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Baseline Risk Assessment

H373204-0000-110-060-0001

REV. 0

DOCUMENT APPROVAL PROCESS

NAME		POSITION/MEETING NO.	SIGNATURE	DATE
Originators:	Duane Fischer	Project Health and Safety Manager		25-06-2024
Approver:	Fanie Scholtz	Project Manager	<i>Scholtz, Fanie</i>	25-06-2024
Original date: 25-06-2024				
Effective date: 25-06-2024				

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APPROVAL

RESPONSIBILITY	DESIGNATION	SIGNATURE	DATE
COMPILED BY (Latest Amendment)	Designation: Project Health and Safety Manager Name: Duane Fischer		25-06-2024
	Designation: TPL Specialist Consultant Name: Christopher Murray		26-06-2024
APPROVED BY	Designation: Project Manager Name: Fanie Scholtz	<i>Scholtz, Fanie</i>	25-06-2024
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DOCUMENT CHANGE HISTORY:

The owner of this document is responsible for the revision and control of the document, including updating of the table below, which contains the history of the document with details of each revision.

Date	Previous Rev. No.	New Rev. No.	Details of Revision
19/06/2024	-	A	New Document – Internal Review
19/06/2024	A	B	Client Review
25/06/2024	B	0	Approved for Use

This table summarises what has been changed in the document so that it is easy to keep track of the effected changes.

XX = Revision and Version number of the document being edited



Triangle with revision number indicates where the changes have been made in this revision

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1 INTRODUCTION

1.1 Purpose

The Baseline Health and Safety Risk Assessment detailed in this report was carried out in order to:

- Identify, analyse and prioritise the health and safety hazards and potential risks (unwanted events) associated with the execution phase of the TPL Inland Network Automation Project
- Identify effective control measures for reducing the risks to levels that are as low as is reasonably practicable
- Satisfy the requirements of the Occupational Health and Safety Act.

1.2 Scope

The Baseline Health and Safety Risk Assessment detailed in this report relates to the execution phase of the TPL Inland Network Automation Project.

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2 METHODOLOGY

The Baseline Health and Safety Risk Assessment was carried out in accordance with TPL's risk management requirements.

The hazards associated with the work were identified, and risk scenarios (unwanted events) were described indicating the manner in which a person may come into contact with, or be exposed to, a specific hazard.

An inherent risk rating (i.e. without considering controls) was qualitatively assigned to each risk scenario using the TPL frequency, probability and consequence scales and descriptors detailed in Table 2-1, Table 2-2 and Table 2-3.

Control measures for managing the risks to levels that are as low as is reasonably practicable were identified for implementation on the project, and control effectiveness ratings (refer to Table 2-4) were then assigned to determine a residual risk rating for each risk scenario.

Table 2-1: Frequency Descriptors

How frequently does the activity occur?		
Key Word	Description of Frequency	Value
Continuous	Occurs at frequent intervals during a shift, or is a continuous process	7
Daily	Occurs at a frequency of at least once per day or once per shift	6
Weekly	Occurs at a frequency of at least once per week	5
Monthly	Occurs at a frequency of at least once per month	4
Quarterly	Occurs at a frequency of at least once every quarter	3
Yearly	Occurs at a frequency of at least once or only a few times per year	2
10 Yearly	Occurs at a frequency of at least once per 10 years or once over the life of the system	1

Table 2-2: Probability Descriptors

What is the probability of the risk occurring?		
Key Word	Description of Probability	Value
Expected	Occurs often as part of the process	5
Probable	Known to occur occasionally	4
Unusual	Known to have occurred during process, but not normally anticipated	3
Remote	Has happened somewhere (operating experience from other sites)	2
Improbable	Should not occur within Transnet Limited's operation life	1

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Table 2-3: Consequence Descriptors

Category and Value	Safety	Health
Disaster 100	Fatality. Permanent / irreversible disability.	Fatal occupational disease e.g. cancer, asbestosis, leukaemia. Irreversible occupational disease e.g. noise-induced hearing loss.
Serious 40	Lost time incident / reversible incident where the employee is booked off for more than 14 days.	Reversible occupational disease e.g. temporal threshold shift, skin irritation.
Important 15	Lost time incident / reversible incident where the employee is booked off for less than 14 days.	Lost time occupational illness e.g. work-induced asthma.
Noticeable 7	Minor and medical treatment injuries. No lost time.	Minor occupational illness that requires medical treatment. Potential time loss.
Insignificant 3	Occupational injuries attended to by a First Aider.	Occupational illness case attended to by a First Aider. Minor occupational illness that requires medical treatment. No lost time.
None 1	No effects.	No effects.

Table 2-4: Control Effectiveness Ratings

RCE Rating	RCE Rating Scale (CE)	Description
Satisfactory	≥80%	To the extent that is reasonably achievable, controls are well designed for the risk, are largely preventative and address the root causes and Management believes that they are effective and reliable most of the time.
Requires Improvement	≥50% <80%	Most controls are designed correctly and are in place and effective. Some more work to be done to improve operating effectiveness or Management has doubts about operational effectiveness and reliability.
Unsatisfactory	≥10% <50%	While the design of controls may be largely correct in that they treat most of the root causes of the risk, they are not currently very effective. There may be an over-reliance on reactive controls. Or Some of the controls do not seem correctly designed in that they do not treat root causes. Those that are correctly designed are operating effectively.
None	<10%	Virtually no credible control(s). Management has no confidence that any degree of control is being achieved due to poor control design and / or very limited operational effectiveness.

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Table 2-5: Risk Ratings

Risk Value	Impact Classification
From 1400 to 3500	Very High
From 980 to 1399	High
From 673 to 979	Medium
Less than 672	Low

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3 RISK ASSESSMENT TEAM

A risk assessment workshop was held on 27 May 2024, and a follow-up workshop was held on 18 June 2024. The workshop participants are indicated in Table 3-1.

Table 3-1: Risk Assessment Workshop Participants

Name	Organisation	Designation
Duane Fischer	Hatch	Project Health and Safety Manager (Facilitator)
Fanie Scholtz	Hatch	Project Manager
Stuart Florence	Hatch	Systems and Process Control Consultant
Neresh Thoolsiram	TPL	Project Manager
Christopher Murray	TPL	Specialist Consultant
Reg Motlounge	TPL	SHEQ Manager
Mabjana Matenchi	TPL	MC&I Principal Engineer
Siyabonga Mnikathi	TPL	Risk Manager

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4 BASELINE HEALTH AND SAFETY RISK ASSESSMENT

The outcome of the Baseline Health and Safety Risk Assessment is presented in detail in Table 4-1.

The following fields in the TPL Baseline Risk Assessment Template have been omitted from Table 4-1:

- Operational Division: Transnet Pipelines
- Business Unit: Project and Construction Management
- Functional Area: Pipeline Operations North
- Operational Area / Depot: Airport, Alrode, Kendal, Klerksdorp, Meyerton, Langlaagte, Rustenburg, Sasolburg, Secunda, Tarlton, Waltloo, Witbank, NOC, SCC, Transnet Academy (Pinetown)
- Sub Depot: N/A
- Work Area: Control Rooms, Switchgear Rooms, Manifolds
- Main Process: Project Execution

