C3.5.1 BASELINE RISK ASSESSMENT

TERMS OF REFERENCE

The Health and Safety Baseline Risk Assessment was conducted based on scope of works set out and site visit. The objective of this baseline risk assessment is to identify and evaluate all baseline risks associated with the execution of the **GTAC 003-2023-24: *OLIFANTSPOORT AND EBENEZER REFURBISHMENT PHASE 1A: ELECTROMECHANICAL REFURBISHMENT OF OLIFANTSPOORT PUMP STATIONS (PS1, PS2 & PS3) AND EBENEZER WATER TREATMENT WORKS & PUMP STATION***

EXECUTIVE SUMMARY

All construction and maintenance activities can subject workers to levels of Occupational stressors and safety factors, e.g., noise, fumes, revolving motor machinery, tools, moving vehicles, electricity, etc., which permanently harm the health and physical wellbeing of persons at work and greatly reduce productivity. The Occupational Health and Safety Act of 1993, and its relevant regulations, require employers to conduct surveys of the actual situation at every site. Measurements must be taken and the identified problems addressed by the employer. Improved conditions ensure better worker morale, loyalty and greater productivity.

SCOPE OF WORK

GTAC 005-2022-23: *OLIFANTSPOORT AND EBENEZER REFURBISHMENT PHASE 1A: ELECTROMECHANICAL REFURBISHMENT OF OLIFANTSPOORT PUMP STATIONS (PS1, PS2 & PS3) AND EBENEZER WATER TREATMENT WORKS & PUMP STATION*

Therefore Gatsheni Sizwe (Pty) Ltd on behalf of Lepelle Northern Water has therefore prepared the following below, must be provided and adhered to by Principal Contractor by means of a Health and Safety File, Plan and Health and Safety Compliance on the following project: GTAC 005-2022-23: Olifantspoort and Ebenezer Refurbishment Phase 1A: Electromechanical Refurbishment of Olifantspoort Pump Stations (PS1, PS2 & PS3) and Ebenezer Water Treatment Works & Pump Station The objective is to ensure that Principal Contractor entering into a contract with Lepelle Northern Water achieves and maintains an acceptable level of occupational health, safety and environmental performance and compliance.

The Works – Olifantspoort Pump Stations: PS1, PS2 & PS3

The nature of works for this project includes, among others, the following activities:

a) Site Establishment
b) Site clearance
c) Rehabilitation of access road to WTW/Pump Station 1 (see item C.3.1.6 below)
d) Refurbishment works within the pump stations (PS 1, 2 and 3) inclusive of :
    i) Replacement of all high lift pumps and their associated valves and pipework. All suction

and delivery site isolating valves to be electrically actuated

ii) Replacement of all auxiliary mechanical systems including cooling water pumps (all pump stations), service water pumps (only in PS 1) and their associated pipe work and valves

iii) Maintenance and load testing of gantry

iv) Replacement of all high lift pump motors and installed of variable frequency/speed drives

v) Maintenance and testing of all high lift pump MV switchgear

vi) Automation of the entire pump station including upgrading existing instrumentation PLC and HMI systems and SCADA systems

vii) Upgrading of the telemetry systems

viii) Replacement and installation of power and control cables

ix) Upgrading of low voltage boards and MCC panels

x) Minor pump station building modifications including painting, small power and lighting

xi) Construction of VFD/VSD substation building to house new VFDs/VSDs

xii) Specialist MV protection studies; earthing and lightning protection studies

e) Coordination and planning for shutdown with the Employer and the Consumers.

f) OH&S

g) Environmental Management

h) Community Liaison and stakeholder management

This Contract includes all of the following works only applicable to pump stations, some valve chambers and some reservoirs:

A. Mechanical and Electrical Works

This portion of the Contract includes the following predominantly mechanical and electrical works defined as follows:

This portion of the Contract includes the mechanical and electrical equipping of the Olifantspoort Pump Stations which are collectively defined as Mechanical and Electrical Works. The Contract includes the following in respect of the Mechanical and Electrical Works for Pump Stations: the design, manufacture, supply, delivery, installation, testing, commissioning, training the Employer's staff in the operation and maintenance thereof, Trial Operation, and upholding during the Defects Notification Period. The Mechanical and Electrical Works for Pump Stations shall be designed to function safely and effectively in conjunction with the infrastructure in this Contract which is designed by the Employer.

The principal features of the design works are described in the specifications, but these cannot indicate every detail necessary to meet the requirements of the Contract because the final design is the Contractor's responsibility. The Contractor shall complete the Works so as to achieve correct operation in a stable, reliable and fail-safe manner, to the approval of the Engineer.

Tenderers shall include for all costs involved in carrying out the work described in design works, including programming to accomplish this work during the contract period in conjunction with the Contractor's other duties.

PS9 Engineering: The Mechanical and Electrical Works For Pump Stations, specifies this portion of the Works and associated detailed requirements, as well as references to other sections of C3: Scope of Works and Volume 5: Drawings where further requirements concerning the associated items of the Works are specified.

