	Unit:	Electricity Unit – HV Projects
	Document type:	Risk Assessment
	Title:	Project Baseline Risk Assessment
	Reference number:	PBRA10/04/2024
	Version:	2.0
	Effective date:	10 April 2024

Project name

27648-5E: SUPPLY, DELIVERY, OFF-LOADING, INSTALLATION AND TESTING OF 11 KV AND 33 KV METAL ENCLOSED DOUBLE BUSBAR FIXED PATTERN SWITCHGEAR FOR A PERIOD OF THIRTY-SIX (36) MONTHS FOR VARIOUS SUBSTATIONS

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Project Baseline Risk Assessment

Introduction

The Electricity Unit has a legal and moral obligation to ensure the safety of its employees and any other persons who may be affected by its acts or omissions at the workplace. Invariably, workplace safety also has financial implications for the Unit, as additional avoidable costs negatively impact on the financial resources of the Unit.

Section 5(1) (a) of the Construction Regulations requires a baseline risk assessment for an intended construction work project. In so doing, the Unit and contractor is mandated with identifying hazards attached to construction work, and to implement measures to mitigate the risks, as far as is reasonably practicable.

In order to determine the extent of reasonableness, the following needs to be considered:

- severity of the outcome,
- likelihood of the occurrence of the identified risk,
- rate of exposure to the risk,
- potential seriousness of the harm to be guarded against,

The risk evaluation method requires risks to be ranked in terms of severity of outcome, frequency of occurrence, and probability of exposure to the risk.

The Electricity Unit is responsible for the distribution of electricity, including the construction of electrical infrastructure and/or maintenance of electrical equipment within its vast area of supply. Infrastructure to supply electricity is developed in accordance with best practices within the industry in order to ensure a safe and reliable supply to consumers across a broad voltage spectrum.

In order to achieve the above responsibility, employees and contractors are required to perform construction work. There is a probability that persons undertaking construction work might be exposed to potentially life-threatening hazards. This risk assessment aims to quantify and rank the hazards and risks which could be experienced when performing construction work, so that management is able to exercise their responsibility and duties in terms of Section 8 of the Occupational Health and Safety Act (85 of 1993).

Glossary of Terms

Severity (S):	extent of potential harm/loss/damage
Exposure (E):	percentage of a workforce exposed to a hazard/risk and/or duration of exposure
Frequency (F):	how often and/or how long persons may be affected within a defined time period
Hazard:	source of or exposure to danger
Raw risk:	risk without taking any mitigation or control into account, i.e. S x F x E
Residual risk:	risk that remains after considering the effectiveness of controls
Risk:	probability that an injury and/or damage will occur
Risk Assessment:	process of evaluating risks arising from hazards, taking into account adequacy of existing controls, and deciding whether or not the risk/s is acceptable

Objective

To provide a uniform methodology whereby risks are evaluated and ranked and record proof of the analysis of the risks associated with specific tasks.

Scope

The following should be considered:

- workplace
- all operational activities
- tasks being performed
- legal requirements

1. Severity, i.e. extent of potential harm/loss/damage	Value
Catastrophic	5
Serious	3
Negligible	1

2. Frequency, i.e. how often and/or how long persons may be affected within a defined time period	Value
Frequent	5
Occasional	3
Rarely	1

3. Exposure, i.e. percentage of a workforce exposed to a hazard/risk and/or duration of exposure	Value
Extensive	5
Significant	3
Negligible	1

