities. Moderate stakeholder concern / interest.	N/A	N/A	Loss of electricity supply > 1% Customers (3,200) > 24 Hrs. Loss of gas supply to > 0.1% Customers (1,300). Business interruption for 1 – 7 days (SGSPAA Assets).	Single permanent partial disability (staff or contractors). Medical aid required for member(s) of the public. Some loss of or damage to third party property. Harm to the natural environment and/or cultural heritage that can be remediated (<1 year management).	Skill set / capability of 10-20% of business critical roles lost within a 6 month period	Regulator requires formal explanations & remedial action plans. Fines or penalties from legal issues, breaches / non-compliances.	Persistent public scrutiny. Reputation impacted with some stakeholders. Some stakeholder concern/negativity.
2 Serious	No material impact on SGSPAA, issues are dealt with internally.	N/A	N/A	Loss of electricity supply to >1%Customers (3,200) > 6 Hrs. Loss of gas supply to > 100 Customers or any contract customer. Business interruption for 1 day (SGSPAA Assets).	Medical treatment injury or lost time injury (staff or contractors). On-site first aid to a small number of member(s) of the public, lost time. Harm to the natural environment and/or cultural heritage requiring minimal remediation (at the time of impact).	Skill set / capability of 5 – 10% of business critical roles lost within a 6 month period	Isolated regulatory or policy violations / breaches. Fines or penalties possible.	Sporadic, adverse media/public attention. Limited adverse reputational impact. Minor stakeholder complaints.
1 Minor	Negligible impact on SGSPAA, issues are routinely dealt with by operational areas.	N/A	N/A	Loss of electricity supply to <1,000 Customers up to 6 Hrs. Loss of gas supply to > 5 residential customers. Business interruption for a few hours (SGSPAA Assets).	Minimal impact on health & safety (staff, contractors or member(s) of the public). Harm to the natural environment and/or cultural heritage requiring no active remediation and/or able to self- remediate.	Skill set / capability of <5% of business critical roles lost within a 6 month period	General regulatory queries. No violations / breaches, fines or penalties.	Negligible media/public attention, reputational impact and/or little or no stakeholder interest.

Likelihood ratings & Risk Levels

1 Rare	2 Unlikely	3 Possible	4 Likely	5 Almost Certain
Event **may** occur only in exceptional circumstances	Event **could** occur at some time	Event **should** occur at some time	Event will **probably** occur in most circumstances	Event is **expected** to occur in most circumstances
• Improbable occurrence only in exceptional circumstances (i.e. may only occur in more than 10 years), or • < 5% probability of occurrence.	• Could occur at sometime within the next 10 years, or • 5% - 25% probability of occurrence	• Might occur at sometime within the next 5 years, or • 26% - 50% probability of occurrence.	• Will probably occur at sometime within the next 2 years, or • 51% - 75% probability of occurrence or • Has a history of occurrence or difficult to control due to external influences.	• Expected to occur once (or more) within 1 year, or • 75% probability of occurre+P18 • Has occurred recently and likely to occur again.nce, or

	Rare	Unlikely	Possible	Likely	Almost Certain
Catastrophic	Significant	High	Extreme	Extreme	Extreme
Major	Moderate	Significant	High	Extreme	Extreme
Severe	Moderate	Moderate	Significant	High	Extreme
Serious	Low	Low	Moderate	Significant	High
Minor	Low	Low	Moderate	Moderate	Moderate

SGSPAA - SGSP (Australia) Assets Pty Ltd (SGSPAA) owner of Jemena and Zinfra

1 "Consequence description" is likely to over-ride the defined loss limits, where loss can occur unexpectedly over a short time.

2 Relevant considerations include harm to the environment and/or cultural heritage such that they could not be reinstated or returned to the natural or comparable state (e.g., the loss of biodiversity or the destruction/desecration of cultural heritage items).

Control Effectiveness Rating

Rating	Description	Level of Concern
Strong	**A fully effective risk management and internal control system** is noted with respect to almost all major risk factors. There exists a comprehensive system of controls that protects against losses from transactional, operational / IT risks, ensures accurate financial reporting and compliance with regulatory requirements. The level of adherence to established systems, controls and procedures is very high and staff members are fully aware of their responsibilities with regard to controls.	With this rating, no Management concerns are evident.
Adequate	**The overall risk management and internal control system is considered adequate**, with some areas lacking or not satisfactorily addressed. Some control issues may be noted, but Management is aware of them and has taken steps to address them; or compensating controls exist to reduce the level of risk within acceptable levels. The audit entity is able to cope with existing and foreseeable exposures and risk/control-related weaknesses and any such weaknesses will not have a material effect on the organisation.	With this rating, only routine Management attention is required.
Fair	**The risk management and internal control system has significant weaknesses** and generally fails to identify and control significant risk exposures or address significant control issues in many respects. Management may be aware of the control weaknesses, but is ineffective in addressing them. Some major issues and control deficiencies are noted in the audit which has resulted in, or could result in material exposure if they are not adequately addressed promptly.	Borderline rating; calls for prompt Management attention.
Poor	**An ineffective risk management and internal control system in almost every respect**. Management is not aware of the risk implication / control deficiencies and	An adverse rating and calls for immediate Management attention.

Risk Prioritisation, Escalation and Reporting Requirements

Risk Rating*	Suggested Action	Suggested Timing	Monitoring & Reporting*
Extreme	Requires immediate action. Highest priority to treat risk. Senior level monitoring.	Action plans prepared and normally implemented within 1 month. Status of risk should be monitored monthly.	**SGSPAA:** Board / RHSEC / ERMC / LT **Functional Group / Zinfra:** Managing Director / Executive General Manager
High	Requires immediate attention – must manage with senior level monitoring. Includes RHSEC and ERMC / LT oversight of Unlikely Likelihood, Catastrophic Consequence Events.	Action plans prepared and normally implemented within 3 months. Status of risk should be monitored monthly.	**SGSPAA:** RHSEC** / ERMC / LT **Functional Group:(Jemena) / Zinfra:** EGM / General Managers
Significant	Requires Management attention with a degree of priority. Includes ERMC / LT oversight of Rare Likelihood, Catastrophic Consequence Events. High level monitoring.	Action plans prepared and normally implemented within 6 months. Status of risk should be monitored every 6 months.	**SGSPAA:** RHSEC** / ERMC** / LT **Functional Group (Jemena) / Zinfra:** EGM / General Managers
Moderate	Requires routine to periodic monitoring.	Action plans prepared and normally implemented within 6 – 12 months (where the benefits outweigh the costs). Status of risk should be monitored at least every 6 months.	**SGSPAA / Functional Group (Jemena) / Zinfra:** General Managers Escalate BU risk to the EGM if the risk consequence or likelihood is increasing.
Low	"Business as usual" - should not require much attention but should be reviewed at least annually. Managed by routine policies and procedures.	Ongoing control as part of a management system. Risk Facilitators to maintain register of Low risks and reassess annually.	**SGSPAA / Functional Group (Jemena) / Zinfra:** Managers Escalate FG / Zinfra risk to the GM if the risk consequence or likelihood is increasing.

Note *: Risk oversight requirements are based on the Residual risk rating, i.e. after existing controls have been evaluated and assigned.
**: RHSEC and ERMC reporting only for Rare and Unlikely Likelihood, Catastrophic Consequence Events. However, the RHSEC may escalate any risk matters to the Board if the RHSEC considers it appropriate.

WSGG Project

Commissioning HAZID Register - Comments and Actions

Line #	HAZID Comments / Actions	Action by	Required Close Out Action	Date Required	Comments	Status	Responsible Party	Close-Out Comments
3.02	Operational: Concerns on non-qualified persons accessing HV transformer including LV side	Frank Libri	• Specific HV locks • Note to be included in work instructions not to access HV Transformer LV side	30/04/2021		On-track	Jemena	
3.03	Operational: Clarity required on what start/stop capability control room will have during maintenance	Mitchell Lowe	Investigate what remote start/stop capability's control room have	26/03/2021		On-track	Jemena	
3.12	Commissioning: New technology to Jemena portfolio, leverage of vendor to better understand risk and risk controls	Mitchell Lowe	Commissioning procedures and package risk assessment to be supplied from electrolyser vendor. Alister to review with GPA once received	26/03/2021		On-track	Vendor/Jemena/GPA	
3.14	Commissioning: New technology to Jemena portfolio, leverage of vendor to better understand risk and risk controls	Mitchell Lowe	Commissioning procedures and package risk assessment to be supplied from microturbine vendor. Alister to review with GPA once received	26/03/2021		On-track	Vendor/Jemena/GPA	
3.16	Commissioning: New technology to Jemena portfolio, leverage of vendor to better understand risk and risk controls	Mitchell Lowe	Commissioning procedures and package risk assessment to be supplied from fuel cell vendor. Alister to review with GPA once received	26/03/2021		On-track	Vendor/Jemena/GPA	
N/A	Pigging of pipeline not covered in Wasco risk register	Andrew Hargrave	Element to be consultatively accessed and added to risk register	N/A	Updated risk register provided	Completed	Wasco	

WSGG Project
Commissioning HAZID Register - General

Effectiveness of Controls

Residual Control Effectiveness			
Weak	Fair	Adequate	Strong
0	0	0	0

Residual Risk Ranking					
	Extreme	High	Significant	Moderate	Low
Residual	0	0	0	0	0

Note: Existing controls assumed to include standard items such as PPE, Competent Operators, PTW / LOTO System, SWMS, Signage / Label

Item #	Project SOW	Activity/Task	Hazard/Risk	Impact	Inherent (Untreated Risk)			Existing/Planned controls	Residual (Treated) Risk			Control Effectiveness	SFAIRP (Y/N)	Additional Actions	Action Responsibility	Due Date	Status	Target Risk			Comments & Assumptions
					Consequence	Likelihood	Risk		Consequence	Likelihood	Risk							Consequence	Likelihood	Risk	
	General	Generic Controls	Where highlighted in green, the corresponding hazard/risk is considered in the Wasco Risk Register, refer sheets 4 for details.					The following generic controls are assumed to be available as Existing Controls for all Activity/Tasks, they are listed here so that they need not be listed in all activities assessed: o Permit to Work Procedure (PTW) o Commissioning work areas bunted off via blue flagging o Commissioning Work Instructions (CWI/WI) o Commissioning Inductions - General induction/PTW training/IOG Induction o Inspection and Test Records (ITR) o Lock Out & Tag Out Procedure (LOTO) o Boundary Isolation Procedure o Notice of Energisation Procedure (NOE) o Competent Personnel o Safe Work Method Statement (SWMS) o Safety Data Sheets (SDS) o Pre-Start Meeting o Toolbox Meetings o Daily Supervisors/Permit Planning Meeting o Emergency Response Procedure o Radio communications o Mandatory PPE (not including task specific in excess of the site mandatory PPE)													
1.01	Logistics	Coordinating the transportation of good (including transportation procured goods)	Refer Wasco Risk Register/HazID																		
1.02	Mobilisation to Site	Transport people to site by road	Refer Wasco Risk Register/HazID																		
1.03	Mobilisation to Site	Personnel not fit for work (in sound medical condition to perform work duties)	Refer Wasco Risk Register/HazID																		
1.04	Mobilisation to Site	Mobile plant and Equipment	Refer Wasco Risk Register/HazID																		
1.05	General	Driving	Refer Wasco Risk Register/HazID																		
1.06	General	Unloading/Loading plant, equipment or materials from trucks/transport.	Refer Wasco Risk Register/HazID																		
1.07	General	Faulty Plant Not fit for purpose Poor mechanical condition	Refer Wasco Risk Register/HazID																		
1.08	General	Working in hot envioronment	Refer Wasco Risk Register/HazID																		
1.09	General	Extreme weather event	Refer Wasco Risk Register/HazID																		
1.10	General	Fitness for work	Refer Wasco Risk Register/HazID																		
1.11	General	Fatigue	Refer Wasco Risk Register/HazID																		
1.12	General	Poor Communication /simops	Refer Wasco Risk Register/HazID																		
1.13	General	Emergency Response	Refer Wasco Risk Register/HazID																		
1.14	General	HRCW (High Risk Construction Work due to "Work in an area with movement of powered plant")	Refer Wasco Risk Register/HazID																		
1.15	General	Working at heights	Refer Wasco Risk Register/HazID																		
1.16	General	Slips / trips and falls	Refer Wasco Risk Register/HazID																		
1.17	General	Noise	Refer Wasco Risk Register/HazID																		
1.18	General	construction waste disposal	Refer Wasco Risk Register/HazID																		
1.19	General	Craneage/lifting	Refer Wasco Risk Register/HazID																		
1.20	General	manual handling	Refer Wasco Risk Register/HazID																		
1.21	General	Use of electrically powered equipment/power tools	Refer Wasco Risk Register/HazID																		
1.22	General	Handling Dangerous Goods or Hazardous Substances	Refer Wasco Risk Register/HazID																		
1.23	General	Use of Compressed air (Compressors)and air tools	Refer Wasco Risk Register/HazID																		
1.24	Earth works and Civil	Interaction of plant or equipment with third party property or personnel.	Refer Wasco Risk Register/HazID																		
1.25	Earth works and Civil	Disturbance/ work outside of defined work area (co-ords)	Refer Wasco Risk Register/HazID																		
1.26	Earth works and Civil	Work near Third Party Assets	Refer Wasco Risk Register/HazID																		
1.27	Earth works and Civil	Inadequate sediment and erosion control	Refer Wasco Risk Register/HazID																		
1.28	Earth works and Civil	Formwork/ concreting	Refer Wasco Risk Register/HazID																		
1.29	Earth works and Civil	Use of concrete pumps/trucks	Refer Wasco Risk Register/HazID																		
1.30	Earth works and Civil	Concrete works Concrete truck/ pump wash out	Refer Wasco Risk Register/HazID																		
1.31	Earth works and Civil	Concrete works Concrete delivery to site	Refer Wasco Risk Register/HazID																		
1.32	Earth works and Civil	Trench excavation, backfill	Refer Wasco Risk Register/HazID																		
1.33	Earth works and Civil	Installation Pre Cast Concrete	Refer Wasco Risk Register/HazID																		