Table 4-1: Baseline Health and Safety Risk Assessment

Activity / Service	1 = Routine / Normal 2 = Non-routine / Abnormal 3 = Emergency	Hazard (Causes, Aspect...)	Category (S, SEC, H, E, RS, Q, CL, F, CM, RB, P, OP)	Risk (Something occurs...)	Impact (Leading to...)	Is there an Opportunity for the identified risk / impact?	Inherent Risk Assessment					Existing Controls (Mitigation)	Residual Risk Assessment								
							Frequency	Probability	Consequence	Inherent Risk Value	Risk Classification		Substitution	Engineering Controls	Administrative Controls	Personal Protective Equipment	Control Effectiveness	Residual Risk Value	Control Effectiveness Classification	Desired Control Effectiveness (DCE)	Risk Classification
							30 %	25 %	20 %	15 %											
E&I Installation, Commissioning (work in operational manifold areas and using portable powered tools)	1	Acoustic - Noise	H	Exposure to noise levels above 85dBA.	Illness - Noise-Induced Hearing Loss (NIHL)	No	6	3	40	720	MEDIUM	<p>Elimination: Not practicable.</p> <p>Substitution: Not practicable.</p> <p>Engineering Control: Not practicable.</p> <p>Administrative Control: 1. Noise Zones to be clearly demarcated and signage to be prominently displayed.</p> <p>Last Resort: 1. Suitable personal Hearing Protection Devices to be provided and to be worn correctly. Training to be provided.</p>	Not Practicable	Not Practicable	Satisfactory	Satisfactory	90.0%	72	Satisfactory	90%	LOW

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Activity / Service	1 = Routine / Normal 2 = Non-routine / Abnormal 3 = Emergency	Hazard (Causes, Aspect...)	Category (S, SEC, H, E, RS, Q, CL, F, CM, RB, P, OP)	Risk (Something occurs...)	Impact (Leading to...)	Is there an Opportunity for the identified risk / impact?	Inherent Risk Assessment					Existing Controls (Mitigation)	Residual Risk Assessment								
							Frequency	Probability	Consequence	Inherent Risk Value	Risk Classification		Substitution	Engineering Controls	Administrative Controls	Personal Protective Equipment	Control Effectiveness	Residual Risk Value	Control Effectiveness Classification	Desired Control Effectiveness (DCE)	Risk Classification
							4	4	100	1600	VERY HIGH		30 %	25 %	20 %	15 %	90.0%	160	Satisfactory	90%	LOW
E&I Installation, Commissioning (work in confined spaces, i.e. block valve chambers)	2	Chemical - Asphyxiant Chemical - Irritant Explosion - Fire - Fire	S	Exposure to a hazardous atmosphere (oxygen deficiency / refined petroleum product vapours), engulfment or entrapment, fire or explosion, in a confined space (block valve chambers).	Fatality Injury - Irritation of Respiratory System Injury - Smoke Inhalation, Burns	No	4	4	100	1600	VERY HIGH	<p>Elimination: Not practicable.</p> <p>Substitution: Not practicable.</p> <p>Engineering Control:</p> <ol style="list-style-type: none"> Safe means of access into and egress from the confined space to be provided. A safe atmosphere to be maintained within the confined space for the duration of the work. The provision of forced-air ventilation to be determined based on the risk assessment conducted, the pre-entry atmospheric testing results, and TPL SCO guidelines. In most cases, the removal of the block valve lid will achieve adequate ventilation. <p>Administrative Control:</p> <ol style="list-style-type: none"> TPL's permit system to be implemented for confined space entry. The requirements of TPL's Confined Space Entry Procedure to be complied with. Task Risk Assessment to be conducted and Safe Work Procedures to be in place. If required (i.e. based on the risk assessment conducted for the specific task to be carried out), hazardous systems or energy sources linked to the confined space to be isolated and locked out prior to entry. Pre-entry atmospheric testing to be carried out by a competent and appointed person who must certify in writing that the atmosphere in the confined space is safe for entry. Confined space atmosphere to be monitored continuously while work is carried out in the space. Suitable monitoring devices that emit both audible and visual alarms to be used. A standby person to be stationed immediately outside the entrance to the confined space whenever any person is inside the space. Suitable emergency response (including evacuation and rescue) procedures to be in place. Emergency response personnel with suitable rescue, resuscitation, first aid, firefighting, communication, and personal protective equipment to be present (i.e. be on standby outside the entrance) during any confined space entry where the risk assessment has determined that this is necessary. Each person required to enter a confined space to receive suitable competency training (provided by a registered service provider) and to be assessed and found competent. TPL to provide emergency response personnel and standby persons. Each person entering a confined space to wear a full body harness attached to a lifeline. Each person required to enter a confined space to receive confined space entry awareness training provided by TPL. <p>Last Resort:</p> <ol style="list-style-type: none"> Suitable respiratory protection to be worn. 	Not Practicable	Satisfactory	Satisfactory	Satisfactory	90.0%	160	Satisfactory	90%	LOW
E&I Installation, Commissioning (in manifold areas)	2	Chemical - Irritant	S	Exposure to refined petroleum product vapours.	Injury - Irritation of Respiratory System	No	4	4	3	48	LOW	<p>Elimination: Not practicable.</p> <p>Substitution: Not practicable.</p> <p>Engineering Control:</p> <ol style="list-style-type: none"> Where practicable and if required, work area to be mechanically ventilated. <p>Administrative Control:</p> <ol style="list-style-type: none"> TPL's permit system to be implemented for confined space entry. The requirements of TPL's Confined Space Entry Procedure to be complied with. Task Risk Assessment to be conducted and Safe Work Procedures to be in place. <p>Last Resort:</p> <ol style="list-style-type: none"> Suitable respiratory protection (an air-supplied Respiratory Protection Device may be required) to be worn while carrying out any work that may result in the release of product vapours. 	Not Practicable	Satisfactory	Satisfactory	Satisfactory	90.0%	5	Satisfactory	90%	LOW

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Activity / Service	1 = Routine / Normal 2 = Non-routine / Abnormal 3 = Emergency	Hazard (Causes, Aspect...)	Category (S, SEC, H, E, RS, Q, CL, F, CM, RB, P, OP)	Risk (Something occurs...)	Impact (Leading to...)	Is there an Opportunity for the identified risk / impact?	Inherent Risk Assessment					Existing Controls (Mitigation)	Residual Risk Assessment								
							Frequency	Probability	Consequence	Inherent Risk Value	Risk Classification		Substitution	Engineering Controls	Administrative Controls	Personal Protective Equipment	Control Effectiveness	Residual Risk Value	Control Effectiveness Classification	Desired Control Effectiveness (DCE)	Risk Classification
							6	5	3	90	LOW		30 %	25 %	20 %	15 %					
E&I Installation (refurbishment of control rooms and switchgear rooms)	1	Chemical - Irritant	S	Exposure to a petroleum product, a paint, or a solvent (skin contact, eye contact, ingestion or vapour inhalation).	Injury - Irritation of Respiratory System, Gastrointestinal System, Eyes, Skin	No	6	5	3	90	LOW	<p>Elimination: Not practicable.</p> <p>Substitution: Not practicable.</p> <p>Engineering Control: 1. Where practicable and if required, work area to be mechanically ventilated.</p> <p>Administrative Control: 1. Task Risk Assessments to be conducted and Safe Work Procedures to be in place for all work involving the handling and / or use of a chemical substance. 2. For each chemical substance, Safety Data Sheet (SDS) to be obtained and used to assess the hazardous properties and risks associated with the substance, and to determine the PPE, first aid and emergency response requirements. 3. Incompatibility of chemical substances to be understood, and substances to be segregated as required. 4. Each container containing a chemical substance to be properly labelled. A chemical substance to be kept in its original container as far as possible. 5. No eating, drinking or smoking to be permitted in any work area. 6. Water and soap to be provided to enable a person to wash his or her hands.</p> <p>Last Resort: 1. Suitable PPE and associated training to be provided. Refer to TPL SOP for PPE (009-TPL-OPS-SHEQ-2096, Rev. 2).</p>	Not Practicable	Satisfactory	Satisfactory	Satisfactory	90.0%	9	Satisfactory	90%	LOW
E&I Installation, Commissioning	1	Chemical - Venom	S	Person stung by an insect resulting in allergic reaction.	Injury - Allergic Reaction	No	6	5	7	210	LOW	<p>Elimination: Not practicable.</p> <p>Substitution: Not practicable.</p> <p>Engineering Control: Not practicable.</p> <p>Administrative Control: 1. Allergies to be reported during entry occupational medical examinations. 2. Persons with insect allergies to carry self-injectable epinephrine (e.g. EpiPen Auto-Injector). 3. Emergency Preparedness and Response Plan to be in place (including procedures for responding to a medical emergency). 4. An adequate number of trained First Aiders to be in place.</p> <p>Last Resort: 1. Long trousers and long-sleeved shirts to be worn. Refer to TPL SOP for PPE (009-TPL-OPS-SHEQ-2096, Rev. 2).</p>	Not Practicable	Not Practicable	Satisfactory	Satisfactory	90.0%	21	Satisfactory	90%	LOW
E&I Installation, Commissioning	1	Chemical - Venom	S	Person bitten by a venomous snake.	Injury - Envenomation	No	4	3	40	480	LOW	<p>Elimination: Not practicable.</p> <p>Substitution: Not practicable.</p> <p>Engineering Control: Not practicable.</p> <p>Administrative Control: 1. Task Risk Assessment to be conducted and Safe Work Procedures to be in place. 2. Good housekeeping practices to be maintained. 3. Snake removal service arrangements to be in place (contact details for snake removers throughout Southern Africa can be found on the African Snakebite Institute's website or app). 4. Emergency Preparedness and Response Plan to be in place (including procedures for responding to a medical emergency). 5. An adequate number of trained First Aiders to be in place.</p> <p>Last Resort: 1. Safety boots to be worn. Refer to TPL SOP for PPE (009-TPL-OPS-SHEQ-2096, Rev. 2).</p>	Not Practicable	Not Practicable	Satisfactory	Satisfactory	90.0%	48	Satisfactory	90%	LOW