4. Risk Classification	Values
Low risk	0 – 24
Moderate risk	25 - 74
High risk	75 - 125

Risk Assessment: Client Baseline Risk Assessment **Activity**: Construction Work **Task:** General Construction - Site Conditions											**Reviewed on**: 10.04.2024 **Compiled by**: SHERQ Division **Revision**: 2	
Hazards	**Associated Risk**	**Effect**	**Pure Risk before rating**				**Engineering Controls**	**Administrative Controls**	**PPE Controls**	**% Control**	**Residual Risk**	**Action Needed**
			S	**F**	**E**	**R**						
Unauthorised access into a Substation	Injury to trespassers Possibility of theft Possibility of assault to employees	**S**	**3**	**3**	**3**	**27**	Adequately barricade restricted work areas with security	1) Restriction signage for all unauthorised persons 2) Ensure effective barricades/warning signs are displayed		**0.8**	**5.4**	Access control Security guard must be present to all substations at all times
Uneven terrain at substation yard	Slip, trips and falls	**S**	**3**	**3**	**3**	**27**		1) Employees conduct site Pre Task Risk Assessments (PTRA) 2) Employees attend Health and Safety induction	Employees are issued with steel toe capped footwear with ankle support	**0.6**	**10.8**	Employees are encouraged to be vigilant at all times and to be aware of underfoot conditions
Extreme weather conditions (WBGT index ≥ 30)	Heat stroke Heat stress	**SH**	**3**	**1**	**3**	**9**		1) Medical surveillance 2) PPE is issued to employees – floppy hats, sunblock, etc. 3) ERW 2(4)(a)-(v) procedure is applied		**0.6**	**3.6**	Relevant personnel encouraged to monitor extreme weather conditions and take precautions
Contaminated work site	Asbestos, HCS, Methane, hazardous waste, etc.	**SHE**	**3**	**3**	**5**	**45**	Adequate ventilation	1) Medical surveillance 2) Material Safety Data Sheets (MSDS) 3) PTRA 4) Employees are trained on HCS handling 5) Disposal of hazardous waste according to local regulations through licensed service provider	Employees issued with suitable PPE - eye protection, gloves, masks/respirators	**0.8**	**9**	1) Issue all employees with suitable PPE 2) Train employees on use thereof 3) Always wash hands post handling HCS 4) Only allow decanting in approved containers and clearly label to indicate the product inside the container
Presence of animals, insects, and reptiles on site	Allergic reaction Animal bites Insect stings Rabies Fatality	**SHE**	**5**	**1**	**3**	**15**		1) Employees attend snake awareness presentation 2) Employees are trained on First Aid Level 1 by an Accredited Service Provider	Employees are issued with appropriate PPE and insect repellent	**06**	**6**	1) Employees are to be cautious when entering areas where it is suspected that there might be insects and pests 2) Employees to ensure they are fully clad in PPE

								3) Employees have emergency numbers readily available on site				3) Employees to be encouraged to attend Advanced First Aid training

Risk Assessment: Client Baseline Risk Assessment **Activity**: Construction Work **Task:** Operating Construction Vehicles- MEP/Crane Trucks											**Reviewed on**: 10.04.2024 **Compiled by**: SHERQ Division **Revision**: 2	
Hazards	**Associated Risk**	**Effect**	**Pure Risk before rating**				**Engineering Controls**	**Administrative Controls**	**PPE Controls**	**% Control**	**Residual Risk**	**Action Needed**
			S	**F**	**E**	**R**						
Loss of control Overturning of vehicles Failure of lifting equipment Breaking of slings Crane truck boom breaking safety clearance Accidental dropping of Load	Injury Property damage Fatality	**S**	**5**	**3**	**3**	**45**	1) Roll over protection structure (ROPS) on all mobile plant 2) load placed at center of gravity 3)Crane truck load tested and mechanically maintained	1) All drivers and Riggers are assessed before being issued with vehicles and/or mobile plant to ensure they are competent to operate the correct class of construction vehicles. 2) Slings inspected periodically and color coded 3) Ensure vehicles are used only for the proper purpose 4) Guiding ropes used to control the suspended load. 5)SWL and wind speed to be observed during lifting operation	Hard hats and protective safety footwear with steel toe cap used during lifting operations	**0.8**	**9**	Employees must drive with caution and within the speed limit
Collisions with other vehicles, fixed objects or pedestrians	Injury Property damage Fatality	**S**	**5**	**3**	**3**	**45**	1) Suitable protective barriers for structures at risk. 2) Amber flashing beacons to be used.	1) Induction given on pedestrian's routes. 2) Traffic management plan in operation.	1)High visibility clothing worn by all construction workers	**0.8**	**9**	
Operating construction vehicles and/or mobile plant for extended periods	Whole body vibration	**H**	**3**	**1**	**1**	**3**	1) Construction Vehicles and Mobile Plant or any other equipment is fitted with anti-vibration technology	1) Procure equipment with lowest vibration levels 2) Minimise the time individuals use the equipment (e.g. job rotation) 3) Medical surveillance on all employees who	1) Employees are issued with the relevant PPE when they are handling or working with vibrating equipment	**0.8**	**0.6**	1)Tool box talks to emphasize the importance of PPE usage

								utilize vibrating equipment 4) Employees are trained on General Safety Induction which incorporate use of construction vehicles/mobile plant				

