

ANNEXURE B

BASELINE RISK ASSESSMENT

**AS PER CONSTRUCTION REGULATION 5(1)(a), 2014
OCCUPATIONAL HEALTH AND SAFETY ACT, NO. 85 OF 1993**



water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

PROJECT:

**GROOT LETABA RIVER WATER DEVELOPMENT
(GLeWaP):
RAISING OF TZANEEN DAM
(REINFORCEMENT)**

PREPARED BY



*This document is prepared on behalf of the Client in terms of
Construction Regulation 5(1)(a). The Baseline Risk Assessment is conducted to
obtain a benchmark of type and size of potential hazards pertaining to the project.
The aim is to identify all major and significant risks.*

DOCUMENT CONTROL

Document Name	Baseline Risk Assessment
Document Number	DWS/DBSA/TZANEEN/BLRA/2023/01
Project Name	Groot Letaba River Water Development: Raising of Tzaneen Dam
Revision Number	Rev 01

LOG OF REVISIONS

Revision No	Date	Prepared By	Reviewed and Approved By	Changes made
Rev 01	11/03/2023	F du Toit	Francois du Toit	For Construction

ISSUE REGISTER

Distribution	Revision No.	Issue Date
Designer - ARQ Dams (Pty) Ltd	00	11/03/2023
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PROJECT DIRECTORY

Position / Department	Company	Contact person	Contact detail
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1. Objective

The objective of this baseline risk assessment was to identify and categorise the low to high hazards associated with performing tasks during different work categories.

The evaluation of results will assist management to eliminate, minimise or control risks to workers associated with the tasks performed or exposure to the working environment.

This risk assessment was also conducted to assist management in identifying training needs in order to concentrate efforts where it is mostly needed.

- 1.1 According to the **Occupational Health and Safety Act 85 of 1993**, all companies must assess where they stand in terms of risk, identifying the major risks which they are exposed to thereby establishing their priorities and a system for future risk control. A baseline risk assessment must be comprehensive and may well lead to further, separate and more in-depth risk assessment studies.
- 1.2 The baseline risk assessment should be reviewed periodically, about every year, after every accident/incident, change of work force or change of plant/equipment to ensure that it is still relevant and accurate. Any other studies will need to be incorporated to achieve a 'complete picture'.

2. Scope of Works

The raising of Tzaneen Dam is being developed by the Department of Water and Sanitation (DWS) through its implementation agent, Lepelle Northern Water, in tandem with the construction of the new Nwamitwa Dam and as part of the Groot Letaba River Water Development Project (GLWaP) to increase the assurance of yield and to enhance the water resources of the Groot Letaba River in serving the needs of the Mopani District of eastern Limpopo Province.

The work shall comprise the following:

- (a) Supply, cut, bend and delivery of High tensile deformed steel bars and mild steel bars for the duration of 12 months.

Special attention to be given to the requirements for reinforcement.

Also refer to the Design Report, Scope of work as per Bill of Quantities and Technical Specifications

3. Risk Analysis Method

The risk analysis considered all the tasks as described in the safe work procedures developed for this specific operation.

The risk analysis included

- a. Description of the task/system under analysis.
 - b. Evaluation of each risk by determining the probability of recurrence and severity of each event.
- 3.1 Evaluation of current and planned controls, barriers and safeguards.
 - 3.2 A selected team of personnel were involved to conduct this on the job task analysis to determine baseline risk assessment

4. Determination of Levels of Risk

- c. Risks associated with each step in the operational process were considered.
- d. The following factors were considered and rated in accordance with the effect it would have on the items described below, should the event occur:
 - Threat to the health and safety of a worker
 - Severity of the event
 - Likelihood of the event happening
 - Event consequence

A risk level was attributed to each event in the following manner:

Low risk	=	1-6
Medium risk	=	7-15
High Risk	=	16-25

6. Risk Ranking & Calculation of risk

6.1 Risk Ranking:

Consequence:

Fatality or permanent disability	- 5
Major Injury	- 4
Average lost time injury	- 3
Minor Injury	- 2
Medical treatment only or less	- 1

Probability:

Common Occurrence	- 5
Has Happen	- 4
Could Occur	- 3
Not Likely to Occur	- 2
Very Unlikely	- 1

6.2 Calculation of Risk:

Consequence: Probability = Risk Ranking (see table in risk assessment)

7. Evaluation of Results

Activities listed in the high-risk categories must be seen as tasks requiring immediate attention. Training will, in most instances, solve the problem satisfactorily.

An implementation plan may then be devised to address the outstanding issues. This action plan must take cognisance of the hazards that should be eliminated concurrently.

8. Definitions

ALARP

As low as reasonably practicable. The concept of weighting the risk against the sacrifice needed to implement the measures necessary to avoid the risk. In health and safety, it is assumed that the measures should be implemented unless it can be shown that the sacrifice is grossly disproportionate to the benefit.

Consequence

The outcome of an event or situation expressed qualitatively or quantitatively, whether a loss, injury, health or environment impact, or disadvantage, or a benefit, gain or advantage.

Control or Barrier

Control or barrier is defined as "anything used to control, prevent or impede energy flows or the loss of control of a hazard". Types of barriers include physical, equipment design, warning devices, procedures, work processes, knowledge and skills, and supervision. Controls impact on the risk of the event, whether it is an opportunity or threat. It is essential to consider controls or barriers in terms of their order of greatest effectiveness. This order is known as the 'Hierarchy of Control'.

Critical Controls

Those controls that significantly influence the likelihood and/or consequence of an event (if removed, they will significantly impact the risk rating).

Event

An incident or situation, which occurs in a particular place during a particular interval of time. Events involve releases or manifestations of, or exposures to the hazard. Events can be wanted (opportunity) or unwanted (threat).

Hazard

A source of potential harm to people, facilities, the environment or the community that, should it involve potential damage, will be an 'energy' such as electricity, pressure, chemical, etc. The environmental term, "aspect", is synonymous with hazard. A hazard must be recognised and understood in order to manage the related risk. Understanding a hazard includes the nature, magnitude, and potential consequences as well as relevant "target" or impact characteristics, potential timeframes, pathways or mechanisms of its manifestation and residual harm. Also, understanding sources of harm to the community may require recognition of incentives.

Likelihood

The probability or chance that an event will occur.