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							Frequency	Probability	Consequence	Inherent Risk Value	Risk Classification		Substitution	Engineering Controls	Administrative Controls	Personal Protective Equipment	Control Effectiveness	Residual Risk Value	Control Effectiveness Classification	Desired Control Effectiveness (DCE)	Risk Classification
							6	4	40	960	MEDIUM		30 %	25 %	20 %	15 %					
E&I Installation, Commissioning (use of electrical equipment)	1	Electrical - Electricity	S	Electric shock or electrocution due to the use of unsafe electrical equipment (including generators).	Injury - Electric Shock, Electrical Burns, Fatality - Electrocution	No	6	4	40	960	MEDIUM	<p>Elimination: Not practicable.</p> <p>Substitution: Not practicable.</p> <p>Engineering Control:</p> <ol style="list-style-type: none"> All electrical equipment to be supplied electricity through (i.e. to be protected by) an approved and tested residual current device (earth leakage device). With the exception of double-insulated equipment, all electrical equipment to have an equipment grounding (earthing) conductor that connects the frame of the equipment being utilised to the grounding (earthing) conductor of the electricity supply system. All generators to be fitted with suitable overcurrent protective devices (i.e. circuit breakers or fuses). If recommended by the manufacturer, an earth pin and an associated bonding cable to be used. All portable hand-held electrical tools to be double-insulated. The IP rating of an item of electrical equipment to be suitable for the environment in which the equipment is to be used. <p>Administrative Control:</p> <ol style="list-style-type: none"> All portable electrical equipment (including generators) to be inspected, tested and tagged on a quarterly basis by competent and appropriately qualified electricians who have been appointed in writing. Inspection and testing to include a continuity test of the grounding (earthing) conductor (as applicable) and a complete examination of the equipment to assure safe use. Details of these inspections and tests to be recorded in a register. Electrical equipment to be inspected by competent operators on a daily basis prior to use. Electrical repair work or diagnostic work on electrical installations / equipment to only be performed by personnel who are competent and authorised to perform this work (i.e. qualified electricians). All work involving the use of electrical equipment to be carried out under the personal supervision of a competent supervisor who has been appointed in writing. Task Risk Assessment to be conducted, and job and equipment-specific Safe Work Procedures to be in place. All persons required to use electrical equipment to receive training on all relevant Safe Work Procedures. Each person potentially exposed to electrical hazards to receive electrical hazard awareness training. <p>PPE: Not practicable.</p>	Not Practicable	Satisfactory	Satisfactory	Not Practicable	90.0%	96	Satisfactory	90%	LOW

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							Frequency	Probability	Consequence	Inherent Risk Value	Risk Classification		Substitution	Engineering Controls	Administrative Controls	Personal Protective Equipment	Control Effectiveness	Residual Risk Value	Control Effectiveness Classification	Desired Control Effectiveness (DCE)	Risk Classification
							5	4	40	800	MEDIUM		30 %	25 %	20 %	15 %					
E&I Installation, Commissioning (work carried out on existing electrical infrastructure)	1	Electrical - Electricity	S	Electric shock or electrocution due to an unsafe electrical installation.	Injury - Electric Shock, Electrical Burns, Fatality - Electrocution	No	5	4	40	800	MEDIUM	<p>Elimination: Not practicable.</p> <p>Substitution: Not practicable.</p> <p>Engineering Control:</p> <ol style="list-style-type: none"> 1. Electrical safety devices (specifically, earth leakage protection and overcurrent protection) to be installed on all distribution circuits and the settings to be established by suitably qualified personnel. 2. Each item of electrical equipment to carry an appropriate IP rating. 3. All electrical cabling to be covered (e.g. in cable trenches) or elevated (in cable trays) to protect it from damage. 4. Sufficient clear working space (for operation, inspection, maintenance and emergency purposes) to be provided around electrical equipment and electrical installations. 5. All electrical panels and cabinets to be kept locked (using keyed-alike padlocks). Keys to only be issued to authorised personnel. 6. Control centres, switchgear rooms, substations, generators, transformers, and other similar electrical plant and equipment to be appropriately guarded and labeled and, with the exception of emergency shut-off mechanisms, to be made inaccessible to unauthorised personnel (i.e. plant or equipment of this nature to be positioned within rooms or fenced enclosures which are to be kept locked). <p>Administrative Control:</p> <ol style="list-style-type: none"> 1. All electrical work to be carried out under the personal supervision of a registered installation electrician or master electrician in accordance with all legal requirements, codes, design criteria and safety standards applicable to the project. 2. Work on electrical installations (new installations, and modifications or repairs to existing installations) to only be carried out by competent and authorised personnel. 3. A registered and appointed installation electrician to personally inspect, test and certify each electrical installation installed or worked on. 4. For every permanent or temporary electrical installation installed or modified, a certificate of compliance to be issued by a competent and appropriately registered electrician. 5. Appropriate warning signage to be prominently displayed within, and at all entrances to, rooms or enclosures housing electrical plant or equipment. The signage is to indicate that unauthorised persons are prohibited from entering, that unauthorised persons are prohibited from handling or interfering with any electrical plant or equipment, the procedure to be followed in the event of a fire, and the first aid procedure to be followed should a person suffer electric shock. 6. All permanent and temporary electrical installations to be inspected and tested by competent and suitably qualified electricians who have been appointed in writing. Permanent electrical installations to be inspected and tested on an annual basis, and temporary electrical installations on a six-monthly basis. The testing to be carried out in accordance with all applicable legal requirements. Details of these inspections and tests to be recorded in a register. 7. Each person potentially exposed to electrical hazards to receive electrical hazard awareness training. <p>PPE: Not practicable.</p>	Not Practicable	Satisfactory	Satisfactory	Not Practicable	90.0%	80	Satisfactory	90%	LOW
E&I Installation, Commissioning (work carried out on existing electrical infrastructure)	1	Electrical - Electricity	S	Electric shock or electrocution due to contact with live conductors (isolation and lockout procedures not in place, not followed, or not followed correctly).	Injury - Electric Shock, Electrical Burns, Fatality - Electrocution	No	6	3	40	720	MEDIUM	<p>Elimination: Not practicable.</p> <p>Substitution: Not practicable.</p> <p>Engineering Control:</p> <ol style="list-style-type: none"> 1. Each electrical installation and item of electrical equipment to be such that it is possible for it to be isolated and physically locked out, and tested for zero energy. <p>Administrative Control:</p> <ol style="list-style-type: none"> 1. TPL's permit, isolation and lockout, and testing for zero energy system to be implemented. 2. Electrical repair work or diagnostic work on electrical installations / equipment to only be performed by personnel who are competent and authorised to perform this work (i.e. qualified electricians). 3. Each person potentially exposed to electrical hazards to receive electrical hazard awareness training. <p>PPE: Not practicable.</p>	Not Practicable	Satisfactory	Satisfactory	Not Practicable	90.0%	72	Satisfactory	90%	LOW