Risk Assessment: Client Baseline Risk Assessment **Activity**: Construction Work **Task:** Manual Handling											**Reviewed on**: 10.04.2024 **Compiled by**: SHERQ Division **Revision**: 2	
Hazards	**Associated Risk**	**Effect**	**Pure Risk before rating**				**Engineering Controls**	**Administrative Controls**	**PPE Controls**	**% Control**	**Residual Risk**	**Action Needed**
			S	**F**	**E**	**R**						
Heavy lifting	Musculoskeletal disorders Work-related neck and upper limb disorders (WRULD) Carpal tunnel syndrome Tenosynovitis Tennis elbow	**SH**	**3**	**3**	**3**	**27**	1) Lifting equipment such as pallet jacks, crane trucks and overhead cranes are provided for employees to use	1) PTRA 2) Employees are trained on the safe procedure for both manual and mechanical lifting 3) Assistants are made available to assist when lifting or moving heavy equipment 4) Trained Riggers are available to move heavy or irregular loads		**0.8**	**5.4**	1) Use lifting equipment when possible 2) Improve workplace layout to improve efficiency 3) Reduce the amount of twisting and stooping 4) Avoid lifting from floor level or above shoulder height, especially heavy loads 5) Avoid repetitive handling 6) Vary the work allowing one set of muscles to rest while another is used 7) Push a load rather than pull a load
Manual handling / Ergonomics Working posture and position Tasks performed in one position for a long time	Muscle strain Cumulative back injuries e.g. slipped disc (prolapsed inter vertebral disc)	**SH**	**3**	**1**	**3**	**9**	1) Lifting equipment such as pallet jacks, crane trucks and overhead cranes are provided for employees to use	1) PTRA 2) Employees are trained on the safe procedure for both manual and mechanical lifting 3) Assistants are made available to assist when lifting or moving heavy equipment		**0.8**	**1.8**	1) Carry out work in a comfortable position with regular changes in position and posture 2) Try to improve workplace layout to improve efficiency 3) Position tools, controls, equipment and furniture to

Repetitive or frequent tasks performed in an uncomfortable position	External injuries e.g. - cuts, bruises, abrasions and crush injuries Internal injuries e.g. muscle and ligament strains and tears, hernias							4) Trained Riggers are available to move heavy or irregular loads				allow work to be done in a comfortable, upright position 4) Hold loads close to body 5) Carry out most work at waist level within easy reach
Load location and distances moved Long distance load movement Load positioning to awkward or specific location	Stress on muscles increases risk of injury External injuries e.g. cuts, bruises, abrasions and crush injuries Internal injuries e.g. muscle and ligament strains and tears, hernias Cumulative back injuries e.g. slipped disc (prolapsed inter vertebral disc)	**S**	**3**	**3**	**3**	**27**	1) Lifting equipment such as pallet jacks, crane trucks and overhead cranes are provided for employees to use	1) PTRA 2) Employees are trained on the safe procedure for both manual and mechanical lifting 3) Assistants are made available to assist when lifting or moving heavy equipment 4) Trained Riggers are available to move heavy or irregular loads		**0.8**	**5.4**	1) Store loads at an approximate height in close proximity to where they will be used 2) Provide adequate space to facilitate ease of loading 3) Try to improve workplace layout to improve efficiency 4) Position tools, controls, equipment and furniture to allow work to be done in a comfortable, upright position 5) Hold loads close to body 6) Carry out most work at waist level within easy reach
Repetitive tasks performed for long periods, or at high speed, without a break	Muscle fatigue increases risk of injury External injuries e.g. cuts, bruises, abrasions and crush injuries Internal injuries e.g. muscle and ligament strains and tears, hernias Cumulative back injuries e.g. slipped disc (prolapsed inter vertebral disc)	**SH**	**3**	**1**	**3**	**9**	1) Lifting equipment such as pallet jacks, crane trucks and overhead cranes are provided for employees to use	1) Employees are trained on how to conduct a pre-task risk assessment 2) Employees are trained on the safe procedure for lifting and moving loads 3) Employees are provided with Assistants to assist when lifting or moving heavy equipment 4) Trained Riggers are available to move heavy or irregular loads		**0.8**	**1.8**	1) Perform a variety of work tasks during the day or take regular breaks 2) Try and improve workplace layout to improve efficiency 3) Position tools, controls, equipment and furniture to allow work to be done in a comfortable, upright position 4) Hold loads close to body 5) Carry out most work at waist level, within easy reach