WSGG Project
Commissioning HAZID Register - General

Effectiveness of Controls

Residual Control Effectiveness			
Weak	Fair	Adequate	Strong
0	0	0	0

Residual Risk Ranking					
	Extreme	High	Significant	Moderate	Low
Residual	0	0	0	0	0

Note: Existing controls assumed to include standard items such as PPE, Competent Operators, PTW / LOTO System, SWMS, Signage / Label

Item #	Project SOW	Activity/Task	Hazard/Risk	Impact	Inherent (Untreated Risk)			Existing/Planned controls	Residual (Treated) Risk			Control Effectiveness	SFAIRP (Y/N)	Additional Actions	Action Responsibility	Due Date	Status	Target Risk			Comments & Assumptions
					Consequence	Likelihood	Risk		Consequence	Likelihood	Risk							Consequence	Likelihood	Risk	
1.34	Earth works and Civil	Piling	Refer Wasco Risk Register/HazID																		
1.35	Pipeline	Stringing of pipe	Refer Wasco Risk Register/HazID																		
1.36	Pipeline	Pipe Welding	Refer Wasco Risk Register/HazID																		
1.37	Pipeline	Pipe Grinding	Refer Wasco Risk Register/HazID																		
1.38	Pipeline	Hot Tap	Refer Wasco Risk Register/HazID																		
1.39	Pipeline	NTD	Refer Wasco Risk Register/HazID																		
1.40	Pipeline	Field Joint Coating	Refer Wasco Risk Register/HazID																		
1.41	Pipeline	Trench excavation, lay , backfill	Refer Wasco Risk Register/HazID																		
1.42	Pipeline Structural, Mechanical and Piping	Reinstatement Use of cutting tools (Grinder, oxy set, cut off saw, etc.)	Refer Wasco Risk Register/HazID Refer Wasco Risk Register/HazID																		
1.43	Structural, Mechanical and Piping	Painting/protective coating	Refer Wasco Risk Register/HazID																		
1.44	Structural, Mechanical and Piping	Failure to ensure structural items secured correctly	Refer Wasco Risk Register/HazID																		
1.45	Structural, Mechanical and Piping	Welding	Refer Wasco Risk Register/HazID																		
1.46	Structural, Mechanical and Piping	Install Pipework / flanges/ Flange management	Refer Wasco Risk Register/HazID																		
1.47	Electrical Disconnection and installation	Electrical Stripping, Glanding and termination (Strip cables, crimp cables Install cables into switchboard)	Refer Wasco Risk Register/HazID																		
1.48	Electrical Disconnection and installation	Use of Ladder Cutting cable tray and brackets Installing brackets and saddles onto concrete Installing cable tray and conduit onto brackets Unserviceable or fit for purpose equipment	Refer Wasco Risk Register/HazID																		
1.49	Electrical Disconnection and installation	Setup cable onto cable stands, Installing cables on cable tray, Cable tie cables in place, electrical testing of cables as per relevant standards	Refer Wasco Risk Register/HazID																		
1.50	Electrical Disconnection and installation	Electrical Equipment installation Mounting of electrical equipment	Refer Wasco Risk Register/HazID																		
1.51	Electrical Disconnection and installation	Instrument tubing and instrument panels	Refer Wasco Risk Register/HazID																		
1.52	Electrical Disconnection and installation	Electrical & Instrumentation Cable Testing	Refer Wasco Risk Register/HazID																		
1.53	Testing	Hydro	Refer Wasco Risk Register/HazID																		
1.54	Testing	NDT	Refer Wasco Risk Register/HazID																		
1.55	Lifting of units	Faulty Plant/crane/equipment	Refer Wasco Risk Register/HazID																		
1.56	Lifting of units	Plant/ Plant or Plant/ Personnel interaction	Refer Wasco Risk Register/HazID																		
1.57	Lifting of units	Poor Communication	Refer Wasco Risk Register/HazID																		
1.58	Lifting of units	Plant/personnel interactions No exclusion zones	Refer Wasco Risk Register/HazID																		
1.59	Lifting of units	Positioning of Truck and Cranes in wrong position Rushing ,Complacency ,unplanned movement ,eyes not on task ,loss of balance/traction/grip , unsuitable ground conditions	Refer Wasco Risk Register/HazID																		
1.60	Lifting of units	Craneage/lifting HRCW (High Risk Construction Work due to "Work in an area with movement of powered plant")	Refer Wasco Risk Register/HazID																		
1.61	Lifting of units	Damage to existing, pipe, piperacks, infrastructure	Refer Wasco Risk Register/HazID																		
1.62	Lifting of units	Noise	Refer Wasco Risk Register/HazID																		

WSGG Project
Commissioning HAZID Register - Pre-Commissioning

Effectiveness of Controls

Residual Control Effectiveness			
Weak	Fair	Adequate	Strong
0	0	9	1

Residual Risk Ranking					
	Extreme	High	Significant	Moderate	Low
Residual	0	0	5	4	1

Note: Existing controls assumed to include standard items such as PPE, Competent Operators, PTW / LOTO System, SWMS, Signage / Label, Induction

Item #	Project SOW	Activity/Task	Hazard/Risk	Impact	Inherent (Untreated Risk)			Existing/Planned controls	Residual (Treated) Risk			Control Effectiveness	SFAIRP (Y/N)	Additional Actions	Action Responsibility	Due Date	Status	Target Risk			Comments & Assumptions
					Consequence	Likelihood	Risk		Consequence	Likelihood	Risk							Consequence	Likelihood	Risk	
General Activities																					
2.01	WSGGP	Complete ITR's & Walk downs.	Refer: Wasco Construction Risk Register																		
2.02	WSGGP	Pre-Commissioning Construction activities occurring in parallel / simultaneously.	Refer: Wasco Construction Risk Register																		
2.03	WSGGP	Introduction of energy (stored, electrical, chemicals) to systems whilst construction contractor remains on site.	Refer: Wasco Construction Risk Register																		
2.04	WSGGP	Working with Stored Energy electricity and nitrogen	Missed or Incorrect isolation leading to uncontrolled release of energy	Exposure to release of energy leading to: - injury / fatality - asset damage - environmental incident	Catastrophic	Possible	**Extreme**	PTW & LOTO Procedures Dedicated & appropriately qualified and trained PIA's and PI's Approved Isolation Plans - developed by SME's in consultation with Zinfra Operations Detailed Work Instructions to be followed (pre-approved) Minimise personnel in area Detailed walk downs completed as part of permit / isolation system Always confirm Isolation & "Test for Dead" prior to commencing works Jem isolation procedure Wasco procedures	Catastrophic	Rare	**Significant**	**Adequate**	Y								
2.05	WSGGP	General working on a Construction Site - SIMOPS	Interface with other works on-site / SIMOPS	Injury to Jemena, Zinfra or contractor personnel	Major	Possible	**High**	Permit to Work system applies and onsite PIA'S Work areas to be controlled by Barricading & signage where necessary, including the use of drop zones and exclusion zones Spotters in place for all required activities Operators of plant and equipment to be VOC'd and hold relevant High Risk licences Communication must occur between interfacing work groups if any cross over is to occur or when in close proximity Active SIMOPS areas to be highlighted during daily pre-start meeting by Supervision SIMOPS covered in Daily Planning/pre start Meetings Handover meetings Approved Traffic Management Plan Wasco induction	Major	Unlikely	**Significant**	**Adequate**	Y								
Electrical Energisation, Inspections			**Asset Damage or delay to program**																		
2.06	WSGGP	Low Voltage Pre-commissioning Initial energisation of electrical equipment. Access to and inspection of low voltage equipment and devices. Testing of low voltage and extra low voltage circuits and protection devices. Fault finding of low voltage and extra low voltage circuits and protection devices.	Electric Shock Equipment damage Short circuit of electrical circuits Incorrect installation Inadvertent energisation of equipment outside of Commissioning Area Unexpected operation Fire/explosion caused by Equipment Failure Incorrect equipment operation	Personnel injury / fatality (GF) Damage to Equipment Schedule Delay Tripping of main incomer/ upstream circuit breakers during energisation (due to electric fault or incorrect protection settings, relays not communicating)	Catastrophic	Possible	**Extreme**	Refer: 4.0 Wasco Risk Register Test before you touch Detailed Commissioning Work Instructions (CWIs) to be followed Licensed electricians ITR's completed Notice of Energisation (NOE) Procedure Minimise personnel in area Calibrated test equipment Circuit breakers / RCDs Detailed walk downs completed & As-Builts marked up Main Earth Grid Check resistance between immediately prior to energisation LV rescue kit Use of 'live' stickers and commissioning tags Test at low energy potential test point Downstream equipment isolated during energisation LVR and CPR trained spotter in place with isolation plan. IR gun for thermographic survey. ICE full control	Catastrophic	Rare	**Significant**	**Adequate**	Y								
Instrumentation & Controls Checks																					
2.07	WSGGP	Extra Low Voltage Pre-commissioning Initial energisation of instrumentation/control systems - Fire & Gas, SCS and SIS panels, Loops, SCADA and communication systems. Testing and fault finding of extra low voltage circuits and instrument devices. Introduction of water/air/hydraulic fluids for instrument and end device pre-commissioning.	Release of Fire suppressant into switch room / equipment room Inadvertent operation / energisation of equipment Unexpected remote operation Introduction of fluids to system, contamination Draining of fluids from system Lack of awareness of Tests	Delay to schedule (GF) Equipment damage Personal injury	Serious	Possible	**Moderate**	Pre-start awareness of hazards Inhibit systems when in relevant areas - MOS Audible alarms/lights pre-release - Fire suppression Remove heads off suppressant release system Remove fuses and knife edges in control panels. Isolation and Tagging (OOS). Control system has been FAT tested Communication between control system vendor and field technicians/workers Segregation of SCADA system until testing complete as far as practical Remote IO tests completed offline FAT of PCS to SCADA communications testing SCADA & HMI SAT Procedure Segregation of Greenfields and existing HMI and SCADA systems for majority of Pre-commissioning Notification of potential to sound operational alarm (inhibit alarms where possible) ESD Buttons have guards/shrouds Housekeeping Detailed Commissioning Work Instructions (CWIs) to be followed. OEM IOMS and procedures.	Serious	Unlikely	**Low**	**Strong**	Y								
Electrical Device Checks																					
2.08	WSGGP	Motor/electrical drive bump testing/operation of equipment (such as motors & pumps/fans and other similar equipment) Run motor with fan belt disconnected (ACHE) Recouple motor to fan with fan belt	Unexpected equipment start up Incorrect equipment operation Exposed rotating equipment Short circuit of electrical equipment. Moving/rotating parts Crush/Pinch points Tools left in equipment Failure to remove shipping chocks.	Personnel injury (GF) Equipment damage Release of contaminants (e.g. lube oil) Refer: 1.08 Chemical / Hazardous Substances Pressurisation of systems inadvertently	Severe	Possible	**Significant**	Minimise duration that any guard is removed Ensure free movement on rotating shafts before testing Radio communication for bump testing Follow vendor IOM Mark shafts/drives for easy identification of direction of rotation at reasonable distance Mechanical installation check sheets complete NOE Single point of control for MCC. Remove keys from shaft / decouple prior to bump testing (if required) Barricading of area. Follow CWIs for all testing Vendor Rep available/present as required Housekeeping. Testing of ESD	Severe	Unlikely	**Moderate**	**Adequate**	Y								

WSGG Project
Commissioning HAZID Register - Pre-Commissioning

Effectiveness of Controls

Residual Control Effectiveness			
Weak	Fair	Adequate	Strong
0	0	9	1

Residual Risk Ranking					
	Extreme	High	Significant	Moderate	Low
Residual	0	0	5	4	1

Note: Existing controls assumed to include standard items such as PPE, Competent Operators, PTW / LOTO System, SWMS, Signage / Label, Induction