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							Frequency	Probability	Consequence	Inherent Risk Value	Risk Classification		Substitution	Engineering Controls	Administrative Controls	Personal Protective Equipment	Control Effectiveness	Residual Risk Value	Control Effectiveness Classification	Desired Control Effectiveness (DCE)	Risk Classification
							6	4	15	360	LOW		30 %	25 %	20 %	15 %	90.0%	36	Satisfactory	90%	LOW
E&I Installation, Commissioning	1	Ergonomic - Awkward Posture	S	Musculoskeletal injury due to awkward body positioning.	Injury – Musculoskeletal	No	6	4	15	360	LOW	<p>Elimination: Not practicable.</p> <p>Substitution: Not practicable.</p> <p>Engineering Control: 1. Correct tools for the job to be provided and used.</p> <p>Administrative Control: 1. Safe working position to be adopted (worker as well as tool). 2. Task Risk Assessments to be conducted and Safe Work Procedures to be in place.</p> <p>PPE: Not practicable.</p>	Not Practicable	Satisfactory	Satisfactory	Not Practicable	90.0%	36	Satisfactory	90%	LOW
E&I Installation, Commissioning (manual handling and lifting)	1	Ergonomic - Exertion	S	Musculoskeletal injury due to improper manual handling / lifting practices.	Injury – Musculoskeletal	No	6	4	15	360	LOW	<p>Elimination: Not practicable.</p> <p>Substitution: Not practicable.</p> <p>Engineering Control: 1. Mechanical aids and / or lifting machines to be used wherever available / whenever practicable.</p> <p>Administrative Control: 1. Task Risk Assessments to be conducted and Safe Work Procedures to be in place. 2. Awareness training to be provided regarding correct manual handling, lifting and carrying techniques.</p> <p>PPE: Not practicable.</p>	Not Practicable	Satisfactory	Satisfactory	Not Practicable	90.0%	36	Satisfactory	90%	LOW
E&I Installation, Commissioning (hot work)	3	Fire - Fire	S	Smoke inhalation and / or burns due to the ignition of petroleum products.	Fatality Injury - Smoke Inhalation, Burns	No	6	3	40	720	MEDIUM	<p>Elimination: Not practicable.</p> <p>Substitution: Not practicable.</p> <p>Engineering Control: 1. Fire blankets to be used where required to provide protection against sparks.</p> <p>Administrative Control: 1. TPL's hot work (i.e. welding, cutting, grinding, etc.) permit system to be implemented. 2. Task Risk Assessments to be conducted and a Hot Work Procedure to be in place. 3. TPL's fire standby service (including Fire Watches) to be in place. 4. Suitable firefighting equipment (provided by TPL) to be at hand wherever hot work is carried out. 5. At the end of every working period (i.e. before each tea / lunch break and at the end of every day), the workplace to be thoroughly inspected to ensure that no material is left smouldering and no condition / situation exists that could give rise to a fire. 6. Training in basic firefighting procedures and the use of firefighting equipment to be provided (by the contractor for all contractor employees).</p> <p>Last Resort: 1. Flame retardant clothing to be worn. Refer to TPL SOP for PPE (009-TPL-OPS-SHEQ-2096, Rev. 2).</p>	Not Practicable	Satisfactory	Satisfactory	Satisfactory	90.0%	72	Satisfactory	90%	LOW

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Activity / Service	1 = Routine / Normal 2 = Non-routine / Abnormal 3 = Emergency	Hazard (Causes, Aspect...)	Category (S, SEC, H, E, RS, Q, CL, F, CM, RB, P, OP)	Risk (Something occurs...)	Impact (Leading to...)	Is there an Opportunity for the identified risk / impact?	Inherent Risk Assessment					Existing Controls (Mitigation)	Residual Risk Assessment								
							Frequency	Probability	Consequence	Inherent Risk Value	Risk Classification		Substitution	Engineering Controls	Administrative Controls	Personal Protective Equipment	Control Effectiveness	Residual Risk Value	Control Effectiveness Classification	Desired Control Effectiveness (DCE)	Risk Classification
							4	2	100	800	MEDIUM		30 %	25 %	20 %	15 %					
E&I Installation, Commissioning	3	Fire - Fire	S	Smoke inhalation and / or burns due to an electrical fire.	Fatality Injury - Smoke Inhalation, Burns	No	4	2	100	800	MEDIUM	<p>Elimination: Not practicable.</p> <p>Substitution: Not practicable.</p> <p>Engineering Control: Not practicable.</p> <p>Administrative Control: 1. Suitable firefighting equipment to be provided in all rooms or enclosures housing electrical plant or equipment. 2. Training in basic firefighting procedures and the use of firefighting equipment to be provided (by the contractor for all contractor employees).</p> <p>Last Resort: 1. Flame retardant clothing to be worn. Refer to TPL SOP for PPE (009-TPL-OPS-SHEQ-2096, Rev. 2).</p>	Not Practicable	Not Practicable	Satisfactory	Satisfactory	90.0%	80	Satisfactory	90%	LOW
E&I Installation, Commissioning (erecting, using and dismantling scaffolding)	2	Gravitational - Collapsing Structure	S	Collapse of temporary works structure (i.e. scaffolding).	Fatality Injury - Crush, Struck By, Fall From Height	No	3	3	15	135	LOW	<p>Elimination: Not practicable.</p> <p>Substitution: Not practicable.</p> <p>Engineering Control: 1. Temporary works to be designed, inspected and approved before use by a competent person (designer) who has been appointed in writing. 2. Only approved components, materials and systems to be used for the construction of temporary works. 3. Temporary works structures to be effectively braced.</p> <p>Administrative Control: 1. Each temporary works structure to be constructed, used and dismantled under the personal supervision of a competent supervisor who has been appointed in writing. 2. Temporary works to only be constructed, maintained, altered or dismantled by competent persons. 3. Prior to use, each component to be inspected by a competent person to ensure that it is in good condition. 4. Task Risk Assessments to be conducted and Safe Work Procedures to be in place. 5. Each temporary works structure to be inspected by the relevant competent supervisor immediately before use, after inclement weather, after any modification has been made, after any load has been imposed, and at least on a daily basis until the temporary works structure has been removed. The results of each inspection to be recorded in a register. 6. No temporary works structure to be removed until authorised in writing by the competent supervisor.</p> <p>PPE: Not practicable.</p>	Not Practicable	Satisfactory	Satisfactory	Not Practicable	90.0%	14	Satisfactory	90%	LOW