Risk Assessment: Client Baseline Risk Assessment **Activity**: Construction Work **Task:** Use of Tools											**Reviewed on**: 10.04.2024 **Compiled by**: SHERQ Division **Revision**: 2	
Hazards	**Associated Risk**	**Effect**	**Pure Risk before rating**				**Engineering Controls**	**Administrative Controls**	**PPE Controls**	**% Control**	**Residual Risk**	**Action Needed**
			S	**F**	**E**	**R**						
Handheld tools	Injuries - Cuts, splinters, abrasions, puncture impact, flying particles / objects	**S**	**3**	**3**	**3**	**27**		1) Employees trained on basic hand skills 2) All hand tools are inspected prior to use and any defects are reported to the supervisor for replacement 3) All hand tools are kept in safe operating condition 4) Employees instructed to use the right tool for the job	1) Employees are issued with the appropriate PPE – gloves, safety glasses, safety footwear and overalls	**0.6**	**10.8**	
Portable electric equipment	Electric shock, cuts, splinters, abrasions, puncture injuries, impact, flying particles / objects	**S**	**3**	**3**	**3**	**27**	1) Portable earth leakage units are used when operating portable electric tools 2) Double insulated tools are used where not earthed	1) Employees trained on safe use of portable electric tools 2) All portable electric tools are inspected prior use and defects reported for replacement 3) All portable electric tools are kept in safe operating condition 4) Employees advised not to wear loose clothing, jewelry and loose hair as it may be entangled onto the moving parts of the machinery	1) Employees are issued with the appropriate PPE – gloves, eye protection, safety footwear, gloves	**0.8**	**5.4**	
Power Tools	Hand arm vibration White finger syndrome Puncture wounds	**S**	**3**	**1**	**3**	**9**	1) Regular maintenance of power tools to	1) Employees trained on the safe use of power tools	1) Employees issued with the appropriate PPE - safety footwear, gloves,	**0.8**	**1.8**	Employer to supply the lowest vibration emitting equipment

	Noise induced hearing loss						ensure vibration is reduced	2) All power tools are inspected prior to use and any defects are reported to the supervisor for replacement 3) Job rotation and regular breaks to reduce time exposure to vibration 4) Medical surveillance for all employees exposed to vibration	eye protection and hearing protection			

Risk Assessment: Client Baseline Risk Assessment **Activity**: Construction Work **Task:** Fire Protection and Prevention											**Reviewed on**: 10.04.2024 **Compiled by**: SHERQ Division **Revision**: 2
Hazards	**Associated Risk**	**Effect**	**Pure Risk before rating**				**Engineering Controls**	**Administrative Controls**	**PPE Controls**	**% Control**	**Residual Risk**	**Action Needed**
			S	**F**	**E**	**R**						
Arson	Burns Explosions Fire Smoke inhalation	**S**	**5**	**3**	**3**	**45**	1) Security presence to prevent trespassers from deliberately or accidentally starting a fire	1) Liaison with the local police where possible 2) Limit the number of combustibles on site 3) Properly stored flammable liquids, LPG and other combustible materials 4) Reducing potential fuel sources 5) Good housekeeping practices 6) Emergency request for assistance cards provided to employees 7) Employees trained on basic fire fighting	1) All employees are issued with arc rated PPE 2) Fire extinguishers and first aid kits are provided for all sites	**0.8**	**9**	