Risk

A combination of the likelihood of an occurrence of a hazardous event or exposure and the severity of the impact (e.g. injury, illness, environmental impact) that may be caused by the event or exposure.

Risk Analysis

A systematic process to understand the nature of and deduce the level of risk.

9. Abbreviations used in Risk Assessment

DSTI

Daily Safety Task Instruction

HIRA

Hazard Identification and Risk Assessment

HCA

Hazardous Chemical Agents

PTO

Planned Task Observation

PPE

Personal Protective Equipment

SOP

Safe Operating Procedure

SWP

Safe Work Procedure

DoEL

Department of Employment and Labour

SDS

Safety Data Sheet

MSDS

Material Safety Data Sheet

DWS

Department of Water and Sanitation

DBSA

Development Bank of South Africa

10. Assessment Team

The following people were involved in establishing the relevant task groups and analysis.

- F du Toit - Pr. CHSA
- N de Bruyn - Risk Assessor
- EF Pieterse - Risk Assessor
- Dr Quentin Shaw (ARQ Dams) - Designers

11. Task Specific-Risk Assessment

Should the baseline assessment indicate tasks in High risk a specific task risk assessment must be conducted. This assessment will then target the specific tasks and the hazards attached to it.

12. Conclusion


The baseline risk assessment for the Groot Letaba River Water Development: Raising of Tzaneen Dam Project reflects the critical occupational health and safety risk scenarios and hazards associated with the scope of activities for the Project.

The project team is confident that effective controls were identified to manage OHS risks.

The effective controls identified must be incorporated into various management systems and processes to ensure that the controls are implemented in the field during execution.

Immediate future actions include;

- Communicate the Baseline Risk Assessment to all construction partners. (Principal Contractors, Sub consultants, vendors etc.)
- All contractors are to further develop effective controls through thorough issue based risk assessments for each of the high and critical risk scenarios identified.

Name		Designation	Signature	Date
F. du Toit	Construction Health & Safety Agent	Pr. CHSA/040/2016		11/03/2023



BASELINE RISK ASSESSMENT

DEPARTMENT OF WATER AND SANITATION: REPUBLIC OF SOUTH AFRICA GROOT LETABA RIVER WATER DEVELOPMENT PROJECT (GLeWaP): RAISING OF TZANEEN DAM

RISK ASSESSMENT TITLE / TASK	BASELINE RISK ASSESSMENT		
PROJECT NAME	GROOT LETABA RIVER WATER DEVELOPMENT PROJECT: RAISING OF TZANEEN DAM	START DATE	Once Permit has been issued
RISK ASSESSMENT REFERENCE NO	DWS/DBSA/TZANEEN/BLRA/2023/01	END DATE	18 Months from commencement
REVISION STATUS	01	REVISION DATE	To be determined
BRIEF DESCRIPTION OF WORK/ACTIVITY	The Raising of Tzaneen Dam		

REQUIRED AND EXISTING CONTROL MEASURES	Available		Adequate		REMARKS
	Yes	No	Yes	No	
Scope of Work (logical steps on how task will be performed)	X		X		
Procedures: (WI / SOP / Vendor Spec)	X		X		
Training, Induction, Competency Certificates, Specific Training / Other Instructions	X		X		Induction Training to be given before any work may commence
Special permits required (specify)		X		X	Construction Work Permit issued by DoEL
Equipment / Tool Registers / Others (specify)	X		X		
Other	X		X		Lockout Permit, Confined Space Permit, Work at Height Permit, Excavation Permit

PROBABILITY LEGEND			CONSEQUENCE / INJURY / LOSS			RANKING						
5	Has happened		5	Fatality or permanent disability or > R 5,000,000			5	4	3	2	1	
4	Quite possible to happen (Happen during last year)		4	Major Injury or > R 1,000,000 < R 5,000,000		5	25	20	15	10	5	
3	Could Happen (No record of recent occurrence)		3	Average Lost time Injury or > R 500,000 < R 1,000,000		4	20	16	12	8	4	
2	Not likely to happen		2	Minor Injury or < R 500,000		3	15	12	9	6	3	
1	Very Unlikely		1	Medical Treatment only or Less or No Financial loss		2	10	8	6	4	2	
HIGH RISK = 15-25		MEDIUM RISK = 7-14	LOW RISK = 1-6		PROB: Probability	CON: Consequence	1	5	4	3	2	1

BASIC PPE REQUIRED FOR TASK	<input checked="" type="checkbox"/> HARD HAT	<input checked="" type="checkbox"/> OVERALL	<input checked="" type="checkbox"/> EAR PROTECTION	<input checked="" type="checkbox"/> DUST MASK
	<input checked="" type="checkbox"/> SAFETY GLASSES	<input checked="" type="checkbox"/> SAFETY FOOTWEAR	<input checked="" type="checkbox"/> GLOVES	<input checked="" type="checkbox"/> SAFETY VEST
ADDITIONAL REFERENCES TO TASK	<input checked="" type="checkbox"/> METHOD STATEMENT	<input checked="" type="checkbox"/> MSDS	<input checked="" type="checkbox"/> PLANNED TASK OBSERVATION	<input checked="" type="checkbox"/> SAFE WORK PROCEDURE
	<input checked="" type="checkbox"/> WORK INSTRUCTION	<input checked="" type="checkbox"/> TRANSMITTABLE DISEASE CONTROL	-	-

Step No	Activity	Task	Potential Hazards	Risks	Current Risk			Suggested Control Measures
	List activity steps	List task steps	Potential dangers that could cause harm. List the potential hazards	Potential Risks due to Hazard	PROB	CON	Ranking	Controls already in place to mitigate the hazard before work may commence
1	Site Identification & Establishment	Project Mobilization of Personnel	Incompetent personnel appointed	Project interruption	3	4	12	<ul style="list-style-type: none"> Ensure all responsible person on site submit CV's. Legal appointment letters to be signed prior to commencement of work. Competencies to be verified. Occupational medicals to be in place prior to commencement of work
				Legal liability claims	3	5	15	
				Financial loss	3	3	9	
			Workers not informed of hazards and risks associated with tasks	Serious injuries or Fatalities	4	5	20	<ul style="list-style-type: none"> Site specific Induction training to be conducted on all personnel prior to commencing work.
			Workers exposed to unknown / unidentified hazards	Serious injuries or Fatalities due to unknown hazards	4	5	20	
		Project Mobilization of Plant and Equipment	Poor / unsafe offloading practices	Load falling on employees	3	5	15	<ul style="list-style-type: none"> Method statement / safe operating procedure to be in place for offloading plant and equipment. To be communicated to employees. Employees to stand clear of offloading operations