Item #	Project SOW	Activity/Task	Hazard/Risk	Impact	Inherent (Untreated Risk)			Existing/Planned controls	Residual (Treated) Risk			Control Effectiveness	SFAIRP (Y/N)	Additional Actions	Action Responsibility	Due Date	Status	Target Risk			Comments & Assumptions
					Consequence	Likelihood	Risk		Consequence	Likelihood	Risk							Consequence	Likelihood	Risk	
Mechanical Device/Package Checks																					
2.09	WSGGP	Mechanical equipment inspections Piping installation inspections Vessel inspections Mechanical pre-commissioning, lubrication, alignment checks, valve positions, flange management Vendor Package Installation Checks	Working at heights, Elevated Work Platforms (EWPs) and Scissor Lifts Incorrect Vessel reinstatement (closure) Inadequate communication between commissioning work groups resulting in activities being conducted incorrectly or out of sequence Equipment failure - lifting devices on equipment.	Personnel Injury (GF) Equipment Damage Release of stored energy	Severe	Possible	Significant	CWIs Vessel Closure & Flange Closure ITR Equipment IOMs Gross Air Leak Test Change Management to be followed Prestart/Stop work with relevant work party Continuous communication with work party.	Severe	Unlikely	Moderate	Adequate	Y								
Using Compressed Air for cleanliness checks, operational checks, blow throughs and Gross Air Leak Tests																					
2.10	WSGGP	Use of air from a compressor to pressurise for testing (simulation of	Refer: 2.09 Mechanical equipment inspections	Personnel injury (GF) Noise	Major	Possible	High	Barricading of release areas & Avoid line of fire Detailed procedures / CWIs	Major	Rare	Moderate	Adequate	Y								
Using Nitrogen for purge of systems, leak test and operational checks																					
2.11	WSGGP	Use of Nitrogen for purge, Inerting, leak testing, operational checks and testing (open air release)	High pressure N2 Packs over pressuring pipework Asphyxiation.	Overpressure of Pipework/Equipment resulting in Personal Injury/Fatality (GF)	Catastrophic	Unlikely	High	Detailed procedures/CWIs Limit personnel involved Hydrotested and leak tested pipework Rated hoses/equipment/regulators inspected prior to use Use of blowdown/vent system where possible / available Optimise stored potential (where possible) Demarcation of commissioning area Lock open piping valves to large volume with Pressure Transmitter where nitrogen supply source exceeds design pressure (EHP N2 pack direct connection) Pack connection/isolation always to be last on first off. Pack valve to be continuously manned and to be in continuous communication with pressure monitor. Refer: 1.63 N2 Gas (Asphyxiation) Personal gas monitoring devices Pressure control instrumentation (2 stage regulator)	Catastrophic	Rare	Significant	Adequate	Y								
Fuel Gas System																					
2.12	WSGGP	Pressurise, leak testing, blow-throughs, regulator testing.	Refer: 2.10 Use of Compressed Air, 2.09 Mechanical equipment inspections, 2.08 Electrical Device Checks	No significant new impacts identified																	
2.13	WSGGP	Start-up, fill and place in to operation dew point control chiller	Refer: 2.12	No significant new impacts identified																	
2.14	WSGGP	Setting up of vessel, Inerting with Nitrogen (prior to fuel gas being available).	Refer: 2.12, 2.10 Refer: 2.11 Use of Nitrogen	No significant new impacts identified																	
Nitrogen Inerting (facilities)																					
2.15	WSGGP	Facility Nitrogen Inerting - enclosed areas (Enclosures)	Refer: 2.10 Use Compressed Air Refer: 2.11 Use of Nitrogen Insufficient N2 Purge High pressure N2 Packs over pressuring pipework Asphyxiation in enclosed areas.	Increased risk of Ignition Overpressure of Pipework/Equipment Personal Injury/Fatality (GF)	Catastrophic	Possible	Extreme	Detailed procedures/CWIs Limit personnel involved Hydrotested and leak tested pipework Rated hoses/equipment/regulators inspected prior to use Demarcation of commissioning area Equipment overpressure protection PSV system Lock open piping valves to large volume with Pressure Transmitter where nitrogen supply source exceeds design pressure (EHP N2 pack direct connection) Minimum 3 piston purges at 1 Barg with hold time achieves minimum dilutions 0-100% Oxygen Tester to confirm N2 Purge Pack connection/isolation always to be last on first off. Pack valve to be continuously manned and to be in continuous communication with pressure monitor. Enclosure ventilation operational. PGMs.	Catastrophic	Rare	Significant	Adequate	Y								
2.16	WSGGP	Facility Nitrogen Inerting of low design pressure vessels, pipework.	Refer: 2.11 Facility Nitrogen Inerting Overpressure - particularly of small volume systems	Overpressure of Pipework/Equipment Personal Injury	Severe	Possible	Significant	Refer: gross air leak testing of low design pressure vessel Refer: facility nitrogen inerting Secondary regulator to be used in conjunction with regulated connection on N2 Pack (<7MPa) for small volumes.	Severe	Rare	Moderate	Adequate	Y								

WSGG Project
Commissioning HAZID Register - Gas Commissioning

Effectiveness of Controls

Residual Control Effectiveness			
Weak	Fair	Adequate	Strong
0	3	11	1

Residual Risk Ranking					
	Extreme	High	Significant	Moderate	Low
Residual	0	0	10	1	4

Note: Existing controls assumed to include standard items such as PPE, Competent Operators, PTW / LOTO System, SWMS, Signage / Label, Induction

Item #	Project SOW	Activity/Task	Hazard/Risk	Impact	Inherent (Untreated Risk)			Existing/Planned controls	Residual (Treated) Risk			Control Effectiveness	SFAIRP (Y/N)	Additional Actions	Action Responsibility	Due Date	Status	Target Risk			Comments & Assumptions
					Consequence	Likelihood	Risk		Consequence	Likelihood	Risk							Consequence	Likelihood	Risk	
Utilities – Power – Commissioning																					
3.01	WSGGP	HV switch gear	Electric Shock Equipment damage Short circuit of electrical circuits Incorrect installation Inadvertent energisation of equipment outside of Commissioning Area Unexpected operation Fire/explosion caused by Equipment Failure Incorrect equipment operation	Electrocution Fire/Explosion Asset Damage	Catastrophic	Possible	**Extreme**	Refer: 1.47, 1.48, 1.49, 1.50, 1.51 and 1.52 Electrical Disconnection and installation Test before you touch Detailed Commissioning Work Instructions (CWIs) to be followed Licensed HV electricians ASV1 Accredited service provider 1 for all switching activities ITR's completed Minimise personnel in area Calibrated test equipment Protection relays Detailed walk downs completed & As-Builts marked up Main Earth Grid installed and proved Check resistance between immediately prior to energisation Use of 'live' stickers and commissioning tags Downstream equipment isolated during energisation CPR trained spotter in place with isolation plan. Allow sufficient time for stored capacitive energy to dissipate - test for dead Endeavor energy walkthrough/inspection HV PPE Support are required from Zinfra HV operators in Victoria Battery charger operational	Catastrophic	Rare	**Significant**	**Adequate**	Y								
3.02	WSGGP	HV transformer	Ref: 3.01	Ref: 3.01	Catastrophic	Possible	**Extreme**	Ref: 3.01	Catastrophic	Rare	**Significant**	**Adequate**	Y	Note to be included in WI not to access HV Transformer LV side	Frank Libri	**30/04/2021**	**Open**				
3.03	WSGGP	Switch room	Electric Shock Equipment damage Short circuit of electrical circuits Incorrect installation Inadvertent energisation of equipment outside of Commissioning Area Unexpected operation Fire/explosion caused by Equipment Failure Incorrect equipment operation	Electrocution Fire/Explosion Asset Damage	Catastrophic	Possible	**Extreme**	Refer: 1.47, 1.48, 1.49, 1.50, 1.51 and 1.52 Electrical Disconnection and installation Test before you touch Detailed Commissioning Work Instructions (CWIs) to be followed Licensed electricians ITR's completed Minimise personnel in area Calibrated test equipment Circuit breakers / RCDs Detailed walk downs completed & As-Builts marked up Main Earth Grid Check resistance between immediately prior to energisation LV rescue kit Use of 'live' stickers and commissioning tags Downstream equipment isolated during energisation LVR and CPR trained spotter in place with isolation plan. Allow sufficient time for stored capacitive energy to dissipate - test for dead	Catastrophic	Rare	**Significant**	**Adequate**	Y	Investigate what remote start/stop capability's control room have	Mitch Lowe	**26/03/2021**	**Open**				
3.04	WSGGP	Field and enclosure lighting	Electric Shock Equipment damage Short circuit of electrical circuits Incorrect installation Inadvertent energisation of equipment outside of Commissioning Area Unexpected operation Fire/explosion caused by Equipment Failure Incorrect equipment operation	Electrocution Fire/Explosion Asset Damage	Catastrophic	Possible	**Extreme**	Refer: 1.47, 1.48, 1.49, 1.50, 1.51 and 1.52 Electrical Disconnection and installation Test before you touch Detailed Commissioning Work Instructions (CWIs) to be followed Licensed electricians ITR's completed Minimise personnel in area Calibrated test equipment Circuit breakers / RCDs Detailed walk downs completed & As-Builts marked up Main Earth Grid Check resistance between immediately prior to energisation LV rescue kit Use of 'live' stickers and commissioning tags Downstream equipment isolated during energisation LVR and CPR trained spotter in place with isolation plan. Allow sufficient time for stored capacitive energy to dissipate - test for dead	Catastrophic	Rare	**Significant**	**Adequate**	Y								
3.05	WSGGP	HVACs	Electric Shock Equipment damage Short circuit of electrical circuits Incorrect installation Inadvertent energisation of equipment outside of Commissioning Area Unexpected operation Fire/explosion caused by Equipment Failure Incorrect equipment operation	Electrocution Fire/Explosion Asset Damage	Catastrophic	Possible	**Extreme**	Refer: 1.47, 1.48, 1.49, 1.50, 1.51 and 1.52 Electrical Disconnection and installation Test before you touch Detailed Commissioning Work Instructions (CWIs) to be followed Licensed electricians ITR's completed Minimise personnel in area Calibrated test equipment Circuit breakers / RCDs Detailed walk downs completed & As-Builts marked up Main Earth Grid Check resistance between immediately prior to energisation LV rescue kit Use of 'live' stickers and commissioning tags Downstream equipment isolated during energisation LVR and CPR trained spotter in place with isolation plan. Allow sufficient time for stored capacitive energy to dissipate - test for dead	Catastrophic	Rare	**Significant**	**Adequate**	Y								
3.06	WSGGP	UPS	Electric Shock Equipment damage Short circuit of electrical circuits Incorrect installation Inadvertent energisation of equipment outside of Commissioning Area Unexpected operation Fire/explosion caused by Equipment Failure Incorrect equipment operation Stored power source	Electrocution Fire/Explosion Asset Damage	Catastrophic	Possible	**Extreme**	Refer: 1.47, 1.48, 1.49, 1.50, 1.51 and 1.52 Electrical Disconnection and installation Test before you touch Detailed Commissioning Work Instructions (CWIs) to be followed Licensed electricians ITR's completed Minimise personnel in area Calibrated test equipment Circuit breakers / RCDs Detailed walk downs completed & As-Builts marked up Main Earth Grid Check resistance between immediately prior to energisation LV rescue kit Use of 'live' stickers and commissioning tags Downstream equipment isolated during energisation LVR and CPR trained spotter in place with isolation plan. Allow sufficient time for stored capacitive energy to dissipate - test for dead	Catastrophic	Rare	**Significant**	**Fair**	Y								
Utilities – Nitrogen system																					
3.07	WSGGP	Start up of nitrogen System	Ref:2.09, 2.13 and 2.14 Nitrogen Inerting Using Nitrogen for purge of systems, leak test and operational checks	No significant new impacts identified to pre commissioning elements																	

WSGG Project
Commissioning HAZID Register - Gas Commissioning

Effectiveness of Controls

Residual Control Effectiveness			
Weak	Fair	Adequate	Strong
0	3	11	1

Residual Risk Ranking					
	Extreme	High	Significant	Moderate	Low
Residual	0	0	10	1	4

Note: Existing controls assumed to include standard items such as PPE, Competent Operators, PTW / LOTO System, SWMS, Signage / Label, Induction

Item #	Project SOW	Activity/Task	Hazard/Risk	Impact	Inherent (Untreated Risk)			Existing/Planned controls	Residual (Treated) Risk			Control Effectiveness	SFAIRP (Y/N)	Additional Actions	Action Responsibility	Due Date	Status	Target Risk			Comments & Assumptions
					Consequence	Likelihood	Risk		Consequence	Likelihood	Risk							Consequence	Likelihood	Risk	
Utilities - Water Systems																					
3.08	WSGGP	Start up electrolysis Water Package and, Pressurise.	Refer: 2.08 Use of Compressed Air, 2.07 Mechanical equipment inspections, 2.06 Electrical Device Checks,	No significant new impacts identified to pre commissioning elements																	
3.08	WSGGP	Demin water system	2.06 Chemical exposure	No significant new impacts identified to pre commissioning elements																	
3.08	WSGGP	Start up CLC System	Glycol exposure Moving parts, fans	Chemical exposure, personal injury	Serious	Possible	Moderate	Ref: 2:08 Electrical Device Checks Closed loop system LOTO	Serious	Unlikely	Low	Adequate	Y								
3.09	WSGGP	Start up water storage tank and pumps	Refer: 2.13	No significant new impacts identified to pre commissioning elements																	
Utilities - Instrument Air System																					
3.10	WSGGP	Pressurisation and blow throughs of IA/Plant Air distribution pipework	Refer: 2.08 Use of Compressed Air, 2.07 Mechanical equipment inspections	No significant new impacts identified to pre commissioning elements									Y								
3.11	WSGGP	Start of IA dryers and systems	Refer: 2.08 Use of Compressed Air, 2.07 Mechanical equipment inspections, 2.06 Electrical Device Checks	No significant new impacts identified to pre commissioning elements									Y								
SAT of vendor packages: Electrolyser –production of hydrogen																					
3.12	WSGGP	Commissioning of Electrolyser	Electricity exposure Hydrogen/Nitrogen Gas leak Pure oxygen leak	Electrocution Fire/Explosion Increased risk of fire/explosion Asphyxiation	Catastrophic	Possible	Extreme	Ref:3.03 Commissioning induction PPE Ventilation system Module Gas detectors Vendor support Gas supply shut down system Commissioning Work Instructions SWMS Earth leakage protection (RCD's) Leak testing FAT testing PTW Flanges taped for snooping as applicable Prior gross air leak test of piping Intranasally safe clothing/ and test equipment (EXI Rated) Electrolyser control system Minimise personal in area Personal gas detector units Pre start meetings Non sparking tooling	Catastrophic	Rare	Significant	Adequate	Y	Commissioning procedures and package risk assessment to be supplied from vendor	Mitch, Alister to review with GPA	26/03/2021	Open				
3.13	WSGGP	Commissioning of Electrolyser	Tight work environment Hot/Cold Pipeline Flex hose use/ failure	Burns Struck by hose	Serious	Possible	Moderate	Commissioning induction PPE Lagging Whip checks Vendor support Commissioning Work Instructions SWMS PTW Barricading	Serious	Unlikely	Low	Adequate	Y								
SAT of vendor packages: Microturbine																					
3.14	WSGGP	Commissioning of Micro turbine	Electricity exposure Fuel Gas leak Flex hose use/ failure	Electrocution Fire/Explosion	Catastrophic	Possible	Extreme	Ref:3.03 Commissioning induction PPE Ventilation system Module Gas detectors Vendor support Gas supply shut down system Commissioning Work Instructions SWMS Earth leakage protection (RCD's) Leak testing FAT testing PTW Flanges taped for snooping as applicable Prior gross air leak test of piping Intranasally safe clothing/ and test equipment (EXI Rated) Electrolyser control system Minimise personal in area Personal gas detector units Pre start meetings Non sparking tooling	Catastrophic	Rare	Significant	Adequate	Y	Commissioning procedures and package risk assessment to be supplied from vendor	Mitch, Alister to review with GPA	26/03/2021	Open				
3.15	WSGGP	Commissioning of Micro turbine	Hot and/or cold surfaces Flex hose use/ failure	Burns Struck by uncontrolled hoses	Serious	Possible	Moderate	Commissioning induction PPE Lagging Whip checks Vendor support Commissioning Work Instructions SWMS PTW Barricading	Serious	Unlikely	Low	Adequate	Y								