Poorly maintained electrical equipment such as switchgear, mini-subs, etc.	Burns Explosions Fire Smoke inhalation	**S**	**5**	**3**	**3**	**45**	1) Maintenance employees conduct regular maintenance to all electrical equipment	1) Work orders are generated for all electrical equipment that requires maintenance	1) All employees are issued with arc rated PPE 2) Fire extinguishers and first aid kits are provided for all sites	**0.8**	**9**	

Explosion due to damaged electrical cable	Burns Explosions Fire	**S**	**5**	**1**	**3**	**15**		1) DL's are used prior to trenching and digging proving trenches is implemented	1) All employees are issued with arc rated PPE 2) Fire extinguishers and first aid kits are provided for all sites	**0.6**	**6**	

Risk Assessment: Client Baseline Risk Assessment **Activity**: Construction Work **Task:** Physical and Psychological Health Hazards												**Reviewed on**: 10.04.2024 **Compiled by**: SHERQ Division **Revision**: 2
Hazards	**Associated Risk**	**Effect**	**Pure Risk before rating**				**Engineering Controls**	**Administrative Controls**	**PPE Controls**	**% Control**	**Residual Risk**	**Action Needed**
			S	**F**	**E**	**R**						
Noise	Noise induced hearing loss	**SH**	**3**	**1**	**1**	**3**	1) Equipment is fitted with exhaust mufflers to limit the noise generated by the machinery	1) Employees are required to undergo annual medicals and be deemed medically fit before being allowed to work with noise generating equipment 2) Baseline and Periodic Audiometric examinations conducted by Occupational Health Clinics	1) Employees are issued with the appropriate PPE - ear muffs, plugs	**0.8**	**0.6**	Employees must be encouraged to maintain a safe working distance from noise sources

Risk Assessment: Client Baseline Risk Assessment **Activity**: Construction Work **Task:** Working in Confined Spaces											**Reviewed on**: 08.04.2024 **Compiled by**: SHERQ Division **Revision**: 2	
Hazards	**Associated Risk**	**Effect**	**Pure Risk before rating**				**Engineering Controls**	**Administrative Controls**	**PPE Controls**	**% Control**	**Residual Risk**	**Action Needed**
			S	**F**	**E**	**R**						
Oxygen deficient environments Build-up of exotic gases	Asphyxiation Explosive atmospheric environments	**SH**	**3**	**1**	**3**	**9**	1) Substations are fitted with positive pressure fans which ensure that there is a fresh supply of air into the basement areas 2) Teams are issued with portable purging fans to ensure that fresh air is always circulated into the confined space	1) PTRA 2) Before employees undertake any work in confined spaces the atmosphere is tested to evaluate the air quality within that environment	1) Employees issued with appropriate PPE for tasks	**0.8**	**1.8**	1) A comprehensive procedure for Entry into Confined Spaces needs to be developed 2) Employees to be trained on the procedure 3) All equipment which generates noxious gases must not be allowed into confined spaces 4) Alternative methods to undertake the work must be investigated 5) All lighting installed, used or introduced into the confined space to be Ex rated
Inadequate lighting	Falls, slips and trips Touching of incorrect equipment Operating incorrect equipment Compromised sight and co-ordination	**S**	**5**	**3**	**3**	**45**		1) PTRA 2) Electrical Inspectors undertake routine planned inspections	1) Employees are issued with portable headlights to increase illumination at night or in confined spaces	**0.6**	**18**	1) Emergency lighting must be made available in the event that all other methods of illumination have failed 2) All defective luminaries must be repaired/replaced 3) All lighting installed, used or introduced into the confined space to be Ex rated
Combustible environments: exotic gases Methane LPG	Explosions Fire Burns Fatality Damage to equipment and property Exposure to toxic gases and fumes	**SH**	**5**	**1**	**3**	**15**	1) Substations are fitted with positive pressure fans which limits the quantity of dust entering the facility 2) Purge fans to be used for circulating/purging	1) PTRA 2) Employees undertake routine cleaning of the substation on a planned maintenance schedule		**0.8**	**3**	1) Entry into Confined Spaces procedure must be followed. 2) Approved gas detectors must be used to analyse the atmospheric properties 3) Personal air monitors must be used to ensure that the atmosphere in the