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1	Site Identification & Establishment		Operators under the influence of Alcohol or other substances while transporting machinery and equipment to site establishment area	Accident causing property damage	3	2	6	<ul style="list-style-type: none"> Company substance abuse / alcohol policy to be available and implemented by communicating the policy to all employees.
				Serious Injuries or Fatalities	3	5	15	
			Pedestrians passing by	Pedestrians / public hit by plant and machinery	3	5	15	<ul style="list-style-type: none"> Camp area to be fenced off to prevent unauthorised entry. Unauthorised and general warning signs to be displayed.
			Theft of material, equipment and machinery	Project interruption	3	3	9	<ul style="list-style-type: none"> Project program to be compiled to prevent machinery and equipment to be left unattended. Security to be implemented.
		Setting up Camp & Storage Facilities	Abnormal load	Accident	2	5	10	<ul style="list-style-type: none"> Special arrangements to be made for abnormal loads. Abnormal load signage to be displayed on trucks if applicable. Valid driver's licence of driver.
			Containers placed on uneven surfaces	Property damage	2	3	6	<ul style="list-style-type: none"> Containers / offices to be placed on level surface.
			Using defective / incorrect equipment to offload containers	Load falling on employees	3	5	15	<ul style="list-style-type: none"> Lifting equipment to be load tested. Load test certificates to be available. Lifting equipment to be placed on register and inspected on a monthly basis. Employees to stand clear of lifting operations and no employees allowed underneath suspended loads.

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	List activity steps	List task steps	Potential dangers that could cause harm. List the potential hazards	Potential Risks due to Hazard	PROB	CON	Ranking	Controls already in place to mitigate the hazard before work may commence
1	Site Identification & Establishment		Sub-standard housekeeping	Incidents / accidents	3	2	6	<ul style="list-style-type: none"> High standards of housekeeping to be maintained. Stacking and storage supervisor to be appointed in writing. Monthly inspections to be conducted on stacking and storing on site
		Installation of Temporary Services	Incompetent person conducting installation	Property damage	3	2	6	<ul style="list-style-type: none"> Competent / registered electrician to conduct temporary electrical installations. Electrical COC to be issued and kept on H&S file
				Electrocution	3	5	15	
			Incorrect location / layout plan	Financial loss	3	3	9	<ul style="list-style-type: none"> Temporary electrical installations to be done on exact location provided by after consultation with client
		Clearing and Grubbing	Poor visibility	Incident / Accident	3	4	12	<ul style="list-style-type: none"> Pre-start inspections to be conducted Windscreens to be kept clean Occupational medicals to be conducted to ensure operator has good eye sight
			Collision	Property Damage	3	4	12	<ul style="list-style-type: none"> Speed limit to be adhered to Occupational medical to be available Proper supervision
				Incident / Accident / Fatality	3	5	15	<ul style="list-style-type: none"> Workers to stand clear from moving machinery when clearing and grubbing takes place
			Excessive Dust	Occupational Illness	3	3	9	<ul style="list-style-type: none"> Water Truck to be used to spray working areas in order to suppress dust

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2	Traffic Accommodation	Positioning of Flagmen and signs	Trips and falls Sprains and strain Sharp edges of signs Dropping of signs Not visible to other road users/plant	Ergonomic related injuries Multiple injuries Financial loss Damage to signs Project interruption Struck by other road users Fatalities	C	5	19	<ul style="list-style-type: none"> Wearing required PPE Induction training. Supervision Traffic awareness training Task specific training Planned Task Observations Supervision
		Preparation & maintenance of temporary traffic signs, Cleaning with water and rags	Workers being exposed to extreme temperatures Workers being exposed to incoming traffic	Dehydration/ Hypothermia Accident/Incidents Financial loss Project interruption Fatalities	C	5	19	<ul style="list-style-type: none"> Wearing required PPE Supervision Correct placement of signs Accredited training
		Loading and offloading of temporary traffic signs	Overcrowding Workers exposed to traffic	Financial loss Project interruption Accident/Incident Fatalities	C	5	19	<ul style="list-style-type: none"> Wearing required PPE Supervision Task specific training Safe operating procedures Planned Task Observations Supervision
		Vehicles driving through construction site	Poor communication between Stop & Go Incoming traffic Vehicles striking plant, equipment and workers Incorrect placement of signs	Accident/incident Legal liability claims Financial loss Property damages Project interruption Fatalities Production time loss	C	5	19	<ul style="list-style-type: none"> Wearing required PPE Flag men in position Supervision Task specific training Safe operating procedures
3	Fire Risk Prevention	Stacking and storing of materials	Materials caching fire	Property damages Production time loss Injury Major financial loss Project time delay	3	3	9	<ul style="list-style-type: none"> Fire extinguishers. Fire Fighting Training. Annual services of fire equipment. Emergency procedure and drills. No flammables stored with combustibles.
		Fires from outside the property.	Fire damaging plant, causing plant not to operate correctly, and contamination of stockpiles.	Property damage Financial loss Production time loss	3	4	12	<ul style="list-style-type: none"> Emergency plan to be put in place in case an emergency occurs.
		Fire risk	Insurance can deny pay-out if fire extinguishers are ineffective and not registered at SANS, legal liability claims can have negative effect on company	Financial loss Possible closing of the company All workers can lose their jobs	3	4	12	<ul style="list-style-type: none"> Regular inspection and maintenance to be done on fire extinguishers Suppliers to be SANS Accredited