WSGG Project
Commissioning HAZID Register - Gas Commissioning

Effectiveness of Controls

Residual Control Effectiveness			
Weak	Fair	Adequate	Strong
0	3	11	1

Residual Risk Ranking					
	Extreme	High	Significant	Moderate	Low
Residual	0	0	10	1	4

Note: Existing controls assumed to include standard items such as PPE, Competent Operators, PTW / LOTO System, SWMS, Signage / Label, Induction

Item #	Project SOW	Activity/Task	Hazard/Risk	Impact	Inherent (Untreated Risk)			Existing/Planned controls	Residual (Treated) Risk			Control Effectiveness	SFAIRP (Y/N)	Additional Actions	Action Responsibility	Due Date	Status	Target Risk			Comments & Assumptions
					Consequence	Likelihood	Risk		Consequence	Likelihood	Risk							Consequence	Likelihood	Risk	
SAT of vendor packages: Fuel cell																					
3.16	WSGGP	Commissioning of Fuel Cell	Electricity exposure Hydrogen leak	Electrocution Fire/Explosion	Catastrophic	Possible	**Extreme**	Ref:3.03 Commissioning induction PPE Ventilation system Module Gas and smoke detectors Vendor support Gas supply shut down system Commissioning Work Instructions SWMS Earth leakage protection (RCD's) Leak testing FAT testing PTW Flanges taped for snooping as applicable Prior gross air leak test of piping Intranasally safe clothing/ and test equipment (EXI Rated) Electrolyser control system Minimise personal in area Personal gas detector units Pre start meetings Non sparking tooling	Catastrophic	Rare	**Significant**	**Fair**	Y	Commissioning procedures and package risk assessment to be supplied from vendor	Mitch, Alister to review with GPA	**Prior to Commissioning**	**Open**				
3.17	WSGGP	Commissioning of Fuel Cell	Fill radiator with coolant	Chemical exposure	Serious	Possible	**Moderate**	Commissioning induction PPE SDS Commissioning Work Instructions SWMS PTW	Serious	Unlikely	**Low**	**Fair**	Y								
SAT of vendor packages: Gas panels																					
3.18	WSGGP	Commissioning of microturbine	Hydrogen leak	Fire/Explosion	Catastrophic	Possible	**Extreme**	Ref:3.03 Commissioning induction PPE Module Gas detectors Gas supply shut down system Commissioning Work Instructions SWMS Leak testing FAT testing PTW Flanges taped for snooping as applicable Prior gross air leak test of piping Intranasally safe clothing/ and test equipment (EXI Rated) Electrolyser control system Minimise personal in area Personal gas detector units Pre start meetings Non sparking tooling	Minor	Possible	**Moderate**	**Adequate**	Y								
Hydrogen purging of the piping / tubing and pipeline systems including venting hydrogen through the pipeline blowdown vent and facility vent and Leak testing piping/tubing and pipeline systems on hydrogen																					
3.19	WSGGP	Introduce Gas, Gas purge, pressurization & snoop tests	Gas leak Local venting of natural gas Release of stored energy (high pressure) Incorrect purging leading to flammable air/gas mixture Unauthorised/ untrained personnel entry into facility permit area with non Ex rated devices - Test gear, radio , laptop, camera , 2 way radio, mobile phone Tube fitting rupture.	Fire/Explosion leading to Personnel injury (GF) Equipment damage Uncontrolled release of gas Project delay	Catastrophic	Possible	**Extreme**	Signed-off Gate 5 Pre-Gas Toolbox and Induction Emergency evacuation training & drill Monitoring of systems during pressurisation Incremental increase of pressure Flanges taped for snooping as applicable All instrument connections inspected Notification of emergency services/stakeholders Continuous communication with external stakeholders Monitor high/low temperatures during pressurisation Hydrotested pipework & equipment Fire & Gas System tested & enabled Gas introduced section by section (minimise inventory) Detailed Introduction of Gas CWI Personal gas detectors Minimise work party and personnel in area Pre-tested cause and effects Confirmation of no outstanding Cat 'A" punch list items Radio communications Suspend all other permits (as applicable) Nitrogen purge complete and confirmed <2% (0 - 100% gas detector) Work crew on standby to rectify any potential issues	Catastrophic	Rare	**Significant**	**Strong**	Y								
3.21	WSGGP	Pressurisation and leak testing of pipeline	Refer: 3.04 Refer: 3.02 Introduction of Gas	No significant new impacts identified				1.53 Hydro by Wasco													

Wasco Australia Pty Ltd

Construction Risk Register

2018 - JEMENA WSGGP Project

Revision No.	Issue Date	Description of Issue	Prepared by	Approved by Project Manager
2	14.12.20	Issued for Use	Ross Clarke	Andrew Hargraves

Item Number	Activity / Product / Task / Process	Risk/ Hazard	Major Effect	Impact / Consequence	Risk			Control measures	Residual Risk				Additional Controls	Residual Risk				Comments
					L	C	R		L	C	RR	ALARP		L	C	RR	ALARP	
1	**Logistics** **Coordinating the transportation of good (including transportation procured goods)**	Loading or transportation of goods Unknown weights Oversize and awkward loads Load not suitably restrained	Health & Safety	Overloading Transport Trucks Unplanned movement occurs during transport Procedure and regulatory breach for not complying with COR requirements	C	4	H	• All personnel involved in the chain of procurement must hold the relevant nationally accredited Chain of Responsibility training. • Shipping container to be accompanied with 'Container Weight Declarations' • Oversize and awkward loads to be assessed to confirm suitable restraint method and weight distrubution • Project Management to allow realistic timeframes for items to be delivered • Restraint of load to be regularly inspected during transit to ensure effectiveness • Oversize loads to be escorted (where required) • Utilise approved transport companies • Engineers to design load restraint method for complex loads • Loading and unloading exclusion zones (LUEZ) must be used at all times during loading/unloading activity associated with a vehicle.	D	4	M	Yes	TMP/documentation to document control measures are captured.					
	Logistics **Coordinating the transportation of good (including transportation procured goods)**	Loading or transportation of goods Unknown weights Oversize and awkward loads Load not suitably restrained	Health & Safety	Overloading Transport Trucks Unplanned movement occurs during transport Procedure and regulatory breach for not complying with COR requirements	C	4	H	• Competent personnel will be utlised for each task, they will report in to to the Construction Superintendent, Construction Supervisor and the Project Engineer who will have ultimate responsibility for ensuring the work is performed in a safe manner. • Wasco's C.A.R.E Program which provides a framework for inspections and management interactions (both project and head office) will be utilised as a method of ensuring compliance.	D	4	M	Yes	TMP/documentation to document control measures are captured.					
2	**Mobilisation to site** **Transport people to site by road**	Fatigued personnel	Health & Safety	personal injury from vehicle accident	C	4	H	• HV driving to be conducted as per the nation heavy vehicle log book process • HV drivers to stop every 5 hours for 15 minutes • LV drivers to stop every 2 hours for 15 minutes • Driver fatigue topic covered as part of the project induction • Project approved roads to be used to transport people and plant to and from the project work fronts • Journey management procedure/plan in place	D	4	M	Yes	Distrbute to Jemena					
3	**Mobilisation to site**	Personnel not fit for work (in sound medical condition to perform work duties)	Health & Safety	personal Injury	C	4	H	• Personnel inculing subcontractors must complete a pre employment medical. This includes a drugs and alcohol test • Covid 19 risk Assessment	D	4	M	Yes						
4	**Mobilisation to site** **Mobile plant and Equipment**	Faulty Plant Not fit for purpose Poor mechanical condition	Health & Safety	personal injury from vehicle accident	C	4	H	• All plant to be maintained as per the OEM or equivalent. • Plant risk assessment , Certificates of compliance,Service History,pre acceptance site inspection and and are to be readily available on site for the duration of the project • All plant to have a daily pre start check done by the operator each shift and recorded. • Copies of the daily pre start check must be submitted at the completion of weekly to the HSE advisor or Supervisor. • All faulty plant to be tagged out of service and quarantined until deemed acceptable • Plant must be fit for purpose and will be recorded onto a Plant Register • Non compromising rules	D	4	M	Yes				0		
	Mobilisation to site **Mobile plant and Equipment**	Entry of unarthorised personel to site	Health & Safety	Personal injury / theft / Infrastructure damage	C	4	H	• site security fencing • Restricted access work areas to be set up/defined • Security of plant and equipment • Site Signage • Identification of high-risk areas/locations • Traffic management Plan • Notifications and planning • Call up signs • Barricading and barriers	D	4	M	Yes						
5	**General Site Work**	Driving	Community, Stakeholder and Reputation	Community complaints poor reflection on the project	B	3	H	• Wasco Inductions ,Client Inductions. Speed limits to be adhered to . • All requirements of Client • Only use registered, roadworthy and correctly maintained vehicles and pre start checks to be done. • Licenced drivers with suitable class of drivers licence. • Project fatigue management procedure to be followed (includes 0 Breath alcohol limit). • Travel management procedure to be followed. All vehicles will be fitted with radios. Drive to the conditions. • Drivers and passengers are to be courteous at all times to fellow road users and pedestrians. • Project penalties to be applied for poor driver/passenger behaviour (including loss of driver privileges or other penalties up to and not excluding removal from the project as determined after suitable investigation and then deliberation of the facts by the WASCO project manager). • Construction Manager Project Engineer and HSE Advisor will be responsible for ensuring all personnel are fit for duty • Construction Manager, Project Engineer and HSE advisor will be trained and competent in performing breath alcohol testing daily • Maintain access into TRS and EGP - no blocking drive way by parking or un/loading.	D	3	M	Yes				0		
6	**General Site Work**	Driving	Health & Safety	Motor vehicle accident resulting in personal and or property damage	C	4	H	• Wasco Inductions ,Client Inductions. Speed limits to be adhered to. • Only use registered, roadworthy and correctly maintained vehicles and pre start checks done. • Licenced drivers with suitable class of drivers licence. • Project fatigue management procedure to be followed (includes 0 Breath alcohol limit. • Travel management procedure to be followed. All vehicles will be fitted with radios. • Drive to the conditions. • Drivers and passengers are to be courteous at all times to fellow road users and pedestrians. • Project penalties to be applied for poor driver/passenger behaviour (including loss of driver privileges or other penalties up to and not excluding removal from the project as determined after suitable investigation and then deliberation of the facts by the WASCO project manager). • Construction Manager Project Engineer and HSE Advisor will be responsible for ensuring all personnel are fit for duty • Construction Manager, Project Engineer and HSE advisor will be trained and competent in performing breath alcohol testing daily.	D	4	M	Yes				0		
7	**General Site** Unloading/Loading plant, equipment or materials from trucks/transport HRCW (High Risk Construction Work due to "Work in an area with movement of powered plant")	moving plant, uncontrolled loads interaction between plant and personnel	Health & Safety	Personal Injury .	C	4	H	• Maintain a dedicated area for loading / unloading • Exclusion zones LUEZ • Spotters in place Spotters to be in place at all times whilst unloading • Trucks to be isolated during task and fundamentaly stable • Transport loading and unloading of equipment and materials use a Take 5 to identify hazards and control risks . • Craneage SWMS to be used if using cranage. • Checking load shift had not occurred during transit - check with driver who will assess and release load binders . • Trained , competent and VOC'd operators / dogman only to be used. • Deny access to unauthorised personnel. • Delivery drivers to have a visitor induction and conduct breath test and be under direct supervision of a fully inducted person.	D	4	M	Yes				0		
	General Site Unloading/Loading plant, equipment or materials from trucks/transport HRCW (High Risk Construction Work due to "Work in an area with movement of powered plant")	moving plant, uncontrolled loads interaction between plant and personnel	Health & Safety	Personal Injury .	C	4	H	• Competent personnel will be utlised for each task, they will report in to the Project Engineer or the Construction Supervisor who will have ultimate responsibility for ensuring the work is performed in a safe manner by utilising the Wasco's C.A.R.E Program which provides a framework for inspections and management interactions (both project and head office) will be utilised as a method of ensuring compliance. • Ensure no loose items are on vehicles leaving site - bolsters, timbers strapped or secured in dog boxes.	D	4	M	Yes						
8	**General Site Work**	Faulty Plant Not fit for purpose Poor mechanical condition	Health & Safety	Personal injury Damage to mobile plant	C	4	H	• All plant to be maintained as per the OEM or equivalent. • Plant risk assessment ,to be readily available in plant/vehicle,reviewed and signed by the operator • Operators to be ticketed and VOC'd • All plant to have a daily pre start check done by the operator each shift and recorded. • Copies of the daily pre start check must be submitted at the completion of eachweek to the HSE advisor or Supervisor. • All faulty plant to be tagged out of service and the fault reported to the supervisor for rectification before the plant can be operated. • Plant must be fit for purpose and will be recorded onto a Plant Register	D	4	M	Yes				0		
9	**General Site Work** **Working in hot enviornment**	Heat Stress	Health & Safety	Serious Personal injury	C	4	H	• Fit for work ,Construction Manager Project Engineer and HSE Advisor will be responsible for ensuring all personnel are fit for duty • Adequate fresh cool water available at all times for the work site. • Shade shelters as required • Wasco management/supervision to ensure that adequate resources are available to allow rotation of tasks and increased rest breaks etc if required. • Reschedule non essential tasks to cooler times of the day • Provide Toolbox meetings topics including "Managing heat stress" • Client Induction prior to starting • Wasco Inductions • Company provided clothing and PPE • Sun protection provided (wide brims , sunblock) • Air conditioned crib room • Site Supervisor to monitor condition of workers • Access to up to date weather forecasts .	D	4	M	Yes				0		

Wasco Australia Pty Ltd

Construction Risk Register

2018 - JEMENA WSGGP Project

Revision No.	Issue Date	Description of Issue	Prepared by	Approved by Project Manager
2	14.12.20	Issued for Use	Ross Clarke	Andrew Hargraves