							air within the confined space					confined space is monitored continuously 4) Fire extinguishers must be close at hand to extinguish any fires 5) Hot work permits must be issued before any hot work is undertaken
Noise Amplification of noise in the confined space Impact noises from hammering activities Drilling noises	Temporary threshold shift Tinnitus Noise induced hearing loss	**SH**	**3**	**1**	**3**	**9**	1) Employees undergo annual medicals and are deemed medically fit before being allowed to work with noise generating equipment 2) Baseline and Periodic Audiometric examinations are conducted by the Occupational Health Clinics		1) Employees are issued with the appropriate PPE for tasks	**0.8**	**1.8**	1) Purchasing specifications need to be developed/revised to ensure that all equipment generates minimum noise (below 85dBA) 2) If noise levels are a nuisance then longer service lines can be purchased to further increase the distances between the employees and the noise generating equipment
Dust and debris falling from overhead positions, structures and equipment	Eye irritation Inhalation of dust/fumes	**S**	**3**	**3**	**1**	**9**	1) Substations are fitted with positive pressure fans which limits the quantity of dust entering the facility 2) Electrical Inspectors undertake routine cleaning of the substation on a planned maintenance schedule	1) PTRA 2) Smoking is prohibited in confined spaces	1) Employees are issued with appropriate PPE for tasks	**0.8**	**1.8**	1) If there is excessive dust or dirt in the confined space then this must be cleaned to an acceptable level before work is permitted to be undertaken 2) Dust inhalation – use of FFP1 masks 3) Installation of “No Smoking” signs in all confined spaces
Stagnant water/sludge	Legionnaires Disease Airborne diseases Lung infections Asthmatic attacks Falls, slips and trips	**SH**	**5**	**3**	**3**	**45**	1) Basements are installed with sump pumps to ensure any excess water is drained	1) PTRA 2) Inspectors undertake routine inspections and cleaning of the substation on a planned maintenance schedule	1) Employees are issued with the appropriate PPE	**0.8**	**9**	If there is stagnant water or sludge in the confined space, then this must be cleaned to an acceptable level before work is permitted to be undertaken

Access Egress Basement entrance ladders Manholes for cable tunnels	Falls, slips and trips Falls from height Cuts and lacerations Fractures Fatality	**SH**	**5**	**3**	**3**	**45**	1) New substation basements are being designed to have access stairs and not ladders	1) PTRA 2) Inspectors undertake routine inspections, cleaning and maintenance of the substation to ensure access points are secured	1) Employees are issued with the appropriate PPE	**0.8**	**9**	Nonslip strips are to be retrofitted to basement access ladders/steps

Risk Assessment: Client Baseline Risk Assessment **Activity**: Construction Work **Task:** Housekeeping and General Safeguarding											**Reviewed on**: 08.04.2024 **Compiled by**: SHERQ Division **Revision**: 2	
Hazards	**Associated Risk**	**Effect**	**Pure Risk before rating**				**Engineering Controls**	**Administrative Controls**	**PPE Controls**	**% Control**	**Residual Risk**	**Action Needed**
			S	**F**	**E**	**R**						
Substandard housekeeping: On site In vehicles	Slips, trips and falls Struck by falling objects Puncture wounds Contaminants/fluid spills	**SE**	**3**	**3**	**3**	**27**	1) Clearing of worksite (waste material/scrap)	1) PTRA 2) Employees conduct visual safety and housekeeping inspections regularly	1) Employees are issued with the appropriate PPE – non-slip protective footwear	**0.8**	**5.4**	Employees/Contractors are to ensure: 1) Prompt and proper disposal of waste material/scrap 2) Protruding nails to be bent over or removed 3) Material required for use on site do not obstruct workplace access, egress and walkways 4) Toolbox talks emphasise the importance of housekeeping
Stacking and storage of: Equipment Material Tools	Struck by falling objects Contusions Damage to material	**S**	**3**	**3**	**1**	**9**	1) Designated storage areas	1) Designated stacking and storage supervisor 2) Compliance with permissible stacking requirements (stack height not exceed 3 times the base smaller dimension) 3) Employees/ Contractor conduct visual inspections	1) Employees are issued with the appropriate PPE	**0.8**	**1.8**	1) Employees to keep storage areas neat and under control 2) Equipment, material and tools to be secured or properly stored in toolboxes, shelves to prevent movement and flying around