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Activity / Service	1 = Routine / Normal 2 = Non-routine / Abnormal 3 = Emergency	Hazard (Causes, Aspect...)	Category (S, SEC, H, E, RS, Q, CL, F, CM, RB, P, OP)	Risk (Something occurs...)	Impact (Leading to...)	Is there an Opportunity for the identified risk / impact?	Inherent Risk Assessment					Existing Controls (Mitigation)	Residual Risk Assessment								
							Frequency	Probability	Consequence	Inherent Risk Value	Risk Classification		Substitution	Engineering Controls	Administrative Controls	Personal Protective Equipment	Control Effectiveness	Residual Risk Value	Control Effectiveness Classification	Desired Control Effectiveness (DCE)	Risk Classification
							4	4	40	640	LOW		30 %	25 %	20 %	15 %					
E&I Installation, Commissioning	1	Gravitational - Falling or Rolling Object	S	Object (tools, equipment, materials, etc.) falling from height.	Fatality Injury - Struck By	No	4	4	40	640	LOW	<p>Elimination: Not practicable.</p> <p>Substitution: Not practicable.</p> <p>Engineering Control:</p> <ol style="list-style-type: none"> Every scaffold platform to be complete (i.e. from ledger to ledger and from transom to transom without any gaps), and to be provided with steel toe boards that are at least 150 mm high and securely attached such that no gap exists between the toe boards and the platform floor. Each opening in a scaffold platform to be fitted with a self-closing trap-door. Cranes, hoists, and approved material baskets to be used to lift and lower tools, equipment and materials in a controlled manner. If necessary, rope and a tool bag to be used for lifting or lowering objects. A tool belt around the waist to be used to secure and carry tools. A tool bag (around the waist or over the shoulder) to be used for carrying tools and materials up and down a ladder or scaffolding. Nothing to be carried in hand. Approved tethering devices with double-locking connectors to be used to secure tools (to a person or to a structure) and equipment and / or materials (to a structure). <p>Administrative Control:</p> <ol style="list-style-type: none"> No items to be permitted to lie loose in elevated positions (e.g. nuts and bolts to be securely stored) and good housekeeping standards to be maintained at all times. Work platforms to be kept free of waste. Where overhead work is carried out, barricading to be erected around the work area to prevent persons from entering such an area and potentially being struck by falling objects. Wherever hazards related to falling objects exist, appropriate warning signage (i.e. "Overhead Work In Progress" and "No Unauthorised Access") to be prominently displayed. Competent supervision to be in place at all times for all work carried out at height. Supervisors to be appointed in writing. Suitable competency-based training to be provided to all persons required to work at height. Each person to be in possession of a valid certificate of competency. Task Risk Assessments to be conducted and Safe Work Procedures to be in place. Persons required to work at height to receive training on all relevant Safe Work Procedures. Each person to be in possession of a valid medical certificate of fitness specifically indicating that the person is fit to work at height. <p>Last Resort:</p> <ol style="list-style-type: none"> Personal Protective Equipment (particularly safety helmets and safety boots) to be worn by all persons at all times. A safety helmet worn while working at height to be secured by means of a chinstrap. 	Not Practicable	Satisfactory	Satisfactory	Satisfactory	90.0%	64	Satisfactory	90%	LOW

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Activity / Service	1 = Routine / Normal 2 = Non-routine / Abnormal 3 = Emergency	Hazard (Causes, Aspect...)	Category (S, SEC, H, E, RS, Q, CL, F, CM, RB, P, OP)	Risk (Something occurs...)	Impact (Leading to...)	Is there an Opportunity for the identified risk / impact?	Inherent Risk Assessment					Existing Controls (Mitigation)	Residual Risk Assessment								
							Frequency	Probability	Consequence	Inherent Risk Value	Risk Classification		Substitution	Engineering Controls	Administrative Controls	Personal Protective Equipment	Control Effectiveness	Residual Risk Value	Control Effectiveness Classification	Desired Control Effectiveness (DCE)	Risk Classification
							30 %	25 %	20 %	15 %											
E&I Installation, Commissioning (lifting operations)	1	Gravitational - Falling or Rolling Object	S	Mobile crane toppling over.	Fatality Injury - Crush, Struck By	No	3	3	40	360	LOW	<p>Elimination: Not practicable.</p> <p>Substitution: Not practicable.</p> <p>Engineering Control:</p> <ol style="list-style-type: none"> Each mobile crane to be fitted with a load cell and a load limiting device to prevent the crane from being operated outside of its safe working limits. No lifting to be carried out using a mobile crane unless the outriggers have been deployed and are locked in position. Load spreaders or packing under the outriggers to be used irrespective of the underfoot conditions. <p>Administrative Control:</p> <ol style="list-style-type: none"> Each mobile crane brought onto the project site(s) to have a current test certificate and record of inspection and maintenance as well as a suitable checklist (derived from the crane manufacturer's inspection recommendations) for use by the operator(s) when carrying out pre-operation safety checks. All mobile cranes to be inspected, tested and confirmed fit for purpose (i.e. safe for use) before being operated or put into service, before being returned to service following any repair or modification, and periodically as follows: <ul style="list-style-type: none"> Each crane to be thoroughly examined every 6 months; and Each crane to be subjected to an annual performance test (i.e. a load test). All lifting tackle to be thoroughly inspected and tagged on a quarterly basis. Details of these inspections to be recorded in a lifting tackle register. Access into an area where lifting operations are being carried out to be restricted. Area to be barricaded and only authorised persons (i.e. those directly involved with the lifting operations) to be permitted to enter. Warning signage (i.e. "Lifting Operations In Progress" and "No Unauthorised Entry") to be conspicuously displayed. Before a mobile crane is moved into position to carry out a lift, the area to be inspected by a suitably qualified person who must verify that the underfoot conditions are satisfactory. Each mobile crane to be fitted with an anemometer. Lifting operations to cease when the wind speed exceeds 25 km/hr. Task Risk Assessments to be conducted and Safe Work Procedures to be in place for all lifting operations. All lifting operations to be carried out under the personal supervision of a competent supervisor who has been appointed in writing. An effective method of communication (e.g. two-way radios) to be in place between the crane operator and the banksman. Persons supervising lifting operations; operating cranes; using lifting tackle and rigging (slinging) loads; providing signals for controlling lifts; and inspecting, maintaining or testing cranes or lifting tackle to be suitably competent and experienced, and to be appointed in writing. Suitable competency-based training to be provided. Each person to be in possession of a valid qualification or certificate of competency. <p>Last Resort:</p> <ol style="list-style-type: none"> Personal Protective Equipment (particularly safety helmets and safety boots) to be worn by all persons at all times. 	Not Practicable	Satisfactory	Satisfactory	Satisfactory	90.0%	36	Satisfactory	90%	LOW