Item Number	Activity / Product / Task / Process	Risk/ Hazard	Major Effect	Impact / Consequence	Risk			Control measures	Residual Risk				Additional Controls	Residual Risk				Comments
					L	C	R		L	C	RR	ALARP		L	C	RR	ALARP	
10	**General Site Work** **Extreme weather event**	Lightning, Rain ,Storms, Wind, Local Flooding	Health & Safety	Personal Injury	C	4	H	• Site supervisor to monitor the Bureau of Meteorology (BOM) day weather forecasts and incorporate in planning. • Site Supervisor to monitor the Bureau of Meteorology (BOM) flood warnings and notify project personnel and contractors if local flooding is evident which impacts access to site. • Site Supervisor to monitor and cease work if weather conditions are dangerous - electrical storms , high wind days , heavy rain. • The Supervisor on site will make the call on rain effected days • Crew to de-mob off work area and into crib rooms , if conditions worsen crew will demob from site back to accommodation. • Ensure erosion and sediment controls are maintained and adequte • Post ESC investigation after rainfall/storm • Cease work due weather if notified/instructed by control room	D	4	M	Yes						
11	**General Site Work**	Fitness for work	Health & Safety	personall injury ,damage to plant and equipment	B	4	H	• Ensure WASCO Fit For Work policy is followed. • 100% alcohol testing of the work force prior to starting work each day. 0 alcohol level required for work. • Random drug testing and targeted drug testing if required. • 5% drug testing average over the term of the project. • Personnel to be adequately rested prior to start each day ,rosters to be designed so there is adequate recovery time between shifts to travel, eat, wash and sleep. 10 hours' continuous rest time prior to and between shifts • WASCO has an EAP available for employee wellness through the services of "Workplace Wellness" (Contact number is office (07) 35351239 or EAP service line 1300 326 350) Inductions and tool box. • Construction Manager Project Engineer and HSE Advisor will be responsible for ensuring all personnel are fit for duty • Construction Manager, Project Engineer and HSE advisor will be trained and competent in performing breath alcohol testing daily. • Toolbox dicussions and site inductions	D	4	M	Yes					0		
12	**General Site Work**	Fatigue	Health & Safety	personal injury ,damage to plant and equipment	B	4	H	• Ensure compliance with the WASCO Fatigue Management Plan (WAPL-HSS-PLN-003) • Fitness for work • Monitor workers to ensure are rested • Consult with the workforce to ensure the work schedule is realistic and fatigue is being managed adequately.Inductions and Tool Box	D	4	M	Yes					0		
13	**General Site Work**	Poor Communication /simops	Health & Safety	Instructions/direction not clear resulting in a health or safety incident	C	3	H	• Ensure all work/task Instructions/directions are clear and concise. • Ensure communication between all work crews is maintained (SIMOPS).In conjunction with Prestart meetings, Hazob cards, Take 5s, SWMS, toolbox meetings • Ensure planning takes into account work crew interactions and suitable meetings/directions are given and understood before starting tasks. • Onboarding inductions to include Simops • Interface meetings with Jemena Management team to be carried out to manage interactions with JGN (Jemena Gas Networks) and EGP (Eastern Gas Pipeline) • Operational Team members. • JGN and EGP controls rooms to be notified workforce is on site	D	3	M	Yes					0		
14	**General Site Work**	Poor Communication	Environmental	Instructions/direction not clear resulting in a diversion from the Construction Environment management Plan and a possible environmental incident	C	3	H	• Ensure all work/task Instructions/directions are clear and concise. • Ensure communication between all work crews is maintained (SIMOPS). • Ensure planning takes into account work crew interactions and suitable meetings/directions are given and understood before starting tasks. • Ensure all environmental controls are installed and maintained as per the site EMP. • Onboarding inductions to include environmental information	D	3	M	Yes					0		
15	**General Site Work**	Poor Communication	Community, Stakeholder and Reputation	Instructions/direction not clear resulting in an incident involving project personnel and a member of the public	C	3	H	• All project personnel are to be courteous and polite to any member of the public. • All questions or concerns to be logged are to be directed to the Client personnel for their attention. • Approprite comms over radio language and site behaviour	D	3	M	Yes					0		
16	**Site Establishment General Site Work** **Emergency Response**	Poor access to emergency services/ medical facilities	Health & Safety	personal injury	C	4	H	• Client Emergency response plan. • Wasco Emergency Response Plan • Regularly review site first aid kits (6 monthly). • Maintain Fire extinguisher register(6 monthly test and tag period) • UHF radios issued for site . • muster point identified at induction. • First aiders identified. • Emergency Numbers including medical facilities are placed in common areas. • Smoking is only allowed in designated areas	D	4	M	Yes					0		
17	**General Site Work** **HRCW (High Risk Construction Work due to "Work in an area with movement of powered plant")**	personnel Interaction with plant (line of fire)	Health & Safety	personal injury	C	4	H	• Restricted access work areas to be set up/defined around working plant. • Prestart meetings • Exclusion Zones - LUEZ • Erect appropriate signage where applicable. • No persons to be in the operational range of operating plant. • The direction of work flow is to be determined by the supervisor and clearly communicated to the plant operators prior to the start of any new task or if there is a change of conditions including new personnel to the task. • Two way radios, Light beacons Reverse beacons on mobile plant while working on the site. • Positive communication (Radio and Visual) • Operator to stop work if positive communications is not established. • Spotters to be used when required • Delinlation from existing facility - hard barrier • non compromising rules	D	4	M	Yes					0		
18	**General Site Work** **Working at heights**	Fall from height	Health & Safety	personal injury	C	4	H	• Plant and machinery to have suitable edge protection in place to access the plant/machine for operation or service/maintenance. • Where practicable an EWP with edge protection should be used when personnel are required to work at height. • EWP to have emergency reverse mode/switch • No work off of ladders other than platform ladders • All Scaffolding to be done by a HRWL Scaffolder • Personnel required to wear harnesses must have proof of training for work at heights. • Fall restraint systems are to be used in preference to fall arrest systems. • All fall restraint/fall arrest equipment must be tested and tagged every three months in accordance with the Rugby system. No person is to work alone if working in a harness. • A rescue plan must be developed and communicated to and understood by the work crew involved with the use of harnesses, fall restraint, fall arrest systems. • EWPs are preferred to the use of fall arrest or fall restraint systems where practicable. • All operators and the ground person (Spotter/stand by rescue person) must be high risk licenced. • EWP ground controls trialled each shift to prove ability to rescue. • All work at height tasks incorporating fall arrest or fall restraint systems or the use of EWPs must be risk assessed and a SWMS developed for the task. • All personnel involved must be signed on and understand the requirements of the SWMS. • Controls are to be monitored to ensure ALARP Training matrix to capture competencies, high risk licences , proof of training etc.	D	4	M	Yes					0		
19	**General Site Work**	Slips / trips and falls	Health & Safety	Personal injury	C	3	H	• Ensure walkways are clear and stable. • Ensure good housekeeping • Wear correct footwear and PPE in good condition. • Three points of contact when accessing and exiting plant or machinery. • Dry off wet access points to plant if required. • Remove mud build up on plant access points as required. Eyes on path	D	3	M	Yes					0		.
20	**General Site Work**	Noise	Health & Safety	Possible serious injury	C	3	H	• Hearing protection to be worn when working around machinery,compressors,grinding and power tools • Ensure good communication within the work crew and especially between the escorting vehicles, dogman/rigger and the crane operator. • Crane crew to nominate what form of signals to be used eg. hand or radio before any lift.. • Verify ambient noise does not interfere with clear communication and adjust communication plan appropriately. • Comply with Noise Management Plan	D	3	M	Yes							
21	**General Site Work**	Uncontrolled construction waste disposal Rubbish being poorly managed on site	Community, Stakeholder and Reputation	Breach of client agreement	C	2	M	• Wasco to ensure that adequate waste bins are available at all times on site. • Change out of full bins as required. • Skip bins to be covered at all times • Covers (shade cloth or the like) for windy conditions if required on light general waste bins. • Any rubbish not contained in a suitable receptacle to be picked up and placed into the relevant waste bin. • Waste is to be recycled wherever practicable. • Controlled/regulated waste to be managed in accordance with CEMP	D	2	L	Yes					0		
22	**General Site Work**	Uncontrolled construction waste disposal Rubbish being poorly managed on site	Environmental	Rubbish being poorly managed on site escaped rubbish/packaging/left over materials. Environmental damage	C	2	M	• Wasco to ensure that adequate waste bins are available at all times on site. • Change out of full bins as required. • Skip bins to be covered at all times • Covers (shade cloth or the like) for windy conditions if required on light general waste bins. • Any rubbish not contained in a suitable receptacle to be picked up and placed into the relevant waste bin. • Waste is to be recycled wherever practicable. • Controlled/regulated waste to be managed in accordance with CEMP	D	2	L	Yes					0		

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					L	C	R		L	C	RR	ALARP		L	C	RR	ALARP	
22	**General Site Work** **Craneage/lifting**	Dropped loads overturned cranes (Plant used in crane mode), unstable crane pad, crane failure	Health & Safety	crush injuries	C	4	H	• A SWMS for general site cranage for under 10 t and under 80% compacity • Lift Study to be carried out and approved by competent person (internal third party) for all critical lifts. • Only high risk licenced operators and dogman/riggers to be used to operate a crane and select rigging and to direct the crane operator. • Plant used in crane mode must be operated by personnel with appropriate proof of training and competence. • Tested and tagged lifting equipment. • Rigging Register maintained and gear inspected by a Competent Person must be tagged (RuGBY System 3 monthly intervals) and in good order • Rigger/Dogman to inspect all lifting Equipment prior to lift and are to ensure the slings/chains are within the safe working load • Mobile crane operations must be within the lift charts of the machine with adequate derating for any slope etc. • Spotters to be used as/if required. • No person to be under a suspended load. • Exclusion Zones in place If there is any unauthorised entry to site/exclusion zone then work must cease until the unauthorised personnel are moved to a position of safety. • Ensure good communication within the work crew and especially between the dogman/rigger and the crane operator.	D	4	M	Yes				0		Competent personnel will be utlised for each task, they will report in to the Project Engineer or the Construction Supervisor who will have ultimate responsibility for ensuring the work is performed in a safe manner by utilsing the Wasco's C.A.R.E Program which provides a framework for inspections and management interactions (both project and head office) will be utilised as a method of ensuring compliance.
	General Site Work **Craneage/lifting**	Dropped loads overturned cranes (Plant used in crane mode), unstable crane pad, crane failure	Health & Safety	crush injuries	C	4	H	• Crane crew to nominate what form of signals to be used eg. hand or radio before any lift. • Tag lines to be used • Impact of weather conditions • Dunnage as required to ensure ground stability of plant. • Non compromising rules • Telehandlers to be used by trained and competent operators • Only a HRWL Crane Operater can operate the telehandler when operating in crane mode over 3t	D	4	M	Yes						
23	**General Site Work**	manual handling	Health & Safety	Musculoskeletal injuries	C	4	H	• Use mechanical aids wherever possible • Use correct lifting techniques. eg 1.Plan Your Lift 2. If the load is too heavy or awkward to handle alone, get assistance. ... 3. Get a Firm Footing. ... 4. Bend Your Knees. ... 5. Tighten Your Stomach Muscles. ... 6. Lift with Your Legs. ... 7. Keep the Load Close. ... 8. Avoid Twisting and Turning Your Back. • Personnel only lift weight that is comfortable to lift for that individual. • Use team lifts where required. • Ensure clear path of travel when moving an item from point to point. • Plan any manual tasks to ensure adequate resources and rotation of tasks if required	D	4	M	Yes				0		
24	**General Site Work** **Use of electrically powered equipment/power tools**	Using electrical equipment	Health & Safety	electric shock or electrocution Personal injury	C	4	H	• All electrical equipment must be tested and tagged (RuGBY System) and in good order. • All electrical equipment must be visually inspected before use each shift to ensure it is in good order with no damage. • All damaged or out of test date electrical equipment must not be used and must be tagged out of service and removed from the job site as soon as practicable for repair by a qualified/ certified repair person (Licenced electrician) before returning to the work area or condemned and replaced. • Electrical circuits must be protected by RCD and tested before the first use daily. Use electrical equipment with the correct IP rating for the environment in which it is being used. • Use battery operated power tools where possible • All electrical leads to off the ground on insulated hooks and/or lead stands	D	4	M	Yes				0		
25	**General Site Work** **Handling Dangerous Goods or Hazardous Substances**	Inhalation ,ingestion ,skin contact ,splash to eyes	Health & Safety	Personal injury	C	3	H	• Storage of DG and hazardous substances as per relevant standards and codes of Practice. • MSDS register to be maintained • MSDS Register to be readily available where the hazardous substances are used and stored. • Hazardous Goods cabinet/container on site . • Hazardous Gases stored as per standard. • All DG and hazardous substances to be risk assessed . • Provide work crews with the correct PPE inline with SDS requirements. • Provide Appropriate First aid equipment including eye wash facilities at works area, Emergency response and Spill response equipment available as required and as recommended by SDS. • Personnel to read SDS and incorporate controls into SWMS or Take 5. • Spill kits • Eye wash station set up at DG/HG container	D	3	M	Yes				0		
26	**General Site Work** **Handling Dangerous Goods or Hazardous Substances**	Environmental leaks , poor disposal of substances	Environmental	Environmental damage	C	4	H	• Storage of DG and hazardous substances as per relevant standards and codes of Practice . MSDS register . • Hazardous Goods container on site • Hazardous Gases stored as per standard. • Emergency response and Spill response equipment available as required and as recommended by SDS. • All disposals in accordance with statuary requirements and in full compliance with the CEMP and EMP. • Spill kits	D	2	L	Yes				0		
27	**General Site Work** **Use of Compressed air (Compressors)and air tools**	Air injection, whipping hoses and fittings, Noise	Health & Safety	hearing damage,personnel injury	C	3	H	• All air compressors to be serviced and maintained in accordance with the OEM. • All hoses and attachments to be in good working order. Safety clips and whip checks to be in place on all air hoses and air tools when in use. • No person to direct compressed air at themselves or another person. No person to blow down clothing. • There must be someone else working in the vicinity or a spotter capable of shutting down the compressor should there be an emergency. • A daily prestart must be conducted on all compressors before use each shift. • Hearing protection to be worn. • SWMS for the task being conducted for additional controls.	D	3	M	Yes				0		
28	**Earth works and Civil** **HRCW (High Risk Construction Work due to "Work in an area with movement of powered plant")**	Interaction of plant or equipment with third party property or personnel. Underground services (e.g. power, gas)	Health & Safety	Possible damage to plant or personnel	C	4	H	• Review DBYD / Client plans / as built drawings • Full service location (potholing) prior to mechanical excavation on site (as required) • Hand-dig in immediate vicinity to known services as per permit requirements • Spotter to accompany mechanical excavation at all times • Jemena high pressure standby to be present for any Jemena Asset Excavations. • Jemena PTW in place (when applicable) • Third party PTW in place • Monitor and restrict the entrance/access to site to reduce the possibility of a third party entering site unauthorised with their vehicle/property. • Ensure site security is monitored constantly by supervision. • Work crew to set up an exclusion zone around Earth works /piling activities. • Signage to be placed for exclusion of personnel not directly involved with the task.	D	4	M	Yes				0		
	Earth works and Civil **HRCW (High Risk Construction Work due to "Work in an area with movement of powered plant")**	Interaction of plant or equipment with third party property or personnel. Underground services (e.g. power, gas)	Health & Safety	Possible damage to plant or personnel	C	4	H	• If there is any unauthorised entry to site/exclusion zone then work must cease until the unauthorised personnel and/or their property is moved to a position of safety • Ensure communication between all work crews is maintained (SIMOPS). In conjunction with Prestart meetings, Hazob cards, Take 5s, SWMS, toolbox meetings.	D	4	M	Yes						
29	**Earth works and Civil**	Disturbance/ work outside of defined work area (co-ords)	Business, Financial	Construction delays	C	3	H	• Survey to identify area of ground disturbance prior to any excavation commencing • Ensure that boundary survey is complete and boundaries are clearly marked before commencing on site clear and grub etc. • Review DBYD / Client plans / as built drawings	E	2	L	Yes				0		
30	**Earth works and Civil**	Interaction of plant or equipment or personnel.	Business, Financial	Possible damage to plant or personnel injury	C	4	H	• Current and approved drawings on site and issued to Excavation team • Current GIS data and Information from client. • Appropriate spotters will be assigned where required. • Work crew to set up an exclusion zone around piling activities. • If there is any unauthorised entry to site/exclusion zone then work must cease until the unauthorised personnel are moved to a position of safety..	D	4	M	Yes				0		
31	**Earth works and Civil** **Work near Third Party Assets**	Failure to follow safety requirements of the Asset Owner	Health & Safety	possible personal or property damage	C	4	H	• Jemena PTW in place • Area surveyed • Dial before you dig and site as built drawings. • Postively identify service using Vacuum Truck excavation • Hard barricade excavations of known services • The location of the services shall be clearly marked. • Signage/flagging to be erected at known location of services as a hold point for work crews. • Jemena high pressure techs. present for works	D	4	M	Yes						