(i). Olifantspoort Pump Station 1
(ii). Olifantspoort Pump Station 2
(iii). Olifantspoort Pump Station 3

B. Civil Works

This portion of the Contract includes the following civil construction work, defined as the Civil Works:

- Setting out of the Works
- The construction of a Variable Speed Drives Room
- Construction of reinforced concrete pumps , motors plinths and general civil works inside the pump station

C. General Works

In accordance with Sub-Clause 4.1.1 of the General Conditions of Contract, the Contractor is responsible for the following, applicable to the Mechanical, Electrical Works and Civil Works:

- Environmental management of the construction area during construction.
- Compliance with the requirements of the OHS Act and health and safety specifications.
- The liaison with the ward councillors of the local communities.
- All Temporary works required to construct the Permanent Works

PS1.3.2.2 **The Works Ebenezer Water Treatment Works and High Lift Pump Station**

The nature of works for this project includes, among others, the following activities:

i) Site Establishment
j) Site clearance
k) Water Treatment Works and High Lift Pump Station
   i) Replacement of lime dosing system, refurbishment of polyelectrolyte dosing system, construction pf rapid mix/flocculation channel, installation of actuators on filter valves, partial replacement of filter media, construction of a supernatant sump and pump station at the sludge dam, refurbishment of chlorine house
   ii) Upgrade of WTW control and instrumentation equipment including programmable logic controllers (PLCs), human machine interface unit (HMI), Remote IO cards, metering equipment and SCADA system
   iii) Replacement of all high lift pumps and their associated valves and pipework. All suction and delivery site isolating valves to be electrically actuated
   iv) Upgrade of all auxiliary mechanical systems including cooling water pumps (all Water Treatment Plant and High Lift Pump Station), service water pumps (only in the pump station) and their associated pipe work and valves
   v) Maintenance, refurbishment, and load testing of gantry
   vi) Replacement of all high lift pump motors and installation of variable frequency/speed drives
   vii) Automation of the entire pump station including upgrading existing control and instrumentation equipment including programmable logic controllers (PLCs), human machine interface unit (HMI), Remote IO cards, metering equipment and SCADA system
   viii) Upgrading of the telemetry systems

ix) Replacement and installation of power and control cables
x) Upgrading of low voltage boards and MCC panels
xi) Minor pump station building modifications including painting, small power and lighting
xii) Specialist MV protection studies; earthing and lightning protection studies
xiii) Supply and installation of power and control cabling and cable supports.

l) OH&S
m) Environmental Management
n) Community Liaison and stakeholder management

This Contract includes all of the following works only applicable to Ebenezer Water Treatment Plant and High Lift Pump Station, some valve chambers and Rustfontein Reservoir:

D. Mechanical and Electrical Works

This portion of the Contract includes the following predominantly mechanical and electrical works defined as follows:

- This portion of the Contract includes the mechanical and electrical equipping of the Ebenezer Water Treatment Plant and High Lift Pump Station which are collectively defined as Mechanical and Electrical Works. The Contract includes the following in respect of the Mechanical and Electrical Works for Water Treatment Plant and High Lift Pump Station: the design, manufacture, supply, delivery, installation, testing, commissioning, training the Employer's staff in the operation and maintenance thereof, Trial Operation, and upholding during the Defects Notification Period. The Mechanical and Electrical Works for Ebenezer Water Treatment Plant and High Lift Pump Station shall be designed to function safely and effectively in conjunction with the infrastructure in this Contract which is designed by the Employer.
- The principal features of the design works are described in the specifications, but these cannot indicate every detail necessary to meet the requirements of the Contract because the final design is the Contractor's responsibility. The Contractor shall complete the Works so as to achieve correct operation in a stable, reliable and fail-safe manner, to the approval of the Engineer.
- Tenderers shall include for all costs involved in carrying out the work described in design works, including programming to accomplish this work during the contract period in conjunction with the Contractor's other duties.
- PS9 Engineering: The Mechanical and Electrical Works For Water Treatment Plant and High Lift Pump Station, specifies this portion of the Works and associated detailed requirements, as well as references to other sections of C3: Scope of Works and Drawings where further requirements concerning the associated items of the Works are specified.
  (i). Ebenezer Water Treatment Works
  (ii). Ebenezer High Lift Pump Station
  (iii). Rustfontein Reservoirs

E. Civil Works

This portion of the Contract includes the following civil construction work, defined as the Civil Works:

- Setting out of the Works
- Minor civil works and refurbishment of chlorine room, lime storage building,

- Construction of reinforced concrete pumps, motors plinths and general civil works inside the pump station
- Construction of Flocculation channel, Sump & Valve Chamber and Raising of filter walls
- Modification of Sludge Dam

F. General Works

In accordance with Sub-Clause 4.1.1 of the General Conditions of Contract, the Contractor is responsible for the following, applicable to the Mechanical, Electrical Works and Civil Works:

- Environmental management of the construction area during construction.
- Compliance with the requirements of the OHS Act and health and safety specifications.
- The liaison with the ward councillors of the local communities.
- All Temporary works required to construct the Permanent Works

1. DEFINITIONS

1.1. **Hazard:** a situation that poses a level of threat to People, production, property, or the environment.
1.2. **Risk:** The probability that something unwanted/ unpleasant will happen
1.3. **Severity** is the anticipated extent or damage that may occur as a result of an unplanned event.
1.4. **Frequency**: how often does activity occur within a predetermined time
1.5. **Likelihood**: how likely are the consequences to occur

2. RISK RATINGS

2.1. Consider what can go wrong that can hurt someone
2.2. Determine what the most likely outcome would be - Consequences
2.3. Determine worst case scenario how likely those consequences are - Likelihood
2.4. Calculate the risk rating
2.5. Required action

3. CONSEQUENCES:

3.1. Severe - Death or permanent disability to one or more persons
3.2. Major - hospital admission required
3.3. Moderate - medical treatment required
3.4. Minor - first aid required
3.5. Insignificant - injuries not requiring first aid

4. LIKELIHOOD

4.1. Almost certain - expected to occur in most circumstances
4.2. Likely - will probably occur in most circumstances
4.3. Possible - could occur at some time
4.4. Unlikely - is not likely to occur in normal circumstances
4.5. Rare - may occur only in exceptional circumstances

5. METHOD

The basic risk assessment principles that will be followed are hazard identification, hazard quantification, risk identification, risk evaluation and ranking and lastly risk management recommendations. (Risk evaluation is described under the heading “Risk evaluation criteria”.) This assessment will be reviewed whenever the Project Scope is altered or after serious / repetitive incidents.