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Activity / Service	1 = Routine / Normal 2 = Non-routine / Abnormal 3 = Emergency	Hazard (Causes, Aspect...)	Category (S, SEC, H, E, RS, Q, CL, F, CM, RB, P, OP)	Risk (Something occurs...)	Impact (Leading to...)	Is there an Opportunity for the identified risk / impact?	Inherent Risk Assessment					Existing Controls (Mitigation)	Residual Risk Assessment								
							Frequency	Probability	Consequence	Inherent Risk Value	Risk Classification		Substitution	Engineering Controls	Administrative Controls	Personal Protective Equipment	Control Effectiveness	Residual Risk Value	Control Effectiveness Classification	Desired Control Effectiveness (DCE)	Risk Classification
							3	3	40	360	LOW		30 %	25 %	20 %	15 %					
E&I Installation, Commissioning (lifting operations)	1	Gravitational - Falling or Rolling Object	S	Suspended load falling to the ground.	Fatality Injury - Crush, Struck By	No	3	3	40	360	LOW	<p>Elimination: Not practicable.</p> <p>Substitution: Not practicable.</p> <p>Engineering Control:</p> <ol style="list-style-type: none"> Each crane or hoist to be fitted with a load cell and a load limiting device to prevent the crane or hoist from being operated outside of its safe working limits. Where practicable, each crane to be equipped with an upper hoist limit switch (or anti two-block device) to prevent the hook block from colliding with the drum, and a lower hoist limit switch to prevent the rope on the drum from unwinding completely. These systems to provide both a visual and an audible alarm to the operator. Each lifting hook to be fitted with a safety latch to prevent the load from accidentally detaching. Only certified lifting tackle to be used to lift a load. Preventative maintenance programme to be in place to ensure that all cranes and hoists are maintained in a safe and serviceable condition. <p>Administrative Control:</p> <ol style="list-style-type: none"> Each crane or hoist brought onto the project site(s) to have a current test certificate and record of inspection and maintenance as well as a suitable checklist (derived from the crane or hoist manufacturer's inspection recommendations) for use by the operator(s) when carrying out pre-operation safety checks. All cranes and hoists to be inspected, tested and confirmed fit for purpose (i.e. safe for use) before being operated or put into service, before being returned to service following any repair or modification, and periodically as follows: <ul style="list-style-type: none"> - Each crane or hoist to be thoroughly examined every 6 months; and - Each crane or hoist to be subjected to an annual performance test (i.e. a load test). All lifting tackle to be thoroughly inspected and tagged on a quarterly basis. Details of these inspections to be recorded in a lifting tackle register. Each crane or hoist operator to carry out pre-operation safety checks using a prescribed checklist. Operator to report any fault, defect or damage to his supervisor immediately. Each item of lifting tackle to be visually inspected by the user prior to use. Access into an area where lifting operations are being carried out to be restricted. Area to be barricaded and only authorised persons (i.e. those directly involved with the lifting operations) to be permitted to enter. Warning signage (i.e. "Lifting Operations In Progress" and "No Unauthorised Entry") to be conspicuously displayed. All lifting operations to be carried out under the personal supervision of a competent supervisor who has been appointed in writing. An effective method of communication (e.g. two-way radios) to be in place between the crane operator and the banksman. Task Risk Assessments to be conducted and Safe Work Procedures to be in place for all lifting operations. Persons involved in lifting operations to receive training on all relevant Safe Work Procedures. Persons supervising lifting operations; operating cranes and hoists; using lifting tackle and rigging (slinging) loads; providing signals for controlling lifts; and inspecting, maintaining or testing cranes, hoists or lifting tackle to be suitably competent and experienced, and to be appointed in writing. Suitable competency-based training to be provided. Each person to be in possession of a valid qualification or certificate of competency. <p>Last Resort:</p> <ol style="list-style-type: none"> Personal Protective Equipment (particularly safety helmets and safety boots) to be worn by all persons at all times. 	Not Practicable	Satisfactory	Satisfactory	Satisfactory	90.0%	36	Satisfactory	90%	LOW

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							Frequency	Probability	Consequence	Inherent Risk Value	Risk Classification		Substitution	Engineering Controls	Administrative Controls	Personal Protective Equipment	Control Effectiveness	Residual Risk Value	Control Effectiveness Classification	Desired Control Effectiveness (DCE)	Risk Classification
							30 %	25 %	20 %	15 %											
E&I Installation, Commissioning	1	Gravitational - Person Falling from Height	S	Person falling from mobile equipment (mobile cranes and trucks).	Injury - Fall From Height	No	3	3	15	135	LOW	<p>Elimination: Not practicable.</p> <p>Substitution: Not practicable.</p> <p>Engineering Control:</p> <ol style="list-style-type: none"> Each item of mobile equipment to be fitted with suitable steps and grab handles. Safe means of climbing onto and down from the load bin (or bed) to be provided. <p>Administrative Control:</p> <ol style="list-style-type: none"> Each operator to have a means of moving supplies and personal items into and out of the cabin that enables the operator to maintain three points of contact while boarding and disembarking the equipment (e.g. a backpack or shoulder strap bag). Steps, handles, etc. to be inspected as part of the pre-operation safety check carried out by the operator of an item of mobile equipment. Any damage or defect to be reported immediately and attended to without delay. Mud, oil, grease, etc. to be prevented from accumulating on steps. <p>Last Resort:</p> <ol style="list-style-type: none"> Personal Protective Equipment (particularly safety helmets and safety boots) to be worn by all persons at all times. 	Not Practicable	Satisfactory	Satisfactory	Satisfactory	90.0%	14	Satisfactory	90%	LOW

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							Frequency	Probability	Consequence	Inherent Risk Value	Risk Classification		Substitution	Engineering Controls	Administrative Controls	Personal Protective Equipment	Control Effectiveness	Residual Risk Value	Control Effectiveness Classification	Desired Control Effectiveness (DCE)	Risk Classification
							4	3	40	480	LOW		30 %	25 %	20 %	15 %					
E&I Installation, Commissioning (working at height, e.g. tank roofs)	1	Gravitational - Person Falling from Height	S	Person falling from height.	Fatality Injury - Fall From Height	No	4	3	40	480	LOW	<p>Elimination: Not practicable.</p> <p>Substitution: Not practicable.</p> <p>Engineering Control:</p> <ol style="list-style-type: none"> Safe means of access and egress to be provided (to and from each workplace at height). Every scaffold platform to be complete (i.e. from ledger to ledger and from transom to transom without any gaps), and to be provided with sturdy guard rails (i.e. fixed edge protection) on all sides. Safe and convenient access to be provided to every scaffold platform by means of properly installed stairways or ladders, which must remain unobstructed at all times. Each opening in a scaffold platform to be fitted with a self-closing trap-door. Only approved scaffolding components to be used to erect a scaffold. Scaffolding to be erected, modified and used only in accordance with the manufacturer's guidelines or recommendations. All anchors (and personal fall protection systems) to be designed and / or approved by a professional structural engineer, and to only be installed and tested by a competent person in accordance with the manufacturer's specifications or specifications certified by a professional structural engineer. <p>Administrative Control:</p> <ol style="list-style-type: none"> Scaffolding to only be erected, maintained, altered or dismantled by competent and appointed Scaffolding Erectors under the personal supervision of a competent Scaffolding Supervisor (Scaffolding Inspector) who has been appointed in writing. A green tag (displaying the words, "Scaffold Safe for Use") or a red tag (displaying the words, "Danger: Do Not Use Scaffold") to be prominently displayed on each scaffold at all times. All fall protection equipment to be thoroughly inspected on a quarterly basis by competent persons appointed in writing and each item of equipment to be tagged to show when it was last inspected. All inspections to be recorded in a register. Fall protection equipment to be visually inspected by the user on a daily basis prior to use. Each anchor (and each personal fall protection system) to be inspected and tested by a competent person upon installation, whenever moved or reinstalled, following any repair or modification, and at least on an annual basis (or more frequently if required by legislation or specified by the manufacturer or designer). An anchor to only be used if a competent person has certified it safe for use. A system to be in place to identify anchor points as authorised for use. No person to be permitted to work at height alone / in isolation. Competent supervision to be in place at all times for all work carried out at height. Supervisors to be appointed in writing. Suitable competency-based training to be provided to all persons required to work at height / use personal fall protection equipment. Each person to be in possession of a valid certificate of competency. Fall Protection (and Rescue) Plan to be in place for any work where a risk of falling exists. Emergency response (rescue) procedures for the rapid retrieval of suspended persons in the event of a fall from height to be in place and to be tested. Task Risk Assessment to be conducted and Safe Work Procedures to be in place for any work where a risk of falling exists. Persons required to work at height to receive training on all relevant Safe Work Procedures. Each person to be in possession of a valid medical certificate of fitness specifically indicating that the person is fit to work at height. <p>Last Resort:</p> <ol style="list-style-type: none"> Suitable fall protection equipment to be provided and used at all times whenever there is a risk of falling 1.8 metres or more, or whenever work is to be carried out within 2 metres of an opening through which (or an edge over which) a person could fall. 	Not Practicable	Satisfactory	Satisfactory	Satisfactory	90.0%	48	Satisfactory	90%	LOW