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					L	C	R		L	C	RR	ALARP		L	C	RR	ALARP	
32	**Earth works and Civil**	Inadequate sediment and erosion control	Environmental	Environmental damage	C	3	H	• Ensure all sediment and erosion controls are installed as per the CEMP and ESCP the specific drawings for the pipeline • ESC Procedure is implemented, and confirming understanding by construction personnel of Procedure through Training and Induction • ESC measures to be installed prior to clearing or within 24 hrs of start • ESC controls to be in place prior to disturbance if rain predicted • Ongoing review of control measures • Controls regularly inspected and repaired when 60% capacity breached • Pre/post rainfall monitoring and audits • Incident reporting • Keep topsoil stockpiles to 2m and away from drainage lines, watercourses • Remove sediment from external roads as soon as possible • Watering roads for dust suppression to be done to minimise runoff • Communicate to construction (during the site walk through) areas of problematic soils on site • Develop (in consultation with construction) the ESC Site Environmental Plans for each construction phase • Upon cessation of works, commence rehab as soon as is practicable • Responsible to uphold the General Environmental Duty and undertake works in accordance with all contractual and legislative requirements.	D	3	M	Yes							
33	**Earth works and Civil** **Formwork/** **concreting**	Manual handling hand tools sharp edges /objects Muscular Skeletal Injuries due to: Posture strain Repetitive strain Vibration concrete burns Concrete slurry contact with eyes	Health & Safety	Musculoskeletal injuries	C	4	H	• Use mechanical aids wherever possible • Use correct lifting techniques. eg 1. Plan Your Lift 2. If the load is too heavy or awkward to handle alone, get assistance. ... 3. Keep the Load Close. ... 4. Avoid Twisting and Turning Your Back. • Personnel only lift weight that is comfortable to lift for that individual. • Ensure clear path of travel when moving an item from point to point. • Plan any manual tasks to ensure adequate resources and rotation of tasks if required. • Task specific gloves and PPE to be used - per site requirements • SWMS • Assess area for hazards • clear access/egress • Caps on reo-bars/star pickets • Correct PPE as identified on MSDS • Check formwork for residual nails prior to use • Formwork to have nails removed when stored for reuse • Correct use of tools • Portable eye wash station to be on site where concrete pour is happening. • First Aid Kits	D	4	M	Yes					0		
	Earth works and Civil **Use of concrete pumps/trucks**	Interaction of plant or equipment	Health & Safety	possible plant property and personal damage	C	4	H	• Deny access to unauthorised personnel. • TMP in place • Trucks to be escorted conto site • Spotters in place • Delivery drivers to have a visitor induction and conduct breath test and be under direct supervision of a fully inducted person. Trucks to be isolated during task and fundamentaly stable	D	4	M	Yes							
34	**Earth works and Civil** **Use of concrete pumps/trucks**	Collapse of concrete pump, line blockage	Health & Safety	possible plant property and personal damage	C	4	H	• All concrete pumps to be maintained in accordance with the OEM and pipes to be thickness tested. • Concrete pump log book to be available at all times the pump is on site. • The log book must be current and up to date. • Only suitably qualified and trained personnel (High Risk Licensed as required) to operate concrete pumps and concrete trucks. • Concrete pumps to be set up on the plant hard stand (Known bearing capacity of the hard stand) in accordance with the operators manual. • Ensure no person in the line of fire when cleaning the pump lines or where there is a blockage	E	4	M	Yes							
35	**Earth works and Civil** **Use of concrete pumps/trucks**	Concrete slurry contact with eyes/skin	Health & Safety	Possible eye injury or skin irritation or dermatitus	C	4	H	• Use appropriate PPE (Glasses) and gloves. • Ensure an adequate supply of eye wash is on site from mobilisation onwards. • If contact occurrs use eyewash to irrigate the affected eye and wash other affected body part with clean running water. Any eye injury requires a medical investigation to ensure no damage to the eye. • Medical investigation as a precaution only and NOT a medically treated injury unless there is a need for further medical treatment.Full Sleeve Shirts to be worn and rolled down. • Check PPE is appropriate for driver/operator in compliance with site requirements.	D	4	M	Yes					0		
36	**Earth works and Civil** **Concrete works Concrete truck/ pump wash out**	uncontrolled wash out of concrete trucks/pumps	Environmental	Contamination of area with uncontrolled wash out of concrete trucks/pumps	B	2	M	Wasco to install and maintain a designated bunded and lined wash out area for the concrete delivery trucks and concrete pumps.	E	2	L	Yes						
37	**Earth works and Civil** **Concrete works Concrete delivery to site**	poor mix design or lengthy delay between batching and delivery to site/placement on site.	Business, Financial	Concrete not to spec and not complying with the Quality parameters	C	2	M	• Wasco to ensure an approved concrete mix design to comply with the time paremeters of the quality requirements for concrete placement. Only order concrete when everything is ready for placement. • Undertake approriate tests prior to pouring (slump)	D	2	L	Yes						
38	**Earth works and Civil** **Trench excavation, backfill**	Excavation, Non compliant open trench causing possible trench collapse and personal damage to workers	Health & Safety	personal injury	C	4	H	• Whenever any person is to enter the trench it shall be benched or shored if deeper than 1.5m. • Shoring box to be used if benching is not possible • 2 suitable forms of ingress/egress (Stairs / ramps) (bellholes) • All operating plant and equipment (including stationary motors, welders etc.) must be at a minimum or 1.5 x depth from the excavation when personnel are to work in the excavation. • No vehicles or plant/equipment are to be placed in the zone of influence of the trench.when personnel are to work in the excavation. • No person to enter an excavation while working alone. • Open trenches/excavations to be protected/identified as required with either an earth bund or bunting or other suitable method (e.g. A cover over a penetration).	D	4	M	Yes							
39	**Installation Pre Cast Concrete** **HRCW (High Risk Construction Work due to "Work in an area with movement of powered plant")**	Working around suspended loads	Health & Safety	Crush injuries	C	4	H	• Only those personnel required for the task to be in the work area to reduce congestion. • Involve Crane/excavator operator ,dogman and other relevant persons when planning, • SWMS for task Competent Operators , • Tested and tagged lifting equipment . • Rigger Gloves • Inspect ground conditions and confirm suitability • Determine the movement and load limitations of any excavators • Loads being lifted are within OEM load charts • Excavators fitted with burst protection	D	4	M	Yes					0		
40	**Earthworks / Piling**	Interaction of plant or equipment or personnel.	Business, Financial	Possible damage to plant or personnel	C	4	H	• Current and approved drawings on site and issued to Earth works/Piling team. • Current GIS data and Information from client. • Appropriate spotters will be assigned where required. • Work crew to set up an exclusion zone around piling activities. • If there is any unauthorised entry to site/exclusion zone then work must cease until the unauthorised personnel are moved to a position of safety.	D	4	M	Yes					0		
41	**Earthworks / Piling**	Incorrect operation of piling rig	Health & Safety	Failure of piling rig, dropped cage, personal damage to personnel working with piling rig	C	4	H	• Exclusion zone to be established around piling activities. • Ensure communication between all work crews is maintained (SIMOPS).In conjunction with Prestart meetings, Hazob cards, Take 5s, SWMS, toolbox meetings. • The number of other trades on site is minimal at the piling stage eliminating unnecessary personnel at the work site. • Only experienced (VOC'd) suitably licenced/trained personnel to be involved with the tasks • High risk licensed dogman to attach and direct suspended loads. . • Plant hazard risk assessments.SWMS and SOPs . • Competent personnel will be utlised for each task, they will report to the Construction Superintendent, Construction Supervisor and the Project Engineer who will have ultimate responsibility for ensuring the work is performed in a safe manner. • Appropriate PPE for task - as per SWMS • Positive communication • Piling rig to be set up on suitable ground conditions - mats to be used if required	D	4	M	Yes					0		