6. RESPONIBILITIES

6.1. Site Management - To ensure that Risk Assessments are conducted, assessed, communicated, addressed and signed.

6.2. Occupational Health Safety Officer- To ensure and enforce that Risk Assessments are communicated and utilized as a tool during work activities on site, as well as activities in the lay down areas.

6.3. Supervision: To ensure that existing Risk Assessments remain applicable and regularly updated upon changes and replacements.

6.4. OHS Representative: To discuss risks on a daily basis and to assist employees regarding changes in risks

7. LEGISLATIVE REQUIREMENTS

The following are legislation or guidelines that were identified as most applicable to this project:

- Construction Regulations, 2014
- The Constitution of the Republic of South Africa (particularly Section 24 of the Bill of Rights).
- Occupational Health and Safety Act 1993 (Act 85 of 1993) and its Regulations.
- National Environmental Management Act 1998 (Act 107 of 1998).
- National Road Traffic Act (93 of 1996) National Environmental Management: Waste Act 59 of 2008
- National Environmental Management Act 107 of 1998 and Amendments
- Air Quality Act 39 of 2004
- Hazardous Substances Act 15 of 1973
- National Water Act 36 of 1998
- Conservation of Agricultural Resources Act 1983 (Act 43 of 1983).
- Mine Health and Safety Act 29 of 1996
- Compensation for Occupational Injuries and Diseases Act No 130 of 1993 (COIDA)
- Applicable South African National Standards (SANS).
- ISO 9001:2008 –Quality Management Systems requirements
- ISO 14001:2004–Environment Management Systems requirements
- OHSAS 18001:2007 –Occupational Health and Safety Management Systems Requirement

- Electrical Installations Regulations GNR

7.1. Risk Management (RM)

The RM methodology comprises five key elements, which are:

7.1.1. Identify site hazards

These are conditions on site that could present Health and Safety risks. e.g. dust, noise, work at heights, travelling, trenching, rigging, uneven terrain, construction vehicle, traffic and hazardous chemical substances.

7.1.2. Identify the risks

These are events that could adversely affect the Health and Safety of people as well as the environment. Included in this step is the identification of causal factors. The risk owner is the person accountable for ensuring that controls are in place, implemented and reviewed/ monitored. Highlight unanticipated risks due to abnormal conditions (e.g. sudden unexpected and short-term changes to environmental conditions).

7.1.3. Analyze the Risks

With the hazards and risks identified, start with listing potential consequences and existing control measures. Then assess the effectiveness of the existing controls. Also taking into account existing controls, determine the anticipated consequences and the likelihood of these consequences using the prescribed framework for health, safety and environmental risks.

7.1.4. Evaluate Risks

This step aimed at ensuring that adequate controls have been identified for the risks, adequate resources have been allocated and adequate progress is being made with implementation. The level of managerial oversight and the timeframe within which the treatment strategy must be established is dictated by the priority rating matrix.

Evaluation includes:

7.1.4.1. Agreement by appropriate managerial levels, that appropriate risk and control measures have been identified.

7.1.4.2. Review of the appropriateness of the control measures them.

7.1.4.3. Review of additional controls/ tasks that have been identified as necessary.

7.1.4.4. Assessment of the measures proposed for measuring the progress of implementation.

7.1.4.5. Assessment of the measures proposed for monitoring effectiveness of the controls.

The Contractor must ensure through his risk management process the hierarchy of controls stipulated as follows, are implemented:

1. ***Eliminat****e* - The complete elimination of the hazard.
2. ***Substitute*** - Replacing the material or process with a less hazardous one.

3. ***Redesign*** - Redesign the equipment or work process.
4. ***Separate*** - Isolating the hazard by guarding or enclosing it.
5. ***Administrate*** - Providing control such as training, procedures etc.
6. ***Personal Protective Equipment (PPE)*** - Use of appropriate and properly fitted PPE where other controls are not practical. (PPE as the last resort)

APPOINTMENTS AS PER THE CONSTRUCTION REGULATIONS

Item	Regulation	Appointment	Responsible Person
1.	5(1)(k)	Principal contractor for each phase or project	Client
2.	7.(1)(v)	Contractor	Principal Contractor
3.	7(3)	Sub-Contractors	Contractor
4.	8(1)	Construction Manager	Contractor
5.	8(2)	Assistant Construction Managers	Contractor
6.	8(5)	Construction Safety Officer	Contractor
7.	8(7)	Construction supervisor	Contractor
8.	9(1)	Person to carry out Risk Assessment	Contractor
9.	9(3)	Risk Assessment Trainer/Instructor	Contractor
10.	10(1)(a)	Fall Protection Planner	Contractor
11.	12 (2)	Temporary Works Supervisor	Contractor
12.	11 (2))	Structures Examiner	Contractor
13.	13(1)	Excavation Supervisor	Contractor
14.	13(2)(ii)(bb)	Professional Engineer or Technologist	Contractor
15.	13(2)(k)	Explosives Expert	Contractor
16.	14(1)	Demolition Work Supervisor	Contractor
17.	14(2)	Demolition Expert	Contractor
18.	14(11)	Explosives Expert	Contractor
19.	16(1)	Scaffold Supervisor	Contractor
20.	17(2)(b)	Compliance Plan Developer	Contractor
21.	17(2)(ii)	Rigger	Contractor
22.	18 (1)	Rope Access Work Supervisor	
23.	19(8)(a)	Material Hoist Inspector	Contractor
24.	20(1)	Bulk Mixing Plant Supervisor	Contractor