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							Frequency	Probability	Consequence	Inherent Risk Value	Risk Classification		Substitution	Engineering Controls	Administrative Controls	Personal Protective Equipment	Control Effectiveness	Residual Risk Value	Control Effectiveness Classification	Desired Control Effectiveness (DCE)	Risk Classification
							6	5	15	450	LOW		30 %	25 %	20 %	15 %					
E&I Installation, Commissioning	1	Gravitational - Slip, Trip or Fall	S	Person slipping or tripping.	Injury – Musculo-skeletal, Laceration, Contusion	No	6	5	15	450	LOW	<p>Elimination: Not practicable.</p> <p>Substitution: Not practicable.</p> <p>Engineering Control: 1. Adequate lighting to be provided.</p> <p>Administrative Control: 1. Walkways to be kept clear of any potential tripping hazards and to be maintained in a non-slip state. 2. Good housekeeping practices to be maintained. 3. Warning signage to be displayed where slipping or tripping hazards exist. 4. Safe working position to be adopted (worker as well as tool). 5. No manual handling that prevents a person from keeping his or her eyes on the path ahead to be carried out. 6. Handrail to always be held while ascending or descending a flight of stairs.</p> <p>Last Resort: 1. Suitable safety boots to be worn.</p>	Not Practicable	Satisfactory	Satisfactory	Satisfactory	90.0%	45	Satisfactory	90%	LOW
E&I Installation, Commissioning (using portable powered tools)	1	Mechanical - Moving Component of Powered Tool	S	Contact with moving part of a powered tool / item of equipment (e.g. drill or grinder).	Injury - Amputation, Laceration	No	5	4	15	300	LOW	<p>Elimination: Not practicable.</p> <p>Substitution: Not practicable.</p> <p>Engineering Control: 1. Effective guarding to be in place to prevent inadvertent contact with moving parts. 2. No handheld powered tool to be fitted with a locking device that can be used to prevent the trigger switch from returning to the off / safe position.</p> <p>Administrative Control: 1. Manufacturer-fitted guarding to only be removed for maintenance, repair, cleaning, and clearing purposes, and only after the tool or equipment has been isolated and locked out. Guarding to be replaced prior to the tool or equipment being put back into operation. 2. Powered tools and equipment to be inspected, and safety devices to be tested, on a quarterly basis by competent persons who have been appointed in writing. Details of these inspections and tests to be recorded in a register. 3. All work involving the use of powered tools and / or equipment to be carried out under the personal supervision of a competent supervisor who has been appointed in writing. 4. Powered tools and equipment to be inspected by competent operators on a daily basis prior to use. 5. Suitable competency-based training to be provided to all persons required to work with powered tools and / or equipment. 6. Task Risk Assessments to be conducted and Safe Work Procedures to be in place. 7. All persons required to work with powered tools and / or equipment to receive training on all relevant Safe Work Procedures.</p> <p>Last Resort: 1. Personal Protective Equipment (particularly safety helmets, safety boots and gloves) to be worn by all persons at all times.</p>	Not Practicable	Satisfactory	Satisfactory	Satisfactory	90.0%	30	Satisfactory	90%	LOW

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							Frequency	Probability	Consequence	Inherent Risk Value	Risk Classification		Substitution	Engineering Controls	Administrative Controls	Personal Protective Equipment	Control Effectiveness	Residual Risk Value	Control Effectiveness Classification	Desired Control Effectiveness (DCE)	Risk Classification
							3	2	15	90	LOW		30 %	25 %	20 %	15 %					
E&I Installation, Commissioning (driving light vehicles and driving / operating trucks and mobile cranes)	1	Mechanical - Moving Mobile Equipment or Light Vehicle	S	Uncontrolled movement of an item of mobile equipment or a light vehicle (due to mechanical failure, electrical fault, operator / driver error, etc.).	Fatality Injury - Crush, Struck By	No	3	2	15	90	LOW	<p>Elimination: Not practicable.</p> <p>Substitution: Not practicable.</p> <p>Engineering Control: 1. Preventative maintenance programme to be implemented to ensure that all light vehicles are maintained in a safe and roadworthy condition. 2. Preventative maintenance programme to be implemented for all mobile equipment.</p> <p>Administrative Control: 1. Each light vehicle and each item of mobile equipment brought onto the project site(s) to have a record of inspection and maintenance as well as a suitable checklist (derived from the vehicle / equipment manufacturer's inspection recommendations) for use by the driver(s) / operator(s) when carrying out pre-operation safety checks. 2. Pre-operation light vehicle / mobile equipment safety check system to be implemented (including a brake functionality test). 3. Task Risk Assessments to be conducted and Safe Work Procedures to be in place. 4. All drivers and operators to receive training on project-specific procedures and requirements. 5. Each driver / operator to be in possession of a valid licence or certificate of competency. 6. All persons to receive induction training with regard to road safety and site vehicle hazards.</p> <p>PPE: Not practicable.</p>	Not Practicable	Satisfactory	Satisfactory	Not Practicable	90.0%	9	Satisfactory	90%	LOW
E&I Installation, Commissioning (driving light vehicles and driving / operating trucks and mobile cranes)	1	Mechanical - Moving Mobile Equipment or Light Vehicle	S	Mobile equipment / light vehicle accident due to operator / driver being unfit for work.	Fatality Injury - Crush, Struck By	No	3	2	15	90	LOW	<p>Elimination: Not practicable.</p> <p>Substitution: Not practicable.</p> <p>Engineering Control: 1. Each light vehicle to be fitted with seat belts for all occupants, cargo barriers / load restraints (for vehicles designed for carrying loads), and dual airbags (driver and front passenger). 2. Each item of mobile equipment to be fitted with seat belts for all occupants.</p> <p>Administrative Control: 1. Entry occupational medical examinations to be carried out. Each operator / driver to be in possession of a valid medical certificate of fitness. 2. Daily alcohol testing to be carried out.</p> <p>PPE: Not practicable.</p>	Not Practicable	Satisfactory	Satisfactory	Not Practicable	90.0%	9	Satisfactory	90%	LOW

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Activity / Service	1 = Routine / Normal 2 = Non-routine / Abnormal 3 = Emergency	Hazard (Causes, Aspect...)	Category (S, SEC, H, E, RS, Q, CL, F, CM, RB, P, OP)	Risk (Something occurs...)	Impact (Leading to...)	Is there an Opportunity for the identified risk / impact?	Inherent Risk Assessment					Existing Controls (Mitigation)	Residual Risk Assessment								
							Frequency	Probability	Consequence	Inherent Risk Value	Risk Classification		Substitution	Engineering Controls	Administrative Controls	Personal Protective Equipment	Control Effectiveness	Residual Risk Value	Control Effectiveness Classification	Desired Control Effectiveness (DCE)	Risk Classification
							3	2	40	240	LOW		30 %	25 %	20 %	15 %					
E&I Installation, Commissioning (lifting operations)	1	Mechanical - Moving Object (Mechanically or Manually)	S	Person struck by suspended load or caught between suspended load and structure.	Fatality Injury - Crush, Struck By	No	3	2	40	240	LOW	<p>Elimination: Not practicable.</p> <p>Substitution: Not practicable.</p> <p>Engineering Control:</p> <ol style="list-style-type: none"> Each crane or hoist to be fitted with a load cell and a load limiting device to prevent the crane or hoist from being operated outside of its safe working limits. Preventative maintenance programme to be in place to ensure that all cranes and hoists are maintained in a safe and serviceable condition. Only certified lifting tackle to be used to lift a load. Tag lines to be used in situations where a load needs to be steadied or guided while suspended. <p>Administrative Control:</p> <ol style="list-style-type: none"> Each crane or hoist brought onto the project site(s) to have a current test certificate and record of inspection and maintenance as well as a suitable checklist (derived from the crane or hoist manufacturer's inspection recommendations) for use by the operator(s) when carrying out pre-operation safety checks. All cranes and hoists to be inspected, tested and confirmed fit for purpose (i.e. safe for use) before being operated or put into service, before being returned to service following any repair or modification, and periodically as follows: <ul style="list-style-type: none"> Each crane or hoist to be thoroughly examined every 6 months; and Each crane or hoist to be subjected to an annual performance test (i.e. a load test). All lifting tackle to be thoroughly inspected and tagged on a quarterly basis. Details of these inspections to be recorded in a lifting tackle register. Each crane or hoist operator to carry out pre-operation safety checks using a prescribed checklist. Operator to report any fault, defect or damage to his supervisor immediately. Access into an area where lifting operations are being carried out to be restricted. Area to be barricaded and only authorised persons (i.e. those directly involved with the lifting operations) to be permitted to enter. Warning signage (i.e. "Lifting Operations In Progress" and "No Unauthorised Entry") to be conspicuously displayed. Task Risk Assessments to be conducted and Safe Work Procedures to be in place for all lifting operations. Persons involved in lifting operations to receive training on all relevant Safe Work Procedures. All lifting operations to be carried out under the personal supervision of a competent supervisor who has been appointed in writing. A lift to be directed and controlled by a single person (a suitably competent and experienced rigger or banksman). An effective method of communication (e.g. two-way radios) to be in place between the crane operator and the banksman. Persons supervising lifting operations; operating cranes and hoists; using lifting tackle and rigging (slinging) loads; providing signals for controlling lifts; and inspecting, maintaining or testing cranes, hoists or lifting tackle to be suitably competent and experienced, and to be appointed in writing. Suitable competency-based training to be provided. Each person to be in possession of a valid qualification or certificate of competency. <p>Last Resort:</p> <ol style="list-style-type: none"> Personal Protective Equipment (particularly safety helmets and safety boots) to be worn by all persons at all times. 	Not Practicable	Satisfactory	Satisfactory	Satisfactory	90.0%	24	Satisfactory	90%	LOW