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	List activity steps	List task steps	Potential dangers that could cause harm. List the potential hazards	Potential Risks due to Hazard	PROB	CON	Ranking	Controls already in place to mitigate the hazard before work may commence
3	Fire Risk Prevention	Smoke	Inhaling smoke if fire occurs	Occupational illness and disease (permanent lung damage)	3	3	9	<ul style="list-style-type: none"> Fire extinguishers. Fire Fighting Training Annual services of fire equipment. Emergency procedure and drills.
		Fire occurring	Employees not knowing where all escape routes are Employees know knowing what to do encase a fire occurs	Possibility of a fatality Serious injuries (3rd degree burns) Legal liability claims Financial loss	3	4	12	<ul style="list-style-type: none"> Supervisors, managers, and safety officer to ensure regular fire drills are done and that there is enough fire fighters to ensure all personnel evacuate the building accordingly First aiders to be trained and available in case of an emergency
4	Driving / Operating Construction Vehicles and Mobile Plant	Inspecting Mobile Machinery	Not conducting inspection properly	Missing deviations, leading to accidents	4	3	12	<ul style="list-style-type: none"> Training. Wearing of correct PPE. Prestart checklist to be done Operators authorised, competent and medically fit Supervision
		Climb into Vehicle/Machinery	Slip / trip and fall	Injury to body	2	2	4	<ul style="list-style-type: none"> Operators authorised, competent and medically fit Task specific training
		Driving/Operating vehicles and plant	Incompetent person operating	Incident / Accident / Fatality Hitting other plant or road users / Hitting surrounding properties and services	3	5	15	<ul style="list-style-type: none"> Drivers/Operators authorised, competent and medically fit Prestart checklist Dust suppression Vehicles and plant conforming to safety standards / legislation Supervision Traffic accommodation Speeds reduction (Rumble strips) Traffic below construction activities will be affected. Applied management be actioned for 24hr service. Concrete barriers SARTSM to be used
			Operating unsafe machine / deviations on machine		4	4	12	
		Driving/Operating vehicles and plant	Material not loaded adequately	Material/Equipment falling off	4	3	12	
			Excessive dust	Occupational lung disease	2	4	8	
			Inadequate Traffic Management plan	Endangering and unnecessary Interface with general road users	3	4	12	

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	List activity steps	List task steps	Potential dangers that could cause harm. List the potential hazards	Potential Risks due to Hazard	PROB	CON	Ranking	Controls already in place to mitigate the hazard before work may commence
5	Material Delivery and bringing new Plant onto site	Transporting of Material to site and bringing new Plant onto site	Warning devices on vehicles not working	Incident / accidents	3	3	9	<ul style="list-style-type: none"> Operator/driver authorised, competent and medically fit Supervision Driver must adhere to the speed limits on site Only authorised drivers to operate vehicle. Adherence to speeds limits tracked Proper communication between site team and delivery company / supplier Pedestrian walkways to be provided by PC Spotter to be appointed to guide offloading activities Lifting equipment and machinery to be load-tested
			Striking overhead services	Project interruption	3	4	12	
				Fatalities	3	5	15	
			Miss communication	Hitting other Plant / property damage	3	4	12	
				Running over co-workers	3	5	15	
6	Survey And Setting Out	Sharpening of pegs	Sharpening of pegs with panga / knife Splinters from pegs	Cuts, amputations to fingers / minor injuries from splinters	3	3	9	<ul style="list-style-type: none"> Task specific training Inspection registers and checklists Supervision Wearing required PPE Order pre-cut pegs from supplier
		Setting out according to plans	Poor/incorrect surveying	Financial losses / Project Interruption	3	3	9	<ul style="list-style-type: none"> Traffic Control Supervision Wearing required PPE Surveying to be done by a competent surveyor as per layout plans Spot checks to be done by engineering staff
7	Earth and Layer Works	Loading Material with Excavator / TLB onto Tipper Trucks / Transporting of Material to construction work area	Warning devices on vehicles not working	Incident / accidents	3	3	9	<ul style="list-style-type: none"> Prestart checklists Plant conform to safety standards Operators authorised, competent and medically fit Operators checking loading area (surface, level, etc.) PTO's. Task Specific Training Supervision No speeding Traffic to be controlled
			Striking overhead services	Project interruption	3	4	12	
				Fatalities	3	5	15	
			Miss communication	Hitting other Plant / property damage	3	4	12	
				Running over co-workers	3	5	15	

Step No	Activity	Task	Potential Hazards	Risks	Current Risk			Suggested Control Measures
	List activity steps	List task steps	Potential dangers that could cause harm. List the potential hazards	Potential Risks due to Hazard	PROB	CON	Ranking	Controls already in place to mitigate the hazard before work may commence
7	Earth and Layer Works	Tipping of Material	Deviations on tipper truck	Incident / accident	4	3	12	<ul style="list-style-type: none"> Prestart checklists Plant conforms to safety standards Task Specific training. Operators authorised, competent and medically fit Inform operators of overhead lines Telly man to indicate to Tipper Truck driver if it is safe to tip Tipper truck to lower bucket prior to moving forward
			Uneven surfaces	Construction vehicle falling over	2	4	8	
			No spotter / telly man	Tipper truck reversing over equipment causing property damage	3	3	9	
			Overhead services (Power line at tipping area)	Project interruption	3	4	12	
				Fatalities	3	5	15	<ul style="list-style-type: none"> Prestart checklists Plant conforms to safety standards Task Specific training Operators authorised, competent and medically fit Supervision Traffic controlled
		Levelling material with grader	Hitting workers / equipment	Fatalities	3	5	15	
			Hitting survey pegs	Project interruption	4	1	4	
			Deviations on grader	Incident / accident	4	3	12	
			Dust	Eye and respiratory irritation	3	4	12	
		Compact material with Roller	Running over workers / equipment	Fatalities	3	5	15	<ul style="list-style-type: none"> Prestart checklists Plant conform to safety standards Task Specific training Operators authorised, competent and medically fit Supervision Traffic controlled
			Deviations on Roller	Incident / accident	4	3	12	
			Dust	Eye and respiratory irritation	3	4	12	
8	Trenches / Excavations	Trenching / Excavate by hand	Underground Services	Financial Loss	3	3	9	<ul style="list-style-type: none"> Identify underground services Location of underground services to be communicated to all relevant personnel Excavation work to take place only as per approved permit / instruction
				Project Interruption	3	3	9	