25.	20(2)	Bulk Mixing Plant Operator	Contractor
26.	21(2)(b)	Explosive Actuated Fastening Device Operator	Contractor
27.	21.2 (g) (i)	Explosive Actuated Fastening Device Controller	Contractor
28.	22(a)	Crane Operator	Contractor
29.	23(d)(i)(ii)	Construction Vehicle and Mobile Plant Operator	Contractor

Item	Regulation	Appointment	Responsible Person
30.	23(1)(k)	Construction Vehicle and Mobile Plant Inspector	Contractor
31.	24(d)	Temporary Electrical Installations Inspector	Contractor
32.	24 (c)	Temporary Electrical Installations Controller	Contractor
33.	28 (a)	Stacking and Storage Supervisor	Contractor
34.	29 (h)	Fire Equipment Inspector	Contractor
35.	29 (i)	Fire Fighter	Contractor

- This list may be used as a reference or tool to determine which components of the Act and Regulations would be applicable to a particular site. This list must not be assumed to be exclusive or exhaustive

Activities

A. Administration

B. Site Establishment and Construction Works

1. Clearing and grubbing of camp site
2. Fencing around camp site
3. Erection of barricades
4. Security at camp site
5. Erection of signs/speed limits on site
6. Delivery of materials at camp site
7. Loading and unloading of site materials (cement bags, tools, paving bricks, bulk Steel Pipes, Reinforcement Steel)

8. Use of cranes for Concrete Slabs, Beams, Steel Tanks, Valves and Pumps
9. Stacking and storage of materials
10. Handling of hazardous chemicals
11. Environmental protection, sanitation and waste removal

C. Earthworks
   1. Excavation and laying of bulk Steel Pipes
   2. Backfill and compaction
   3. Entering a confined space
   4. Use of concrete
   5. Use of hand tools
   6. Use of machinery

D. Emergency preparedness
   1. Evacuation during site emergencies
   2. Providing first aid
   3. Firefighting activities

E. Electrical power supply system, Electrical Sub-Station and energy powered tools
   1. Working with electrical power supply system, portable electrical equipment

F. Housekeeping
   1. Cleaning
   2. Cleaning oil spillages
   3. Waste disposal

G. Traffic accommodation
   1. Workers crossing the road
   2. Working in or next to the road

H. Public safety

I. Night work

REF	ACTIVITY, HAZARD & RISK IDENTIFICATION	LOSS	CONTROLS TO BE IMPLEMENTED	RISK ASSESSMENT	

	ACTIVITY	HAZARD	RISK	TYPE		(C)	(L)	CLASS	SWP / SOP /MS REF NUMBER
A. Administration									
	Medical examinations	Employees unfamiliar with their medical conditions	Health problems resulting in time loss and project delays	H	• All employees are to be declared medically fit by a registered occupational health practitioner	3	3	13(H)	
	Admin documentation	Nonconformance issues	Work stopped due to non-compliance		• All necessary permits, method statements and plans to be in place prior to commencement of task	3	3	13(H)	
	Application of wayleaves	No wayleave and supporting permits	Time loss due to work stoppage by authorities resulting in unnecessary costs		• Ensure that all documentation and permits are in place	3	3	13(H)	
	Entering site without being inducted	Employees exposed to unknown hazards	Moderate to severe injuries	S	• SHE induction must be given to persons before entering site	4	4	21(CR)	
	Appointments	Appointments not done as per construction regulation	Time loss due to work	S		3	2	9(M)	

	Induction training Performing Risk Assessments	Persons have not received induction training before starting work Risk assessments not performed before commencement of any new work and during hazardous activities	stoppage by authorities Employees are not aware of the risks associated with their activities Employees are not aware of the risks they are exposed to during work	S S	• Standard appointment letters should be completed as required by the OHSAct. Refer to Appointments in the safety file • Management is to ensure that all workers have received health & safety induction training pertaining to the hazards associated with the activities performed. • Proof of the induction training must be maintained for all persons that perform high risk activities. • Complete the Induction Form. • Appoint a competent Supervisor in writing and provide HSE Representative Training. Supervisor to do a risk assessment that includes the following: • The identification of risks and hazards to which persons may be exposed. • The analysis and evaluation of the risks and hazards identified. • A plan to mitigate, reduce or control the risks and hazards that have been identified.	4 4	3 3	18(H) 18(H)	
B. Site Establishment and Construction Works									
01	Clearing and grubbing of camp site	Incompetent Yellow plant machine operators,	Injury, injuries to third parties & fatalities	S	• Operator must have knowledge, experience, training, and qualifications specific to the work they have been appointed to do	4	4	21(CR)	Environmental Management Plan