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							Frequency	Probability	Consequence	Inherent Risk Value	Risk Classification		Substitution	Engineering Controls	Administrative Controls	Personal Protective Equipment	Control Effectiveness	Residual Risk Value	Control Effectiveness Classification	Desired Control Effectiveness (DCE)	Risk Classification
							6	4	15	360	LOW		30 %	25 %	20 %	15 %					
E&I Installation, Commissioning	1	Mechanical - Moving Object (Mechanically or Manually)	S	Caught in a pinch point while manually handling an object.	Injury - Crush, Laceration, Contusion, Avulsion	No	6	4	15	360	LOW	<p>Elimination: Not practicable.</p> <p>Substitution: Not practicable.</p> <p>Engineering Control: 1. All necessary tools (i.e. the correct tools for the job) to be provided and used to keep body parts safely positioned.</p> <p>Administrative Control: 1. Task Risk Assessments to be conducted and Safe Work Procedures to be in place for tasks involving the manual handling of objects.</p> <p>Last Resort: 1. Suitable PPE to be provided and worn (including gloves).</p>	Not Practicable	Satisfactory	Satisfactory	Satisfactory	90.0%	36	Satisfactory	90%	LOW
E&I Installation, Commissioning	1	Mechanical - Moving Object (Mechanically or Manually)	S	Contact with a sharp edge or end of an object (tools, materials, work pieces and waste).	Injury - Laceration	No	6	4	7	168	LOW	<p>Elimination: Not practicable.</p> <p>Substitution: Not practicable.</p> <p>Engineering Control: Not practicable.</p> <p>Administrative Control: 1. Task Risk Assessments to be conducted and Safe Work Procedures to be in place.</p> <p>Last Resort: 1. Suitable PPE to be provided and worn (including gloves and safety glasses).</p>	Not Practicable	Not Practicable	Satisfactory	Satisfactory	90.0%	17	Satisfactory	90%	LOW
E&I Installation, Commissioning (welding operations)	2	Particulates and Aerosols - Fume	S	Exposure to welding fumes (inhalation).	Injury - Irritation of Respiratory System	No	3	3	3	27	LOW	<p>Elimination: Not practicable.</p> <p>Substitution: Not practicable.</p> <p>Engineering Control: 1. Where practicable and if required, work area to be mechanically ventilated.</p> <p>Administrative Control: 1. Task Risk Assessments to be conducted and Safe Work Procedures to be in place for welding activities.</p> <p>Last Resort: 1. Respiratory protection to be worn by artisans and assistants.</p>	Not Practicable	Satisfactory	Satisfactory	Satisfactory	90.0%	3	Satisfactory	90%	LOW
E&I Installation, Commissioning (welding operations)	2	Radiation - Non-Ionising Radiation	S	Exposure to ultraviolet radiation (welding arc) resulting in arc eye.	Injury - UV Burn to Eyes (Corneas)	No	3	3	7	63	LOW	<p>Elimination: Not practicable.</p> <p>Substitution: Not practicable.</p> <p>Engineering Control: Not practicable.</p> <p>Administrative Control: 1. Task Risk Assessments to be conducted and Safe Work Procedures to be in place for welding activities.</p> <p>Last Resort: 1. Suitable eye protection (i.e. a welding helmet) to be worn by welders and assistants. 2. Where practicable, screens to be erected to protect passers-by.</p>	Not Practicable	Not Practicable	Satisfactory	Satisfactory	90.0%	6	Satisfactory	90%	LOW

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							Frequency	Probability	Consequence	Inherent Risk Value	Risk Classification		Substitution	Engineering Controls	Administrative Controls	Personal Protective Equipment	Control Effectiveness	Residual Risk Value	Control Effectiveness Classification	Desired Control Effectiveness (DCE)	Risk Classification
							30 %	25 %	20 %	15 %	Control Effectiveness		Residual Risk Value	Control Effectiveness Classification	Desired Control Effectiveness (DCE)	Risk Classification					
E&I Installation, Commissioning (in manifold areas)	1	Thermal - Heat	S	Exposure to hot conditions resulting in heat stress.	Injury - Heat Stroke, Heat Exhaustion, Heat Cramps, Heat Rashes	No	3	4	7	84	LOW	<p>Elimination: Not practicable.</p> <p>Substitution: Not practicable.</p> <p>Engineering Control: Not practicable.</p> <p>Administrative Control:</p> <ol style="list-style-type: none"> Suitable facilities to be provided for use during breaks (i.e. shaded, well-ventilated areas with adequate seating and tables). Suitable work / rest (break) cycles to be established. Plenty of drinking water to be provided. Facilities to be provided for keeping water cool. Heat stress awareness training to be provided. <p>Last Resort:</p> <ol style="list-style-type: none"> Hard hat shade brims and sunscreen to be supplied to persons working outdoors. 	Not Practicable	Not Practicable	Satisfactory	Satisfactory	90.0%	8	Satisfactory	90%	LOW
E&I Installation, Commissioning (using portable powered tools)	1	Vibrational - Hand / Arm Vibration	S	Exposure to hand-arm vibration.	Injury - Musculo-skeletal, Vascular	No	5	3	3	45	LOW	<p>Elimination: Not practicable.</p> <p>Substitution: Not practicable.</p> <p>Engineering Control:</p> <ol style="list-style-type: none"> Only good quality tools / equipment to be used. Tools / equipment (handles, in particular) to be properly maintained. <p>Administrative Control:</p> <ol style="list-style-type: none"> Task Risk Assessments to be conducted and Safe Work Procedures to be in place. Suitable work / rest (or job rotation) cycles to be established. Correct / safe posture to be adopted by the user / operator, and the tool / equipment to be held correctly. <p>PPE: Not practicable.</p>	Not Practicable	Satisfactory	Satisfactory	Not Practicable	90.0%	5	Satisfactory	90%	LOW
E&I Installation, Commissioning	1	Weather - Lightning	S	Person(s) struck by lightning.	Fatality Injury - Various	No	2	2	40	160	LOW	<p>Elimination: Not practicable.</p> <p>Substitution: Not practicable.</p> <p>Engineering Control: Not practicable.</p> <p>Administrative Control:</p> <ol style="list-style-type: none"> Inclement Weather Procedure to be implemented. Suitable awareness training to be provided. <p>PPE: Not practicable.</p>	Not Practicable	Not Practicable	Satisfactory	Not Practicable	90.0%	16	Satisfactory	90%	LOW

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Comments Resolution

The owner of this document is responsible for the revision and control of the document, including updating of the table below, which contains the history of the document with details of each revision.

Date	Section	Comment	Resolution