Step No	Activity	Task	Potential Hazards	Risks	Current Risk			Suggested Control Measures
	List activity steps	List task steps	Potential dangers that could cause harm. List the potential hazards	Potential Risks due to Hazard	PROB	CON	Ranking	Controls already in place to mitigate the hazard before work may commence
8	Trenches / Excavations	Trenching / Excavate by Machinery	Employees standing too close to machinery	Bumping / hitting employee with bucket of machine causing serious injury	3	4	12	• Employees to stand clear of machinery in operation
			Incompetent / unfit operator	Accident-causing fatality	3	5	15	• Operators to undergo occupational medical surveillance. • Occupational Medical Certificate to be available on H&S file • Operator competency to be available
			Underground Services	Financial Loss	3	4	12	• Identify underground services • Location of underground services to be communicated to all relevant personnel
				Project Interruption	3	4	12	• Excavation work to take place only as per approved permit / instruction
			Operating next to excavation edge / placing excavated material next to excavation	Collapse of trench / excavation (sides caving in)	4	5	20	• Ground stability to be tested in case of deep excavations • Excavated material to be placed away from excavation edge • Operator to be competent
		Backfilling	Employees standing too close to machinery	Bumping / hitting employee with bucket of machine causing serious injury	3	4	12	• Employees to stand clear of machinery in operation
9	Working near services	Excavating near underground power lines	Striking overhead underground electrical cables	Electrocution	3	5	15	• Contractor to refer to design drawings indicating underground powerlines and to plan accordingly. • Prestart checklist • Operator authorised, competent and medically fit • Machinery may not exceed height of overhead power lines • Supervision • Banksman/Spotter checking plant height
			Overhead power lines knocked over	Legal Liability Claims	3	5	15	
			Damaging power lines	Property damage	3	3	9	

Step No	Activity	Task	Potential Hazards	Risks	Current Risk			Suggested Control Measures
	List activity steps	List task steps	Potential dangers that could cause harm. List the potential hazards	Potential Risks due to Hazard	PROB	CON	Ranking	Controls already in place to mitigate the hazard before work may commence
10	Lifting & Lowering Operation	Mobile Cranes / Truck-mounted crane	Incorrect slinging	Employees struck by swinging load	4	4	16	<ul style="list-style-type: none"> Crane / Truck-mounted crane operator to be competent in the operation of the specific machine. Employees to stand clear of lifting operations
			Defective Crane	Load falling on employees	4	5	20	<ul style="list-style-type: none"> Crane to be load tested. Pre-start inspection to be conducted on a daily basis prior to shift. Employees to stand clear of lifting operations and no employees allowed underneath lifted loads.
		Mobile Cranes / Truck-mounted crane	Incompetent operator / not medically fit to operate	Incident / Accident	3	4	12	<ul style="list-style-type: none"> Operators (and all other employees) to be sent for Occupational medical surveillance. Medical certificates and Annexure 3 to be placed on the H&S file.
			Exceeding maximum load capacity	Crane toppling over	3	5	15	<ul style="list-style-type: none"> Crane to be load tested. Maximum Load Capacity to be displayed on Crane. Outriggers of crane to be placed in order to keep crane steady. Crane spec to be available for reference purposes.
		Chains / Slings	Defective equipment used causing falling objects	Load falling on employees	4	5	20	<ul style="list-style-type: none"> Lifting equipment to be load tested. Load test certificates to be available. Lifting equipment to be placed on register and inspected on a monthly basis. Employees to stand clear of lifting operations and no employees allowed underneath lifted loads.
			Objects not correctly hooked	Serious injuries, Fatality due to falling loads / objects	4	5	20	<ul style="list-style-type: none"> Competent rigger to be appointed.

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	List activity steps	List task steps	Potential dangers that could cause harm. List the potential hazards	Potential Risks due to Hazard	PROB	CON	Ranking	Controls already in place to mitigate the hazard before work may commence
11	Temporary Works	Manual handling of Temporary works material	Incorrect handling of scaffold material. Improper manual lifting techniques	Injuries	3	2	6	<ul style="list-style-type: none"> Task specific training to be provided to employees. Ergonomically risks being taken into account
		Temporary Work Erection	Incorrect erection of Temporary Work	Temporary Works collapsing	3	5	15	<ul style="list-style-type: none"> Temporary Works to be erected in accordance with SANS
		Working on or with Temporary Works	Employees working on incomplete Temporary Works	Serious injuries or fatalities	3	5	15	
12	Moving Rotary Core Drilling to Drilling Position.	Rotary Core Drilling rig hydraulic pipe break	Possible oil leaks	Minor Environmental Impact	C	2	5	<ul style="list-style-type: none"> Visual Inspection needs to be done after drill rig has been running for a while Drip tray to be placed under machine when parked. Spill kits must be readily available Maintenance schedule to be adhered to.
		Incompetent Rotary Core Drilling Operator Setting up rig into a position	Lose control of Rotary Core Drilling resulting into injury to employees	Single Fatality	C	5	19	<ul style="list-style-type: none"> Only certified competent operators to be used to operate machine. Plan Task Observation to be conducted
		Movement of Rotary Core Drilling to next position	Rig colliding with existing personnel causing injury	Lost time Injury	C	4	14	<ul style="list-style-type: none"> Rig operator to warn people in the immediate vicinity of his actions. Flagman to always direct the operator when the rig is moving into position
		Uneven surface / unstable ground conditions	Rotary Core Drilling fall over and killed someone	Single Fatality	C	5	19	<ul style="list-style-type: none"> Rig to be set up on stable, level platform. Inspect terrain before commencing with setting up the rig. Ensure ground conditions are stable and level.

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13	Concrete works For Dam Raising	Steel Fixing (Reinforcement)	Tripping hazards	Bodily injuries / sprains and strains	3	3	9	<ul style="list-style-type: none"> High standards of stacking and storage to be maintained on site Task specific training to employees involved with steel fixing Monthly register checklist on hand tools to be conducted. Deviations to be reported
			Manual handling of material	Injuries / Ergonomic Risks (Musculoskeletal Disorders)	2	2	4	
			Using unsafe hand tools	Injuries	3	2	6	
		Ready-Mix	Unauthorised personnel pouring concrete	Injuries	3	3	9	<ul style="list-style-type: none"> Only authorised personnel to pour concrete Operator to be medical fit First aid to be on site at all times Workers to wear correct PPE Workers working with vibration equipment must ensure they have firm footing Concrete truck driver to ensure that the handbrake is secured to prevent truck from running out of control. Task Specific Training
			Concrete truck running over personnel, equipment or material	Fatalities	3	5	15	
				Property damage	3	3	9	
				Project interruption	3	4	12	
		On Site Mixing	Exposed moving parts	Loss of limb	4	4	16	<ul style="list-style-type: none"> All moving parts of concrete mixer to be guarded Correct PPE to be worn by employees operating concrete mixer
			Excessive concrete dust	Occupational Illness or Disease	4	4	16	
		Using Concrete Pump	Concrete pump hitting workers	Injuries	3	3	9	<ul style="list-style-type: none"> Workers to always stand clear from pump movements