		Oil leakages from machines	Soil pollution	E	• Oil spills must be cleaned out • Spill kits must be available onsite	2	4	12(M)	
		Contractor's workers not following Safe Working Procedures (SWP)	Injuries	S	• Workers to be trained on safe working procedures • Toolbox talks on importance of following SWP'S	5 4	4 4	24(CR) 21(CR)	
		Working on uneven surfaces		S	• Use of proper footwear PPE	3	3	13(H)	
		Damage to adjacent private property by machine bumping into private property	Leg & ankle injuries property damage	S	• Prior to the beginning of clearing or grubbing activities, the project engineer or the certified inspector is to inspect the area to determine if these activities are likely to cause damage or require access to adjacent private property. • When felling, topping or trimming trees, broken or cut limbs are not to fall on or damage overhead wires.	3	4	17(H)	
		Non disposal of generated waste	Environmental pollution	E H	• The disposal of all cleared or grubbed materials is the responsibility of the contractor to remove from the right-of-way and disposed at locations off the project outside the limits of view of the traveling public	2 3	4 5	12(M) 20(H)	

		Exposure to venomous reptiles and insect bites Exposure to dust from yellow plant machines	Manifestation of rodents Insect bites and Illness from snake bites Illnesses associated with lungs, Pollution	H H	• All waste must be removed from site through a formal waste management program • No littering is allowed on site • Use of insect repellents • Weed control • Environmental awareness during toolbox talks • Spay water on ground to minimize the production of dust • Employees working close to the machines and exposed for longer periods to the machine must be provided with dust masks	3 3	4 4	17(H) 17(H)	
02	Fencing around camp site	Substandard fencing Exposure to sharp edges Unauthorized persons accessing site via poor fencing	Fence blown down in high winds Cuts & lacerations Theft	S S S	• The safety fencing should be strong enough and durable enough to withstand the elements • Wear proper PPE • It should be of a design that makes it difficult to climb	3 2 5	3 3 4	13(H) 8(M) 24(CR)	

		and green netting			• It should have reinforcement at the bottom so that one cannot climb underneath it				
		Persons entering site without PPE	Moderate to severe Injuries	S	• Gates or joins should not provide a security threat • Persons must wear correct PPE before entering site	4	4	21(CR)	
		Use of hand tools to erect fence	Injuries to eyes	S	• Use of protective safety eyewear(goggles)	4	4	21(CR)	
		Work site not barricaded from public							
03	Erection of barricades on work site		Moderate to severe injuries		• Erect barricades to control access to the job site from the public and control the worksite as a whole	4	3	18(H)	
04	Security at camp site	Un-authorized persons entering site	Injuries	S	• No contractor may allow or permit any employee or person to enter site unless the person has undergone Health and safety induction training	4	4	21(CR)	
		Unsecured storage facilities	Theft	S	• Security system and guards should be used • Use very secure, lockable storage units • Equipment and tools to be locked inside secure area	1	4	7(M)	
	Substandard fencing	Fence blown away by wind if there is no net	Theft	S	• Use net to increase security	1	4	7(M)	

05	Erection of signs/speed limits on site	Speeding vehicles on site	Vehicle accidents	S	• Ensure erection of site speed signs	4	4	21(CR)	To be included in Traffic Management Plan
		Poor condition of hand tools used to erect signs	Hand and eye injuries	S	• Use of proper PPE (protective gloves and goggles)	4	3	18(H)	
		Manual use of hand tools to dig holes	Back injuries from bending	S	• Training on proper bending postures	3	3	13(H)	
		No signage on construction site	Employees parking vehicles anywhere on site	S	• Allocation of designated parking areas for delivery/plant vehicles and staff/visitors	2	3	8(M)	
06	Delivery of materials at camp site	Incompetent vehicle and machinery operators	Accidents	S	Employment controls for persons required to drive. Valid driver's license.	4	4	21(CR)	To be included in Traffic Management Plan
		Driver not adhering to Safe driving techniques	Injuries	S	Safe driving techniques to be adhered to at all times	3	4	17(H)	

		Machinery operators not competent to perform specific appointed work	Injuries to third parties	S	Operator must have knowledge, experience, training, and qualifications specific to the work they have been appointed to do; follow SWP's	4	4	21(CR)	
		Oil spills from machinery	Environmental pollution	E	Use of spill kits and persons trained on using them; regular maintenance of forklifts; use of drip trays	4	4	21(CR)	
		Inhalation of fumes	Lung illnesses	H	Air quality monitoring and surveys Use of masks	3	5	20(H)	
		Dust inhalation		H	Regularly spraying water on dry soil to minimize dust	3	5	20(H)	
		Dropping of loads	Lung illnesses	S	Correct positioning of equipment and low loaders	3	4	17(H)	
			Property damage						
07	Loading and off-loading of site materials	Manual lifting	Musculoskeletal injuries	S	• Practice correct lifting techniques when lifting loads • Do not lift heavy loads without assistance	3	4	17(H)	Procedure for manual handling
		Carrying heavy loads	Back Injuries	S	• Correct handling techniques, proper posture techniques when handling heavy or big loads of equipment.	3	4	17(H)	Procedure for manual handling