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					L	C	R		L	C	RR	ALARP		L	C	RR	ALARP	
42	**Stringing of pipe**	Unsafe operation of excavator	Health & Safety	Personal injury	C	3	H	• A LOAD/ UNLOAD EXCLUSION ZONE is to be established prior to any lifting.No person to access on to the load without adequate edge protection in place to prevent a fall. Excavator operator must be competent and VOC'd Trained and competent rigger/dogman slinging the load.Lifting equipment inspected ,Test and tagged by a competent person. One person directing lifting operations – single point of contact. • Truck to escorted onto site • Positive communications. • Spotter in place. • Truck driver to remain in the truck at all times • Ensure all non-essential equipment and personnel clear of area and pipeline (Close off ROW if necessary). • truck driver will drive forward as instructed by the spotter • Excavator to position pipes at intervals along the right of way • No body parts in the line of fire. • Personnel ensure no part of body is placed under the suspended load. (Positive communications) • Operator to slew without unnecessary sharp movements • Ensure pipe is no higher than 1m from the ground if walking excavator is necessary.	D	3	M	Yes							
43	**Pipe Welding**	Pipe joining	Business, Financial	Incorrect welding materials, technique, procedures etc	C	4	H	1. Inspection/Quality Processes 2. Visual inspection of pipe. 3. Weld procedures and independent third party validation 4. Qualified Welders.	D	4	M	Yes							
44	**Pipe Welding**	Pipe joining Pinchpointsmanual handling.	Health & Safety	Musculoskeletal injuries Hand injuries	C	4	H	• Clamps etc. Pinchpoints Gloves to worn • Personnel only lift weight that is comfortable to lift for that individual. • Use team lifts where required. • Ensure clear path of travel when moving an item from point to point. • Pipe supports	D	4	M	Yes							
45	**Pipe Welding**	Suspended Pipe during alignment & tackingDropped pipe	Health & Safety	Dropped pipe/Significant crush if pipe rolls after drop	C	4	H	• Welding work procedures including fit- up • Accepted work procedures • Knee high drop height. Use of chocks/skids/bags • Qualified Welders • No work under suspended loads	D	3	M	Yes							
46	**Pipe Welding and Grinding**	Electricity ,	Health & Safety	Electrical Shock / Burns/	C	4	H	• Only welders with VRD (Voltage Reduction Devices) fitted may be used on site. • All electrical equipment must be tested and tagged (RuGBY System) and in good order. • All electrical equipment must be visually inspected before use each shift to ensure it is in good repair with no damage. • All damaged or out of test date electrical equipment must not be used and must be tagged out of service and removed from the job site as soon as practicable for repair by a qualified/ certified repair person (Licenced electrician) before returning to the work area or condemned and replaced. • Electrical circuits must be protected by RCD and tested before the first use daily. . • All electrical leads to off the ground on insulated hooks and/or lead stands	D	4	M	Yes							
47	**Pipe Welding/grinding**	Welding flash/burns etc	Health & Safety	Potential eye injuries, burns etc.	C	3	H	• Use correct PPE for the task, (Welding masks, welding gloves,) appropriate for the specific task. • Restrict unnecessary personnel from entry into the welding work area. SWMS to show controls. • Take 5 as required. • Only experienced and suitably qualified welders to be used. All welding plant and consumables to be in good order. • Ensure part rods etc. are not just dropped and are disposed of safely. • Welders to use correct welding eye protection at all times when welding. • Double eye protection when grinding • Welding Humpies to be utilised	D	3	M	Yes				0			
48	**Welding/grinding**	uncontrolled movement of grinder, failure of oxy set/hoses)	Health & Safety	Personal Injury	C	4	H	• Use flash back arrestors on both gauge and hand piece ends of oxy set, guarding to be in place with grinders., handle to be in place on grinder in accordance with OEM, experienced trades people and trades assistants to use tools of trade. • All tools to be inspected prior to use each shift. • Any damaged tools to be tagged out of service and repaired or replaced before use on site. • Hazards and controls to form a part of the relevant SWMS for the tasks involving these tools. • Use correct PPE for the task, (Welding masks, welding gloves, welding bib.) appropriate for the specific task. • Double Eye protection when grinding and oxy cutting.	D	4	M	Yes				0			
49	**Pipe Welding**	Uncontrolled Fire	Health & Safety	Property, Plant & Equipment Damage, Injury to Personnel	C	4	H	• Fire Extinguishers on Each Welding Rig • Humpy to be used during welding and grinding as required • Fire watcher to be in place • Conditions to be assessed and monitored each day by senior representative onsite. Consideration given to wind direction and adjacent land use • Adhere to local council bushfire controls - exemption as required	D	4	M	Yes							
50	**Pipe Welding** **Welding in bell holes**	Possible trench collapse and engulfment, equipment roll over, unsuitable access points, trenches not correctly protected, adverse weather conditions affecting the integrity of the trench/excavation	Health & Safety	personal injury	C	4	H	• Well ventalated area • All operating plant and equipment (including stationary motors, welders etc.) must be at a minimum or 1.5 x depth from the excavation when personnel are to work in the excavation. • Check wind direction • Spotters in place • No personnel are to enter a trench unless site specific Risk Assessments conducted and deemed safe by the supervisor • No person is authorised to enter a trench if lone working • Assessment of ground conditions to be conducted constantly by a competent trenching supervisor • Use of benching or shoring boxed as determined by availability of space and ground conditions must be constructed • No working in trenches greater than 1.5 metres if benching or shoring is not constructed/installed and something could affect the stability of the trench (eg. water seepage from side or base, cracks appearing, subsidence beside the excavation). • 2 Access & Egress points at all times must be installed where personnel will be working & 1 x ladder at the site as an emergency back up.	D	4	M	Yes				0			
51	**Hot tap** **HRCW (High Risk Construction Work due to"Work on or near energised electrical installations or services and/or work on or near presurised gas mains or piping"**	Uncontrolled gas release,ignition of gaseg. underground pipes Damage to existing infrastructure	Health & Safety	Damage to existing infrastructure resulting in personal damage to personnel	C	5	E	• Client Induction • High pressure standby techs on site Jemena PTW • Any work within 5 meters of the live gas assetts shall require work to be conducted under Client PTW with all the associated conditions,controls and information. • Personal Gas detectors used with every work group in Hazardous area Work shall not start until all relevant service plans have been received and service locations marked on the pipe and. • SWMS and procedures in place • Specilised Contractor with trained and competent personnel to be utilised for hot Tap work • Discharge stored energy • Check depressurisation prior to unbolting / cut-ins • Double isolation where possible	E	5	M	Yes							
52	**NDT**	Radiation exposure	Health & Safety	Health effect	B	4	H	1. Only conducted by NATA approved, competent & licensed personnel 2. Safe System of Work SWMSN 3. Supervision/Pre-start/Check safe 4. Sub-contractors Procedures and emergency response for use with radioactive materials 5. Inductions 6. Exclusion zones 7. Signage 8. Exposure monitors for technicians 9. Sequencing of work	D	4	M	Yes							
53	**Field Joint Coating** **Stopaq**	Eye injury Skin contamination Dust on pipe Surface prep	Health & Safety	Medical Treatment	C	3	H	• Ensure a current copy of all the MSDS's for the product being used are available onsite where the work is being carried out. All personnel shall read through the MSDS's and be aware of the known risks and associated hazards with each material they will be using. • Ensure appropriate PPE are worn and used in accordance with MSDS requirements • Surface must be clean to ensure adhesion and prevent rework • double eye protection and PPE for mechanical brushing (griding) • Power tools in good use, tested and tagged and appropriate for task.	D	3	M	Yes							
54	**Field Joint Coating**	cutting of tape ,hand injury	Health & Safety	Medical Treatment	C	2	M	• PPE gloves to worn • scizzors to be used • Competent personnel • Safe System for Work * (SWMS)	D	2	L	Yes							
55	**Field Joint Coating**	Manual handling	Health & Safety	Possible serious injury	C	3	M	• Where awkward positions are required to be maintained in order to complete wrapping take regular breaks • Rotate tasks • Use correct manual handling techniques. • Wear appropriate gloves for manual tasks being undertaken	D	3	M	Yes							

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56	**Trench excavation, lay , backfill**	Work near Third Party Assets, Failure to follow safety requirements of the Asset Owner	Health & Safety	possible personal or property damage	C	4	H	• Client PTW required witihin 20m of underground services and 5m of aboveground services (signage required for exclusion zones) • Area surveyed • Dial before you dig and site as built drawings. • Positively identify services using Vacuum Truck excavation • Hard barricade excavations of known services (where required) • The location of the services shall be clearly marked. • Approval from asset owner prior to any works in asset exclusion zone • Authorisation to excavate	D	4	M	Yes						
57	**Trench excavation, lay , backfill**	Excavation, Non compliant open trench causing possible trench collapse and personal damage to workers	Health & Safety	personal injury	C	4	H	• Whenever any person is to enter the trench it shall be benched or shored if deeper than 1.5m. • 2 suitable forms of ingress/egress (Stairs / ramps) (bellholes) • All operating plant and equipment (including stationary motors, welders etc.) must be at a minimum or 1.5 x depth from the excavation when personnel are to work in the excavation. • No vehicles or plant/equipment are to be placed in the zone of influence of the trench.when personnel are to work in the excavation. • No person to enter an excavation while working alone. • Open trenches/excavations to be protected/identified as required with either an earth bund or bunting or other suitable method (e.g. A cover over a penetration).	D	4	M	Yes						
58	**Trench excavation, lay , backfill**	Excavation - plant Line of fire	Health & Safety	crush injuries	C	4	H	• Exclusion zone around mobile plant • Positive communication with operator • Deadman switch to be used at all times • Competent operator • Only essential personnel in work area * Spotters when required * SWMS	D	4	M	Yes						
59	**Trench excavation, lay , backfill**	Install Pipe Trench collapse, overturned excavator	Health & Safety	, crush injuries	C	4	H	• The lifting in of the pipe by the Excavators shall be deemed a multiple lift and a lift plan is required to demonstrate adequate capacity of the machines for the placement of pipe into the trench. • All Dual lifts rigging and direction to be conducted by a Intermediate rigger or above • Lift plan in place • Excavators is to remain >2m from the edge of the trench to avoid collapse where possible.No vehicles or plant/equipment are to be placed in the zone of influence of the trench • Exclusion zone around the slew area of the excavator • Positive communications • No personnel to be between the pipe and the trench when lifting is undertaken. "Line of Fire" shall be addressed in the SWMS for the task. • Spotter when required * SWMS * Inspection of all lifting equipment prior to use by a competent person and tagged	D	4	M	Yes						
60	**Trench excavation, lay , backfill**	Holiday Inspection (steel transition fittings) for risers	Health & Safety	Electrical Shock	C	2	M	• Experienced Jeeper Operator * All other personnel clear of Pipe under test. • Ensure Jeeper is turned off whilst not in use. • Pipe is earthed * SWMS * Site Supervision	D	2	L	Yes						
61	**Trench excavation, lay , backfill**	Install Pipe Pipe damaged during the placement process	Business, Financial	Delays financial loss	C	2	M	• Ensure that the pipe is handled in a manner to prevent damage to the pipe. • Ensure correct bedding is installed to protect the pipe. • Ensure that the pipe is controlled to prevent permanent distortion of the pipe through excessive flexing/bending during placement after welding. * SWMS • Ensure pipe joins are suitably coated to protect the pipe	D	2	L	Yes						
62	**Trench excavation, lay , backfill**	As-built surveying Line of fire	Health & Safety	crush injuries	C	3	H	• As-built survey to be recorded from side of trench, no walking on top of pipe • Suitable attachment on the survey pole shall be installed so the operator does not lean too far over the trench • Survey will take place once there is sufficient static pipe in the trench, to be clear of lower in operations	D	3	M	Yes						
63	**Trench excavation, lay , backfill**	Backfill Plant personnel interaction	Health & Safety	Personal Injury	C	4	H	• Competent operator • Restricted access work areas to be set up/defined around working plant and exposed edges/excavations Call up, • Positive coms with operators • The supervisor must clearly communicate site conditions and control measures to be adopted/followed to the plant operators and other work crew members prior to the start of any new task or if there is a change of conditions including new personnel to the task. • Spotter if required. • Speed limit, parking for light vehicles away from the pipeline machinery and its work range, • Two way radios, • Light beacons on mobile plant while working on the site. * SWMS	D	4	M	Yes						
64	**Trench excavation, lay , backfill**	Backfill Poor compaction	Environmental	Poor implementation of final environmental controls	C	2	M	• Ensure all fill is compacted with adequate passes of the grader tyres, or other suitable plant on the trench line to reduce possible subsidence which may required rework at a later date. • Competent operator • Suitible fill to be used	D	2	L	Yes						
65	**Reinstatement of is returned to pre construction state**	Poor implementation of final environmental controls	Environmental	Re work Poor implementation of final environmental controls	C	3	H	• Ensure that all required permanent controls are in place in accordance with the CEMP. • Photographic proof of reinstatement to be collected as proof of compliance with all relevant environmental requirements. • This may be achieved through a pre-construction photographic survey and a post-construction photographic drive through.	D	3	M	Yes						
66	**Reinstatement** **Interaction with plant/other personnel**	Interaction with plant/other personnel	Health & Safety	personal injury plant damage	C	4	H	• Competent operator • Restricted access work areas to be set up/defined around working plant. • The direction of work flow is to be determined by the supervisor and clearly communicated to the plant operators prior to the start of any new task or if there is a change of conditions including new personnel to the task. • Spotter if required. • Speed limit, allocated parking for light vehicles, Two way radios.	D	4	M	Yes						
67	**Reinstatement** **Installation of Marker signs**	Manual Handling Noise	Health & Safety	Personal Injury	C	4	H	• Electrical equipment serviceable / tested and tagged • RCD to be use with all electrical tools & equipment • Correct PPE for the task, Task specific gloves to be worngloves • As built survey of constructed line • Known offsets per drawing *SWMS	D	4	M	Yes						
68	**Structural, Mechanical and Piping** **Use of cutting tools (Grinder, oxy set, cut off saw, etc.)**	uncontrolled movement of grinder, failure of oxy set/hoses	Health & Safety	Personal Injury	C	4	H	• Use flash back arrestors on both gauge and hand piece ends of oxy set, guarding to be in place with grinders/cut off saws ,, handle to be in place on grinder in accordance with OEM • Experienced trades people and trades assistants to use tools of trade. • All tools to be inspected prior to use each shift. • Any damaged tools to be tagged out of service and repaired or replaced before use on site. • Hazards and controls to form a part of the relevant SWMS for the tasks involving these tools. • Double eye protection to be used. • Task specific gloves to be worn.	D	4	M	Yes					0		
69	**Structural, Mechanical and Piping** **Painting/protective coating**	Painting/protective coating	Health & Safety	Personal injury to hazardous nature of required coatings	C	4	H	• Only experienced personnel to be used to apply protective coatings. • All applications and preparation of the surface to be protected to be in accordance with the MSDS for the product. • A SWMS must be prepared for the task in consultation with the work force. • Adequate and appropriate PPE must be supplied and utilised in accordance with the MSDS for the product/s being used.	E	4	M	Yes					0		
70	**Structural, Mechanical andPiping** **Painting/protective coating**	Painting/protective coating	Environmental	Incorrect disposal of hazardous substances. Escape of hazardous substances to the environment	C	2	M	• Ensure all hazardous products are stored correctly (i.e. Haz Substances Container) and all empty /used containers are disposed of in accordance with the MSDS and the Project CEMP. • Any spills to be contained, reported, investigated and cleaned up in accordance with the CEMP	D	2	L	Yes					0		
71	**Structural, Mechanical and Piping**	Failure to ensure structural items secured correctly HRCW (High Risk Construction Work due to "Work in an area with movement of powered plant")	Health & Safety	Potential for collapse and injury to personnel	C	4	H	• All structural work to be conducted in accordance with the SWMS. • Ensure structural items are secured in accordance with the design drawings. • Ensure all bolts are positively identified when tightened to specification. • Use only high risk licenced crane operators and rigger/dogmen. • Dogman /rigger to ensure that the structural items are correctly secured before removing the rigging from the load (Positive communication with the personnel securing the structural members).	E	4	M	Yes					0		
72	**Structural, Mechanical and Piping** **Welding**	Welding flash/burns etc	Health & Safety	Potential eye injuries, burns etc.	C	3	H	• Use correct PPE for the task, (Welding masks, welding gloves, welding bib etc.) Use welding screens and /or welding huts appropriate for the specific task as required. • Restrict unnecessary personnel from entry into the welding work area. SWMS to show controls. • Take 5 as required. • Only experienced and suitably qualified welders to be used. All welding plant and consumables to be in good order. • Check where welding / electrical leads will run not to cause entanglement	D	3	M	Yes					0		