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14	Pipework and connection of pipes	Installation and connection of pipes	Confined space	Health risk	3	4	12	<ul style="list-style-type: none"> Confined space entry permit to be issued to individuals prior to working in confined spaces Occupational medicals to be of personnel to be available
			Misuse or Incorrect use of equipment (Ergonomically incorrect)	Injuries	3	3	9	<ul style="list-style-type: none"> Task specific training Ergonomic Training Correct equipment to be used for specific tasks Proper supervision
			Faulty equipment	Injuries	3	3	9	<ul style="list-style-type: none"> Equipment to be inspected on a monthly basis and deviations to be recorded and reported
		Commissioning of System / Testing of pipes	Sub-standard housekeeping	Employees tripping over obstacles causing injuries	3	2	6	<ul style="list-style-type: none"> High standards of housekeeping to be maintained
			Leakage could result in pipes bursting	Injuries	3	3	9	<ul style="list-style-type: none"> Competent person to conduct / supervise plumbing work
			High pressure 10 – 20 bar	Project interruption	3	4	12	<ul style="list-style-type: none"> Competent person to conduct / supervise plumbing work

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15	Scaffold work	Scaffold Erection	Incorrect erection of scaffolding or Erection method incorrect (Ergonomically incorrect)	Collapse of scaffold causing serious injury or fatality	4	5	20	<ul style="list-style-type: none"> Scaffolding to be erected by a competent scaffold erector, appointed in writing Scaffolding to be inspected by a competent person, appointed in writing. Inspections to be done daily and recorded in writing Scaffolding to be erected in accordance with SANS 10085
		Working on scaffolding	Falling from heights	Serious injury / fatality	4	5	20	<ul style="list-style-type: none"> Employees to be issued with specific safety harnesses for the specified work Safety harnesses to be worn by employees whilst working on scaffolding and to be hooked to scaffold / anchor points. Safety harnesses to be in good condition, on register and inspected regularly
			Scaffold collapsing	Serious injury / fatality	3	5	15	<ul style="list-style-type: none"> Scaffolding to be erected by a competent scaffold erector, appointed in writing Scaffolding to be inspected by a competent person, appointed in writing. Inspections to be done daily and recorded in writing Scaffolding to be erected in accordance with SANS 10085 Scaffold to be anchored / erected in such a way to prevent collapse.
			Falling tools and equipment	Head injury	3	4	12	<ul style="list-style-type: none"> Tools and equipment may not be placed on edge of platform boards. Lifting and lowering of tools must be done properly in a bucket with a rope and no tools may be thrown from heights.

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		Disassemble scaffolding	Falling from heights Incorrect disassembling method (Ergonomically incorrect)	Serious injury / fatality	4	5	20	<ul style="list-style-type: none"> Scaffolding to be disassembled under proper supervision (construction work supervisor / scaffold supervisor) To be disassembled from top to bottom. Employees to wear safety harnesses while conducting this activity
16	Working at heights	Edge Work	Falling off edges	Major injuries (fractures), etc.	3	3	9	<ul style="list-style-type: none"> Edge protection to be in place. Employees working near edges to wear safety lanyards to prevent them from falling over edge
				Fatality	3	5	15	
		Openings	Falling into openings	Major injuries (fractures), etc.	3	3	9	<ul style="list-style-type: none"> All openings to be covered. Employees working near openings to wear safety lanyards to prevent them from falling into openings
				Fatality	3	5	15	
17	Hazardous Chemical Agents	Handling	Incorrect handling	Skin irritation	2	3	6	<ul style="list-style-type: none"> MSDS's to be available MSDS's to be communicated to all employees handling HCA Task specific training
			Exposed to HCA	Occupational Illness or Disease	3	4	12	
			Not trained to work with HCA	Occupational Illness or Disease	3	4	12	
		Storage	Incorrect storage of HCA	Production time loss	3	3	9	<ul style="list-style-type: none"> Task specific training HCA inspections PPE HCS compatibility chat to be available and implemented HCS to be stored in accordance with compatibility chart
			Fire hazard	Explosion	3	5	15	
18	Stacking & Storage	Stacking and storage of material and equipment	Sub-standard stacking and storing practices	Collapsing of stacked / stored material causing serious injuries	3	3	9	<ul style="list-style-type: none"> Stacking and storage supervisor to be appointed in writing. Monthly inspections to be conducted on stacking and storing on site

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19	Hot Work	Gas Welding & Cutting	Incorrect storage of gas cylinders	Sudden release of pressurised gas	3	4	12	<ul style="list-style-type: none"> Gas cylinders to be stored in accordance with requirements. To be stored in a designated area. Gas cylinders to be chained.
			Hot surfaces	Burns	3	3	9	<ul style="list-style-type: none"> Task specific training to be conducted on employees conducting hot works. Competent First aider and box to be readily available on site. Employees to wear the relevant PPE, e.g. welding helmet, apron, welding gloves etc.
			Fire hazard	Explosion	3	5	15	<ul style="list-style-type: none"> Designated smoking area to be established. No smoking near hot work activities. Gas cylinders to be secured at all times.
			No flashback arrestors	Explosion	4	5	20	<ul style="list-style-type: none"> Gas welding equipment to be in accordance with requirements. Flashback arrestors to be fitted to gas welding and cutting equipment
		Electrical Welding & Cutting	Incompetent person operating welding machine	Incident / Accident	3	3	9	<ul style="list-style-type: none"> Task specific training to be conducted. Competency to be available and person to be appointed in writing
			Not wearing a welding helmet	Sparks in face / Arc eyes	3	3	9	<ul style="list-style-type: none"> Welding helmet to be issued to persons conducting welding. Employees conducting welding, to wear the relevant PPE, e.g. welding helmet, apron, welding gloves etc.
			Exposed electrical wiring	Electrocution	3	5	15	<ul style="list-style-type: none"> Monthly inspections to be conducted on electrical arc welding machine and deviations to be recorded and reported.