		Twisting	Spinal injuries	S	• Avoid twisting the upper body suddenly whilst carrying heavy loads.	3	4	17(H)	
		Handling exceeding loads	Back and spinal injuries	S	• Ask for assistance to carry heavy and awkward loads. • Use correct lifting method and ask for assistance for loads exceeding 25kg.	3	4	17(H)	
		Workers not following SWP's for manual handling	Back and spinal injuries	S	• Employees should be properly trained and follow safe work procedures. • Only Trained First Aider must perform treatment of injury.	3	4	17(H)	
		Pregnant women doing strenuous work	Miscarriage in pregnant women	H	• Woman should avoid strenuous work from early pregnancy onwards to well after the birth.	3	4	17(H)	
08	Use of cranes to offload Elevated Steel Tank, Concrete slabs, Beams	Operation of crane by incompetent person	Fatalities	S	• only competent well-trained operators must operate cranes	5	3	22(CR)	
		Overloading of cranes	Toppling of load	S	• loads must be properly secured • use of competent trained operator	5	4	24(CR)	
			Swerving	S	• use of competent out riggers. Loads bigger than 5T- bunksmens. Loads smaller than 5T- Riggers	3	3	13(H)	
		Fall of loads		S	• Proper slinging techniques	3	3	13(H)	

		Incorrect/side loading Use of damaged slings and shackles Poor/unstable ground conditions Improper set up of crane pads	Damage to property Pinch or crush points by materials Drop of loads Crane tip over Accidents	S S S S	• Proper li • fting and tackling techniques • regular maintenance of cranes • Operation by competent person • Use of adequate full PPE • All lifting equipment must be inspected before being used • Look for impediments, depressions, voids, trenches on ground – check ground stability • Be aware of potential vehicle traffic that may conflict with your area of operation. • Redirect traffic or adjust your outrigger pad set up as needed • All uneven ground should be leveled prior to placement of any crane pad	4 4 4 4	3 3 3 3	18(H) 18(H) 18(H) 18(H)	
09	Stacking and storage of materials including	Improper Stacking of bulk Steel Pipes resulting in materials falling	Injuries	S	• Follow proper stacking procedures • Proper supervision and inspections	4	4	21(H)	

	Concrete Slabs								
10	Handling of hazardous chemicals	No bunding for Storage of fuel and oil resulting in spills	Environmental pollution	E	• All fuel storage to be in specific bunded fuel storage tanks that holds 110% of the capacity of the container. • Spill kits required and persons trained on using them	4	4	21(CR)	Environmental management plan/ Fire Protection Plan
		Fire extinguishers not accessible	Property damage from fire	S	• Fire-fighting equipment must be installed in suitable locations around the flammable liquids store with visible symbolic signs.	4	5	23(CR)	
		Skin contacts with chemicals	Skin irritation and skin dermatitis	H	• Provide 16-section format MSDS and PPE (Gloves)	1	4	7(M)	
		Inhalation of hazardous chemicals	Illnesses associated with lungs	H	• Use of dust masks	3	3	13(H)	
		Incorrect disposal of chemicals	Environmental pollution	E	• Follow environment plan	3	4	17(H)	
		Inventory list of chemicals not kept		S	• Compile a complete list of the chemicals in your workplace	3	3	13(H)	

		Ingestion Employees not trained on working with hazardous chemicals Unmarked chemicals	poisoning risks associated with incorrect use of chemicals risks associated with using unknown chemicals	S S S	• Making available emergency medical help • Trained personnel to handle hazardous chemicals • All chemicals on site must be correctly marked and labeled	3 3 3	3 3 4	13(H) 13(H) 17(H)	
11	Environmental protection and sanitation	Employees smoking anywhere on site	Risk of a fire starting from a lit cigarette Bacterial/ viral/fungi	E H	• Smoking must be prohibited outside designated smoking areas	1 2	4 4	7(M) 12(M)	Environmental Management Plan

		Use of unhygienic toilets according to regulation requirements Working in extreme weather i.e., hail, strong winds, Heat Run-off lubricants from vehicles Employees standing near noisy machinery for prolonged periods	and parasite infections heatstroke Water and ground water pollution Noise exposure to ears	 H E H	• Ensure that toilets are regularly cleaned and maintained, including temporary units. • Employees are required to wash their hands after going to the toilets/ using urinals. • EHS weather watch via internet • Find shelter in a secure building • All work must be halted under such conditions • Provide employees with water • Ensure that there is no un-natural flow into storm water channels. • Laborers can sustain noise-induced hearing loss when not using correct PPE. I.e. Ear muffs, ear plugs	 2 3 2	 4 4 4	 12(M) 17(H) 12(M)	 Environmental Management Plan Environmental Management Plan
C. Earthworks									
01	Excavations and Laying of bulk Steel Pipes	Excavations done by incompetent supervisor	Excavations work on unstable ground	S	• Evaluate the stability of the ground before excavation work begins. • Inspection by a qualified engineer • A contractor must ensure that all excavation work are carried out under the supervision of a competent person.	5	3	22(CR)	Appointment of competent person

		Fall or dislodgement of material in an excavation	Being buried/trapped	S	• The contractor must with instructions from the excavation supervisor take reasonable and sufficient steps in order to prevent any person from being buried or trapped by a fall or dislodgement of material in an excavation • Deep excavation signs must be visibly placed near excavation area	4	4	21(CR)	
		Workers not following safe working procedures	Injuries	S	• No load, material, plant or equipment is to be placed or moved near the edge of any excavation where it may cause its collapse and consequently endangers the safety of any person. (1m distance from excavation)	4	4	21(CR)	
		Excavations not being inspected	Fall of ground	S	Every excavation must be inspected daily and after rain or fall of ground.	4	4	21(CR)	
02	Backfill and compaction	Flying debris getting into eyes of workers	Loss of sight – Backfill and Compaction works create flying debris which may pose a significant eye hazard	S	• Workers must be issued eye protection upon hire. E.g. eye goggles • Re-enforcement on the use of eye protection during site tool box talks	4	4	21(CR)	