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73	**Structural, Mechanical and Piping Welding**	Restricted work area, minimal working room resulting in awkward positions and poor access and egress	Health & Safety	Musculoskeletal injuries	C	4	H	• Rotate task between welders or give adequate rest periods between each pile/skid weld. • Encourage the work crew involved to do stretching exercises prior to and after each weld cycle. • Welder to have a TA available to assist and reduce stress on the welders body and the need to get in and out to source materials. • Adequate means of access and egress Clear the area around the openings of tools, equipment and material. • Check where welding / electrical leads will run not to cause entanglement • Combustion engine equipment i.e. compressor, generator, shall never be positioned to allow exhaust fumes to be drawn into the work area • Set up welding machines away from work area and run leads to work area	D	4	M	Yes						
74	**Structural, Mechanical and Piping**	Damage to installed building, pipe, pipe racks, infrastructure HRCW (High Risk Construction Work due to "Work in an area with movement of powered plant")	Health & Safety	Plant, machine, Crane or lifted load strikes infrastructure causing damage to infrastructure or load and possible damage to crew working in vicinity	C	4	H	• Use spotters when working close to above ground assets (Dogman Rigger and other as required.). • Only those personnel required for the task to be in the work area. Exclusion zones delineated as required. • No personnel under a suspended load. Use tag lines to eliminate personnel in the line of fire. • Ensure adequate escape path for dogman/rigger or other worker involved in the task. • Use only experienced and where required high risk licenced personnel to undertake the task. • Ensure good communication within the work crew and especially between the dogman/rigger and the crane operator. • Ensure slew cranes are set up correctly in accordance with the crane OEM with adequate crane pads and on known bearing capacity hard stand.	D	4	M	Yes				0		
75	**Structural, Mechanical and Piping** **Install Pipework / flanges/ Flange management**	Pipe rolling on stands or supports Congestion within the work area, rushing , complacency ,Torque multiplie Manual handling.	Health & Safety	hand Injuries. Musculoskeletal injuries crush injuries	C	4	H	• Only those personnel required for the task to be in the work area to reduce congestion. • Determine the movement limitations of any cranage and the load, lift plan if considered to be a difficult lift due to congestion restrictions Involve crane operator ,dogman and other relevant persons when planning. • SWMS for general cranage Competent (High Risk Licensed) Operators , • Tested and tagged lifting equipment . • Rigger Gloves • SWMS for Removal/Installation of Pipe and Valves, Including Flange Management • Take 5 • Inspect all pipe supports • Pipe stands to be rated for the pipe that they are supporting, no modifications to construction pipe stands. • Placed on Level hard ground. • Chock wedges / Ratchet straps to be utilised to stop pipe rolling • Ensure pipe stability before removing any rigging • Ensure all pipe fitters and those undertaking flange management are trained and deemed competent. and follow flange management Plan • Ensure all bolts are positively identified when tightened to specification. • Use mechanical aids wherever practicable. Use correct lifting techniques. • Calibrated equipment. • Personnel only lift weight that is comfortable to lift for that individual. • Use team lifts where required. Ensure clear path of travel when moving an item from point to point. • Plan any manual tasks to ensure adequate resources and rotation of tasks if required. • Inspect all hand tools before use	D	4	M	Yes				####		
76	**Electrical Disconnection and installation**	Electrical Stripping, Glanding and termination (Strip cables, crimp cables Install cables into switchboard)	Health & Safety	Hand injuries, Crushes/ Pinch points Slips, trips, Manual handling	C	3	H	• Appropriate tools and equipment available and relevant to task • Ensure all personnel are fit for work • Site access approval and relevant inductions completed • Trained and competent personnel to complete scope of works • Licensed electrician performing work • File burrs • Awareness of surroundings • Maintain good housekeeping • Maintain good posture, avoid twisting, use additional persons for larger cables • Use a cable stripping tool where possible, wear gloves where required • Keep hands clear of crimping jaw, positive communications • No work to be done inside the Hazardous area without the appropriate Client Permit to Work with all the associated conditions and information. • Personal Gas detectors used with every work group	D	3	M	Yes				0		
77	**Electrical Disconnection and installation**	Use of Ladder Cutting cable tray and brackets Installing brackets and saddles onto concrete Installing cable tray and conduit onto brackets Unserviceable or fit for purpose equipment	Health & Safety	personnel injury	C	4	H	• SWMS for task • Use platform type ladder • Maintain 3 points of contact • Ensure platform Ladder is on secure level ground • Establish a drop/Exclusion Zone around area and use a spotter if required • Visual inspection and function test prior to use of equipment • Ensure equipment is tested and in date • Correct Hand and Eye protection and Site-specific PPE • Maintain safe body position at all times • Use adequate hearing protection • Double eye protection when grinding • File burrs after cutting • Task Specific Gloves to be worn while cutting • Practice safe lifting techniques / 2 person lift if required • Follow manufactures recommendations and SDS, PPE requirements • SDS to be checked prior to any activity were solvents, cutting compounds etc are to be used.	D	3	M	Yes				0		
78	**Electrical and instrumentationElectrical Installation of cable** **Setup cable onto cable stands, Installing cables on cable tray, Cable tie cables in place, electrical testing of cables as per relevant standards**	Slips, trips, pinch points, manual handling, cable drum falling, Restricted access, Damage to cables	Health & Safety	Personnel Injury	C	3	H	• Practise safe lifting technique • Check for sharp edges along cable route, use cable rollers where required • Maintain good posture, additional personnel required during pull, • Use of winch where required ,Competent operator ,rated winch and rope • cut cable ties flush, • Housekeeping • Avoid overreaching • Trained and competent personnel to be present on both ends of cable being tested. • Awareness of surroundings	D	3	M	Yes				0		
79	**Electrical Disconnection and installation** **Electrical Equipment installation** **Mounting of electrical equipment**	Manual handling	Health & Safety	Musculoskeletal injuries Pinch point injuries, crushing injuries Hand injuries	C	3	H	• Ensure all persons conducting activity are trained, competent correctly licensed to perform task. • Wear appropriate PPE to perform task • Be aware of surroundings • Ensure good housekeeping round work area • Positive communication between activity team members to ensure everyone knows what is happening • Provide an exclusion zone around the area when conducting lifts • Two man lifts or mechanical aids for heavy or awkward equipment lifts	D	3	M	Yes				0		
80	**Electrical Disconnection and installation** **Instrument tubing and instrument panels**	Cutting of tubing, attachment of tubing to devices tube bending	Health & Safety	Musculoskeletal injuries hand injuries from sharp edges, sprain	C	3	H	• Ensure all persons conducting activity are trained, competent correctly licensed to perform task. • Wear appropriate PPE to perform task eg gloves to worn • Correct tools for the Task • Ensure good housekeeping around work area • Positive communication between activity team members to ensure everyone knows what is happening • Mark tube to ensure visual check is possible after termination of tube into device	D	3	M	Yes				0		
81	**Electrical Disconnection and installation** **Electrical & Instrumentation Cable Testing**	incorrect drawings/installations equipment not fit for purpose / suitably maintained electrical equipment not isolated	Health & Safety	Electic shock personal injury	C	4	H	• Licenced Electrician to carry out electrical installation works • Wear gloves if contact with sharp edges is possible • Carry out inspection without handling equipment where possible • Confirm equipment to be tested is recorded as isolated as per isolation procedure prior to works. • Use correct tools for inspection • No LV equipment to be opened when not isolated.	D	4	M	Yes				0		
82	**Testing**	Hydro testing sudden/ unsuspected release of stored energy	Health & Safety	Personal Injury	C	4	H	• Exclusion zones during onsite testing •Trained and experienced/qualified hydro testing crew • Testing times scheduled to eliminate excess workers on site: i.e. at lunch breaks, out of normal hours, etc. • A specific SWMS for all hydro testing. Line of Fire" hazards must be addressed in the SWMS. • Ensure that all fittings/hoses are correctly pinned and have whip checks correctly applied. • Clear communication with all other personnel who are to remain working on the processing construction site, during any of the hydro testing processes, near the exclusion zone.	D	4	M	Yes				0		
83	**Testing**	Hydro testing	Environmental	Potential for contaminated water to be released to the environment	C	2	M	• All hydro water to be captured and where possible reused . • All hydro water to be released or used in another way is to meet the environmental requirements.	D	2	L	Yes				0		
84	**NDT testing**	NDT testing Radiation	Health & Safety	Potential for personal damage to work crew and others in the work area.	C	4	H	• Exclusion zones during onsite testing • Trained and experienced/qualified testing crew • Testing times scheduled to eliminate excess workers on site: i.e. at lunch breaks, out of normal hours, etc. • A specific SWMS for all NDT e.g. A specific SWMS for radiography and other forms of NDT. • Clear communication with all other personnel who are to remain working on the construction site during any of the NDT processes.	E	4	M	Yes				0		

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Note: All relevant items in Part A apply to this section																		
1	**Lifting of Units**	Faulty Plant/crane/equipment	Health & Safety	Personal injury caused by faulty plant	C	4	H	• All crane certifications , Specs and maintenance records to be submitted before coming to site and reviewed . • Rigging arrangements to be inspected and verified for condition, suitability and tagging prior to dispatch to site. • Only approved plant and equipment to be allowed to operate on site. • Equipment to match that used to generate lift study, All plant to be maintained as per the OEM or equivalent. • Plant risk assessment , Operators to be ticketed and VOCed • All plant to have a daily pre start check done by the operator each shift and recorded. Copies of the daily pre start check must be submitted at the completion of each day to the Supervisor.	D	4	M	Yes				0		
2	**Lifting of Units Unloading/Loading plant, equipment or materials from trucks/transport**	Plant/ Plant or Plant/ Personnel interaction	Health & Safety	in personal or plant damage	C	4	H	• Maintain a dedicated area for loading / unloading crane components and set up. • Restricted access work areas to be set up/defined around working plant. • Breach of a restricted access work area shall result in disciplinary action as determined by the WASCO Construction Supervisor. • The direction of work flow is to be determined by the supervisor and clearly communicated to the plant operators prior to the start of any new task or if there is a change of conditions including new personnel to the task. • Reversing beeper on vehicles and plant. Spotter if required. Speed limit, allocated parking for light vehicles, Two way radios, Light beacons on mobile plant while working	D	4	M	Yes				0		
3	**Lifting of Units**	Poor Communication	Health & Safety	Instructions/direction not clear resulting in a health or safety incident	C	3	H	• Site Ensure communication between all work crews is maintained (SIMOPS). • Ensure planning takes into account work crew interactions and suitable meetings/directions are given and understood before starting tasks. • Carry out daily pre-lift meetings with the client rep on site, prior to carrying out heavy lifting operations • Assess prior to access to the work front Updated drawing Lift study, compaction tests.	D	3	M	Yes				0		
4	**Lifting of Units**	Plant/personnel interactions No exclusion zones	Health & Safety	No exclusion zones Possible plant strike on personnel	C	4	H	• No personnel to work inside the work zone of plant where practicable. • Delineation of the work zone is the minimum required with no go areas clearly signposted for exclusion of personnel not directly involved with the task. • Spotters in place SIMOPS to be discussed and advised at morning prestart. Communication between work crews to ensure risks are controlled	D	4	M	Yes				0		
5	**Lifting of Units**	Positioning of Truck and Cranes in wrong position Rushing ,Complacency ,unplanned movement ,eyes not on task ,loss of balance/traction/grip , unsuitable ground conditions	Health & Safety	resulting in injury to personnel	C	4	H	• Follow lift study/plan for positioning of cranes and truck Checking load shift had not occurred during transit - check with driver who will assess and release load binders . Review load on arrival and confirm generally consistent with the design details used to generate the lift study. • Heights and clearances for any lift over activities to be verified against design details via dummy run prior to commencing lift over. Trained , competent and VOCed operators / dogman only used. Fence to be removed for truck and crane access .Site to be secured at night . • Operator to verify radii in the required boom configuration by positioning hook and reading off computer prior to rigging load. Check slew radius clear of obstructions all round. Ground bearing capability to be tested and report to be prepared by authorized engineer. • Monitor and inspect ground conditions in the lead up to the lift to verify no substantial change from ground bearing tests, particularly, wet weather. • Matts to be used under all out-riggers to spread load and minimize ground bearing pressure, min. size as listed on drawing.	D	4	M	Yes	Provide additional bog matts available to use if required.	D	4	M	Yes	
6	**Lifting of Units**	Craneage/lifting HRCW (High Risk Construction Work due to "Work in an area with movement of powered plant")	Health & Safety	Possible crush injuries, dropped loads, pinch points, overturned cranes unstable crane pad, underground services,	C	4	H	• A SWMS to be developed in conjunction and consultation with the workforce involved for general site cranage. • Only high risk licensed operators and dogman/riggers to be used to operate a crane and select rigging and direct the crane operator. • For Heavy lifts the crane pad will be tested for compaction and bearing pressure capacity. All heavy lifts will be performed with a • Lift plan/Lift study commensurate with the weight of the load and the potential risk. Tested and tagged lifting equipment. • Mobile crane operations must be within the lift charts of the machine with adequate derating for any slope etc. For dual lifts only one nominated intermediate rigger or better to control the lift Spotters to be used. • Lifting points loose or damaged, Inspect, verify tight and tighten as necessary. Rigging to be re-inspected onsite prior to use. • Remove items placed on skids for transport (where arise) prior to slew and place. • Inspect for accumulation of water or other foreign materials during transport which may increase weight, remove as necessary. • Crane operator/s to verify weights as load taken.No person to be under a suspended load. • No person to be in the operational range of operating plant. Exclusion zones to be installed for lifting tasks to ensure other work crews are not in the firing line. Don't place	D	4	M	Yes				0		
7	**Lifting of Units**	Damage to existing, pipe, piperacks, infrastructure	Health & Safety	g damage to infrastructure or load and possible injury to crew working in vicinity	C	4	H	• Use spotters when working close to above ground assets (Dogman Rigger and other as required.). • Only those personnel required for the task to be in the work area. Exclusion zones delineated as required. No personnel under a suspended load. Use tag lines to eliminate personnel in the line of fire. • Ensure adequate escape path for dogman/rigger or other worker involved in the task. Use only experienced and where required high risk licensed personnel to undertake the task. • Ensure good communication within the work crew and especially between the dogman/rigger and the crane operator. • Ensure slew cranes are set up correctly in accordance with the crane OEM with adequate crane pads and on known bearing capacity hard stand. Ground bearing capability to be tested and report to be prepared by authorized engineer. • Monitor and inspect ground conditions in the lead up to the lift to verify no substantial change from ground bearing tests, particularly, wet weather. • Matts to be used under all out-riggers to spread load and minimize ground bearing pressure, min. size as listed on drawing. • Matts to be monitored during lifting activities. Check slew radius clear of obstructions all round. Operator to verify radii in the required boom configuration by positioning	D	4	M	Yes				0		
8	**Lifting of Units**	Noise	Health & Safety	Possible serious injury	C	3	H	• Ensure good communication within the work crew and especially between the dogman/rigger and the crane operator. • Crane crew to nominate what form of signals to be used eg. hand or radio before any lift. • Verify ambient noise does not interfere with clear communication and adjust communication plan appropriately.	D	3	M	Yes						