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20	Electrical Works	Installation of Electrical Cables / Transformers	Exposure to live electricity	Electrocution	4	5	20	<ul style="list-style-type: none"> Electrical source to be isolated when conducting installation work Competent and registered electrician to conduct the electrical installation work Occupational medical to be available
			Incompetent person conducting electrical installations	Project interruption	4	5	20	
		Connecting of electricity to existing systems	Exposure to live electricity	Electrocution	4	5	20	<ul style="list-style-type: none"> Electrical source to be isolated when conducting installation work Competent and registered electrician to conduct the electrical installation work Occupational medical to be available
			Incompetent person conducting electrical connection	Project interruption	4	5	20	
		Commissioning of Electrical System	Using electrical equipment in wet areas or outside in wet conditions	Electrocution	4	5	20	<ul style="list-style-type: none"> Electrical equipment may not be used in wet areas or wet conditions Task specific training
			Overloaded power-points	Fire risk	3	4	12	<ul style="list-style-type: none"> Competent and registered electrician to conduct the electrical installation work Fire equipment to be readily available
			Trailing cables from static equipment and whilst using portable electrical equipment	Short circuit	3	3	9	<ul style="list-style-type: none"> Antistatic PPE
				Fire Risk	3	4	12	<ul style="list-style-type: none"> Competent and registered electrician to conduct the electrical installation work Fire equipment to be readily available

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20	Electrical Works	Commissioning of Electrical System	Faulty cables	Electrocution	4	5	20	<ul style="list-style-type: none"> Electrical source to be isolated Competent and registered electrician to conduct the electrical installation work Occupational medical to be available
				Short circuit	3	3	9	<ul style="list-style-type: none"> Antistatic PPE
				Fire Risk	3	4	12	<ul style="list-style-type: none"> Competent and registered electrician to conduct the electrical installation work Fire equipment to be readily available
21	Working near Water Environment	Working above / in close proximity of water environment conducting activities on structure	Slip, trip and falling into water	Drowning / fatalities	3	5	15	<ul style="list-style-type: none"> Employees to be made aware of hazards by means of induction training. Lifesaving equipment (life jacket, etc.) to be placed near water environments
22	Construction of Structure	Brick Work & Plastering	Working with cement	Dermatitis	3	2	6	<ul style="list-style-type: none"> Safety gloves to be worn by employees working with cement
			Handling bricks	Hand injuries	3	2	6	<ul style="list-style-type: none"> Safety gloves to be worn by employees handling bricks
			Working at height	Employees falling from heights causing serious injuries of fatality	3	5	15	<ul style="list-style-type: none"> Employees conducting brickwork at heights to follow the correct procedures. Scaffolding to be erected in accordance with SANS 10085 Safety harnesses to be worn when working at heights

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			Falling objects (bricks, tools, etc.)	Head injuries	3	4	12	<ul style="list-style-type: none"> Overhead work to be barricaded Signage to be displayed Head protection to be worn by employees where falling objects poses a hazard
23	Construction of Structure	Electrical Work	Exposed to live electricity while installing plugs, light fittings, etc.	Electrocution	4	5	20	<ul style="list-style-type: none"> Electrical source to be isolated when installing and connecting electrical plugs, etc. To be done by a competent electrician
		Plumbing Works	Working at heights while installing gutters and downpipes	Employees falling from heights causing serious injuries of fatality	3	5	15	<ul style="list-style-type: none"> Employees conducting plumbing work at heights to follow the correct procedures. Scaffolding to be erected in accordance with SANS 10085 Safety harnesses to be worn when working at heights
			Falling objects	Head injuries	3	4	12	<ul style="list-style-type: none"> Overhead work to be barricaded Signage to be displayed Head protection to be worn by employees where falling objects poses a hazard
			Manual handling of material	Injuries / Ergonomic Risks (Musculoskeletal Disorders)	2	2	4	<ul style="list-style-type: none"> Task specific training to be provided to employees. Ergonomic risks to be taken into account
			Using unsafe hand tools	Injuries	3	2	6	<ul style="list-style-type: none"> Hand tools and equipment to be inspected on a monthly basis and deviations to be recorded and reported
			Substandard housekeeping	Injuries	3	3	9	<ul style="list-style-type: none"> High standards of housekeeping to be maintained on site Stacking and storage inspections to be conducted on a regular (monthly) basis

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	List activity steps	List task steps	Potential dangers that could cause harm. List the potential hazards	Potential Risks due to Hazard	PROB	CON	Ranking	Controls already in place to mitigate the hazard before work may commence
			Exposure to open flames	Fires / burns	3	4	12	<ul style="list-style-type: none"> Task specific training to be provided Competent plumber to supervise work Firefighting equipment to be readily available with trained personnel
			Falling off tower platform edges	Major injuries (fractures), etc.	3	3	9	<ul style="list-style-type: none"> Edge protection to be in place. Employees working on platform to wear safety lanyards to prevent them from falling over platform edge
				Fatality	3	5	15	
		Working at Heights	Falling into / off structure	Major injuries (fractures), etc.	3	3	9	<ul style="list-style-type: none"> All openings to be covered. Employees working on structure to wear the appropriate safety harness
				Fatality	3	5	15	
24	Construction of Dam Structure	Tower Cranes Operation (Lifting)	Incompetent operator / not medically fit to operate	Incident / Accident	3	4	12	<ul style="list-style-type: none"> Lifting Permit to be issued and Complied with Rigging study to be done and signed off by Competent Person Supervision Task Specific Training
			Exceeding maximum load capacity	Crane toppling over resulting in damage to existing structures	4	5	20	
			Defective equipment used to causing objects to fall	Load falling on employees	4	5	20	
			Objects not correctly hooked	Serious injuries, Fatality due to falling loads / objects	4	5	20	
25	Gabions	Gabion cage assembly	Sharp edges of cage Uneven surfaces Faulty equipment	Major injuries Project interruption Financial loss 3rd Party claims Material/Equipment damage	3	3	9	<ul style="list-style-type: none"> Task Specific Training Wearing required PPE Registers/Checklists Supervision