03	Entering a confined space	No gas detectors- Air quality is not tested before entering confined space	Fires and explosion can occur causing multiply injuries to employees	S	• Before a person enters a confined space, gas detectors must be used to determine the need for breathing apparatus.	4	4	21(CR)	
		Entering a confined space without inspection	Injuries to workers	S	• All confined spaces must be inspected before any person enters the confined space	4	3	18(H)	
		Inadequate symbolic safety signs and notices	May result in fatalities to workers	S	• SWP training must be given to workers. • Only competent persons must be appointed in writing	4	3	18(H)	
		Oxygen content dropping to less than 20% by volume	Insufficient % of oxygen can have a serious impact on the entrant working inside the confined space, suffocate	S	• When oxygen drops to less than 20% by volume, the area must be cleared of all people and artificial ventilation systems put into place.	4	4	21(CR)	
04	Use of concrete for Concrete	Workers not trained on working with concrete	Severe chemical burns to exposed	S	• Task to be done by competent shutter hands and concrete hands	3	3	13(H)	

	Service Reservoir		skin and eyes		• Use of correct PPE, i.e. Waterproof gloves, overalls, eye goggles				
05	Use of hand tools	Incorrect use of hand tools	Hand loss	S	• Practice correct use of tools for the correct task	4	4	21(CR)	
		Not following Safe Working Procedures	Injuries	S	• Training on safe working procedures • Correct use of PPE	4	4	21(CR)	
		Using sub-standard tools	Injuries to hands	S	• Regular tool inspections • Removal of damaged tools	4	5	23(CR)	
		Using homemade tools to perform tasks	Injuries to hands	S	• Use the correct tools for the correct task • Conduct Hand tool Risk Assessment	4	4	21(CR)	
06	Use of machinery	Use of faulty equipment	Injuries	S	• Maintenance of equipment as per manufacturer's requirements • periodic repairs • removal of faulty equipment	4	5	23(CR)	
			Electrocution	S	• display visible signage that indicates faulty equipment	3	3	13(H)	

		Contact with exposed/ damaged wires Work stoppages	 Loss of production	 E	• toolbox talks • proper supervision	3	4	17(H)	
		Oil and fuel spills	Environmental pollution	S	• Any leaks must be contained with drip trays and spill kits must be used to minimize environmental damage	3	4	17(H)	
D. Emergency Preparedness									
01	Evacuation during site emergencies	Workers uninformed of emergency evacuation routes	Injuries	S	• Conduct emergency drills • SHE Orientation	3	4	17(H)	Emergency Plan
			Stampede	S	• Supervision during evacuation	4	4	21(CR)	
		Emergency evacuation signs not visible to employees	Fatalities	S	• Emergency evacuation routes and assembly points must be clearly marked	5	4	24(CR)	

02	Providing first aid	Incompetent first aider	Escalation of injuries	S	• Trained first aiders	4	4	21(CR)	Emergency plan
		Untrained persons attending to first aid cases	Fatalities	S	• Trained first aiders	5	4	24(CR)	
		First aider not using PPE	Bacterial, viral infections	S	Use gloves and CPR mask	4	4	21(CR)	
03	Fire fighting activities	Incompetent fire fighter	Burns	S	• Trained fire fighters	4	4	21(CR)	Fire Protection Plan
		Workers not trained on emergency plan	Injuries	S	• Conduct fire drills • Emergency plan must be in place	4	4	21(CR)	
		Emergency numbers not displayed on site for everyone to see	Fatalities	S	• Emergency numbers must be visible to everyone	5	3	22(CR)	
		Fire extinguishers not working and not inspected	Property damage		• Fire extinguishers must be easily accessible and available	4	5	23(CR)	

		Smoke inhalation	Suffocation	H	• Firefighting equipment must be inspected • Use of masks	4	4	21(CR)	
E. Electrical power supply system, Electrical Sub-Station and energy powered tools									
01	Working with electrical power supply system, portable electrical equipment	Exposure to faulty electrical equipment/tools	Shock	S	• Regular tool inspections • Ensure that the connections (DB Boards, cables to equipment, equipment, etc.) are tight. • Risk Assessments	3	4	17(H)	
		Use of incorrect tools for the wrong job	Fatalities	S	• Equipment must be in good working condition. • Correct use of the correct tool for the correct task • Access to live equipment is to be controlled.	5	4	24(CR)	
		Incompetent person performing electrical work	Fire	S	• Regular maintenance of equipment	4	3	18(H)	

		Contact with live /damaged wires	Electrocution	S	• Only competent persons to perform tasks. • Safe work procedure/lock out procedure to be available and followed when working on electrical machinery and/or equipment. • Certificate of compliance to be issued before the electrical installation is handed over for use, or if alterations and modifications have been done. • Correct usage; do not work on live equipment	4	4	21(CR)	
F. Housekeeping									
01	Sweeping/cleaning	Exposure to cleaning chemicals	Skin irritation	S	• Use of PPE (gloves)	1	4	7(M)	
			Skin dermatitis	H	• Use of PPE (gloves)	2	4	12(M)	
		Inhalation of chemicals	Dizzy spell	H	• Use of masks where necessary	1	4	7(M)	
		Musculoskeletal from repetitive motion including bending, stretching, reaching etc.	Back injuries	H	• Practice correct bending postures	3	4	17(H)	