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	List activity steps	List task steps	Potential dangers that could cause harm. List the potential hazards	Potential Risks due to Hazard	PROB	CON	Ranking	Controls already in place to mitigate the hazard before work may commence
		Filling gabion with rocks/stone	Sharp edges of rocks/stone Uneven surfaces Faulty equipment Throwing rocks/stone	Major injuries Project interruption Financial loss 3rd Party claims Material/Equipment damage	3	3	9	<ul style="list-style-type: none"> Task Specific Training Wearing required PPE Registers/Checklists Supervision
		Closing gabion cage	Sharp edges of cage Uneven surfaces Faulty equipment	Major injuries Project interruption Financial loss 3rd Party claims Material/Equipment damage	3	3	9	<ul style="list-style-type: none"> Task Specific Training Wearing required PPE Registers/Checklists Supervision
26	V-Drains, Edge Beams and Concrete Works	Setting out of edge beam, V-Drain and concrete works area Insert level pegs according to plan	Misuse of equipment Faulty equipment Tripping over pegs	Injury Accident/Incident Legal liability claims Financial loss	3	3	12	<ul style="list-style-type: none"> Supervision Task specific training Wearing required PPE Registers/Checklists
		Excavation of edge beam, V-Drain and concrete works area by hand	Faulty equipment Obstacles/uneven surfaces Dust Rocks, gravel shooting up into the eyes	Trips and fall misuse of equipment Injury due to faulty equipment	3	3	12	<ul style="list-style-type: none"> Supervision Task specific training Wearing required PPE Registers/Checklists
		Compacting of floor using pedestrian roller or compactor	High noise levels Excessive dust Faulty equipment Running over equipment and tools	Injuries Damage to plant and equipment Noise Induced Hearing Loss Financial loss	3	3	12	<ul style="list-style-type: none"> Supervision Task specific training Wearing required PPE Registers/Checklists
		Mixing concrete using Concrete Mixer	Cement dust inhalation Splashing cement	Injuries Eye irritation Production interruption Financial loss	3	3	12	<ul style="list-style-type: none"> Supervision Task specific training Wearing required PPE Registers/Checklists
		Pouring concrete for edge beam, wing wall or apron slabs	Splashing onto workers Faulty equipment Mixer truck being hit by other road users	<ul style="list-style-type: none"> Injuries Eye irritation Production interruption Financial loss	3	3	12	<ul style="list-style-type: none"> Task specific training Wearing required PPE Registers/Checklists Traffic accommodation Flagmen in position Supervision TSO to check on activities regularly

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27	Exposure to Occupational Hygiene Stresses (Noise, Dust, Vibration and Hazardous Agents)	Working in Noise zone	Excessive noise exposure	Noise Induced Hearing Loss	4	4	16	<ul style="list-style-type: none"> Noise survey done Noise zones indicated PPE requirements indicated Wearing required PPE Medicals surveillance Supervision Contain high noise levels through engineering, elimination or substituting control Noise Survey to be conducted by an AIA
		Working in dusty area	Excessive dust exposure	Respiratory and eye irritation	4	5	20	<ul style="list-style-type: none"> Dust suppression Wearing of required PPE Induction & task specific training Supervision Work in dusty areas kept to a minimum Dust survey to be conducted by an AIA
				Poor visibility causing accidents	3	4	12	
		Working on machine	Vibrating equipment / Poorly maintained equipment Absence of medical surveillance	Hand & Arm Vibration Syndrome	2	4	8	<ul style="list-style-type: none"> Registers/Checklists Anti-vibration PPE Task specific training Medical surveillance Supervision Maintenance Vibration survey to replace/substitute vibrating tools, equipment and plant
				Occupational Vibration Syndrome	2	4	8	
		Servicing machine and exposure to Hazardous Agents	Exposure to hazardous Agents	Eye, skin and respiratory irritation	3	3	9	<ul style="list-style-type: none"> Registers/checklists Hazchem training MSDS's available Wearing required PPE Stored/Used to manufacturer's instruction Signage displayed Medical surveillance Supervision Accredited HCA training
				Chemical burn	3	2	6	
				Fire hazard	3	4	12	

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				Occupational illness and disease	2	4	8	<ul style="list-style-type: none"> Emergency eye wash to be available
28	Demolition Work	Take down and remove existing structures or part thereof	Material falling on workers working with inadequate PPE or standing underneath / alongside existing structure	Materials falling from heights Head injuries Bodily injuries Fatalities Legal liability claims	3	5	15	<ul style="list-style-type: none"> Task Specific Training Demolition Work Supervisor to be Present, all the time First Aid DSTI's PTO's No person to work in area that is not declared safe. No work to stand alongside or on top of an unstable structure. Watchman to be present when structure is demolished by machinery. Demolition area to be barricaded
			Workers working on unstable structure	Collapsing of structures Serious injuries Fatalities Legal liability claims Production time loss	3	5	15	
			Temporary works e.g. Scaffolding erected by incompetent erector	Collapsing of structures Serious injuries Legal liability claims Production time loss	3	4	12	
			Removal of heavy material at heights	Shortage of workers to lift heavy materials Serious back injuries Collapsing or tilting of scaffolding Legal liability claims	3	4	12	
			Working with damage or unsafe potable electrical equipment	Hand, facial, and bodily injuries Electrocution Legal liability claims	3	3	9	
			Manual handling of materials (demolished materials)	Excessive production of dust Inhalation exceeding OEL Respiratory damage Legal liability claims Production time loss	3	3	9	
29	Transmittable Diseases (e.g. COVID-19)	Coming into contact with other workers. Normal working activities on site	Workers exposed to Health Hazards namely Diseases / Bacteria / Viruses (e.g. COVID-19)	Serious illnesses due to Health hazards. Contracting disease.	4	5	20	<ul style="list-style-type: none"> Health and Safety Management Plan to include planning around transmittable diseases and the relevant regulations Compile and implement a Risk Assessment and Safe Operating Procedure pertaining to the transmittable disease

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30	Site Demobilization	Disconnect Services	Incompetent person disconnecting temporary electrical distribution boards	Property damage	3	2	6	<ul style="list-style-type: none"> Competent / registered electrician to conduct the disconnection of temporary electrical installations.
				Electrocution	3	5	15	
		Loading of material, equipment and offices	Employees standing underneath lifting operations	Load falling on employees	4	5	20	<ul style="list-style-type: none"> Lifting equipment to be load tested. Load test certificates to be available. Lifting equipment to be placed on register and inspected on a monthly basis. Employees to stand clear of lifting operations and no employees allowed underneath suspended loads. Operators to be competent.
		Loading of Machinery on Trucks	Improper loading of plant and machinery	Plant / machinery falling off trucks causing property damage	4	5	20	
				Load falling on employees	4	5	20	
		Transporting of equipment, machinery and tools	Vehicle not roadworthy	Accident	3	5	15	<ul style="list-style-type: none"> All construction vehicles to be roadworthy Verification on roadworthiness to be done before entering site