02	Cleaning oil spillages	Spill kits not available	Slips and falls	E	• Spill kits must be available and accessible on site	3	4	17(H)	Environmental Management Plan
		Untrained persons doing spill cleanups	Improper clean ups	E	• Training must be provided to persons responsible for spill cleanups • Conduct spill drills	2	4	12(M)	
		Incorrect disposal of contaminated waste	Environmental pollution	E	• Designated bins for disposal of contaminated waste	3	4	17(H)	
03	Waste disposal	Mixing of waste	High disposal costs	E	• Use of separate coloured bins for the disposal of general, hazardous and recyclable waste • Waste disposal by a registered waste disposal company	2	4	12(M)	
G. Traffic accommodation									
01	Workers crossing the road	Vehicle drivers not adhering to speed limits	Vehicle accidents	S	• Adherence to Road Traffic Management Plan (RTMP) and NRTA • Toolbox talks • Use of certified flagmen	3	4	17(H)	To be included in Traffic Management Plan
		Work area not barricaded	Injuries to 3Rd parties	S	• Use temporary barriers to close off work site	4	4	21(CR)	

		Drivers not adhering to stop/go Working at night	Property damage fatalities	S S	• Safe stopping areas • Use of warning lights, hazard lights, directional signs • Provide adequately visible PPE	3	4	17(H)	
02	Working in or next to the road	Employees not aware of their surroundings	Injuries to employees caused by passing traffic	s	• Use of trained flagmen to conduct and control road traffic	3	3	13(H)	
H. PUBLIC SAFETY									
01	Unauthorized persons entering site	Members of public unknowingly exposed to risks	Moderate to severe injuries	S	• Site must be clearly fenced and closed off. Warning signage must be placed at entrance to prohibit unauthorized entry.	4	4	21(CR)	
02	Working near the road	Workers unaware of their surroundings	Damage to public vehicles passing by Injuries to third parties	S S	• Certified traffic Safety Officer to control traffic • Safe work procedures must be in place • Sufficient signage • SARF	3 4	3 3	13(H) 18(H)	

03	Public passing near construction site	Material falling from elevation	Injuries to third parties	S	• Construct temporary protective gantries or covered walkways to provide protection when employees are working above areas where the public or other employees need to pass	4	3	18(H)	
04	Moving motorized and other equipment around	Workers not following procedures when offloading equipment from low loaders	Moderate to severe injuries to third parties	S	• Follow procedure for offloading • Correct positioning of equipment and low loaders	4	4	21(CR)	
I. Night Work									
01	Working at night	Reduced visibility for motorists	Accidents	S	• Temporary lighting set to avoid glare and shadows for motorists, equipment drivers, workers	4	4	21CR)	
		Drivers, pedestrians, workers less alert and more likely to be tired	Injuries	S	• Work schedules set up to allow enough sleep • Maintain strict sleep schedule, make sleep a priority	3	4	17(H)	
		Workers less visible	Accidents and injuries	S	• Use of retroflective high visibility apparel meeting ANSI/ISEA 107-2004-Class 3 to improve visibility	4	3	18(H)	
		Decreased visibility on site		S		4	4	21(CR)	

			Trips, falls, run overs		• Temporary lighting to ensure good visibility				

RISK ASSESSMENT MATRIX						
LOSS TYPE		CONSEQUENCE ©				
		INSIGNIFICANT (1)	***MINOR (2)***	***MODERATE (3)***	***MAJOR (4)***	***CATASTROPHIC (5)***
Harm to people (Safety / Health) (S/H)		First aid case / Exposure to minor health risk	Medical Treatment case / Exposure to major health risk	Lost time injury / Reversible impact on health	Disabling Injury / Irreversible impact on health	Fatality / Impact on health ultimately fatal
Environmental impact (EI)		Minimal environmental harm – immediate clean-up	Material environmental harm – incident remediable in short term	Serous environmental harm – incident remediable in medium term	Major environmental harm – incident remedial in long terms	Extreme environmental harm – Incident irreversible
LIKELIHOOD (L)		**RISK RATING**				
5 (Almost	The unwanted event has occurred frequently; and is likely to re-occur within 1 week	**11 (M)**	**16 (H)**	**20 (H)**	**23 (CR)**	**25 (CR)**

certain)						
4 (Likely)	The unwanted event has occurred infrequently; and is likely to re-occur within 1 month	**7 (M)**	**12 (M)**	**17 (H)**	**21 (CR)**	**24 (CR)**
3 (Possible)	The unwanted event has happened in the business at some time; or could happen within the next 3 months	**4 (L)**	**8 (M)**	**13 (H)**	**18 (H)**	**22 (CR)**
2 (Unlikely)	The unwanted event has happened in the business at some time; or could happen within the next 6 months	**2 (L)**	**5 (L)**	**9 (M)**	**14 (H)**	**19 (H)**
1 (Rare)	The unwanted event has never been known to occur in the business; or it is highly unlikely it will occur the next year	**1 (L)**	**3 (L)**	**6 (M)**	**10 (M)**	**15 (H)**

RISK RATING	RISK LEVEL	GUIDELINES FOR RISK MATRIX AND MANAGEMENT PRACTICES
21 – 25	(CR) – Critical Risk	Eliminate, avoid, implement specific action plans / procedure to manage and monitor
13 – 20	(H) – High	Pro-actively manage
6 – 12	(M) – Medium	Actively manage
1 – 5	(L) - Low	Monitor and manage as appropriate