





**SHE Baseline Risk Assessment for Projects**

**Form: SAM SHE 00304F**

**Template Rev: 02**

**Date: February 2018**

|                               |   |
|-------------------------------|---|
| <b>Project Site:</b>          | Panfontein  |
| <b>Project Description:</b>   | Construction of the stockpile area and rehabilitation of drying beds at Rand water Panfontein Station |
| <b>System</b>                 | Primary   |
| <b>Specification No.</b>      | SHER 27.11.20   |
| <b>Risk Register Rev.No.</b>  | 1   |
| <b>Date Compiled/revised:</b> | 20/11/2020  |
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| <b>Approved by:</b>           | Zelda Malepe  |

Tolerable risk
Medium risk
High risk

| Risk no. | Department / Location                           | Activity   | Hazards/ Aspects   | Risks/ Impacts  | Risk Context    | Impact |              | Exposure  |        | Likelihood  |              | Inherent Risk | Existing Controls - Elimination, Substitution, Engineering Controls, Administration Controls  | Control Effectiveness |        | Residual Risk Exposure | Identify Opportunities from process or activities / Further mitigation |              |          |        |
|----------|---|--|--|---|-----------------|--------|--------------|-----------|--------|-------------|--------------|---------------|---|-----------------------|--------|------------------------|--|--------------|----------|--------|
|          |   |  |  |   | Risk Category   | Rating | Basis Points | Rating    | Factor | Rating      | Basis Points | Basis Points  |   | Rating                | Factor | Factor                 | Description  | Action Owner | Due Date | Update |
| 1        | Raw Water / Panfontein Site Camp                | Access Control   | Contact with moving vehicles, Struck by moving plant or machinery/Use of guns/violence   | Bodily injuries, property damage, theft   | Safety          | Major  | 50           | Medium    | 0.60   | Likely      | 0.59         | 18            | Rand Water Security available at the Main Gate and Truck Gate. Contractor to provide Security at site camp. Induction. Keeping of firearms in a safe. Signage.  | Satisfactory          | 0.35   | 6                      | N/A  | N/A          | N/A      | N/A    |
| 2        | Raw Water / Panfontein Project Site             | Protection of assets and equipment: Existing Services and Site Camp Facilities | Employees, third parties   | Theft, loss   | Safety          | High   | 25           | High      | 0.80   | Likely      | 0.59         | 12            | Securing of assets, competent security personnel (PSIRA registered), existing contractor site camp facilities and services, be cautious when working near Rand Water assets with machinery  | Satisfactory          | 0.35   | 4                      | N/A  | N/A          | N/A      | N/A    |
| 3        | Raw Water / Panfontein Site Camp & Project Site | Driving on site  | Speeding, uneven roads, adverse weather conditions, incompetent personnel, faulty vehicles, medically unfit, unauthorised vehicles on site, fatigue  | Accidents, fatality, financial claims, environmental contamination, property damage, injuries                                 | Health & Safety | Major  | 50           | Medium    | 0.60   | Likely      | 0.59         | 18            | Speed limit is 20km/h on site, one way roads will be demarcated for the project (drawing RO27538_03) , traffic management plan, awareness, road maintenance, vehicle road worthiness, medical fitness records, PDP's, controlled access, regular breaks, inductions | Satisfactory          | 0.35   | 6                      | N/A  | N/A          | N/A      | N/A    |
| 4        | Raw Water / Panfontein Site Camp                | Site establishment   | Site identification, clearing area and ground, under ground services not detected, site layout plan, fence erection, loading and off loading, noise and dust, poor housekeeping, inadequate stacking and storage, temporary electrical installations | Underground services damaged, electrocution, flooding, gas leaks, property damage, third party claims, environmental impacts, | Safety          | Major  | 50           | Very High | 1.00   | Very Likely | 0.82         | 41            | Site security. Induction. Keeping of firearms in a safe. Signage, inspections and monitoring, legal appointment letters, procedures, electrical certificate of compliance, existing services are available. Electrical Certificate of Compliance                    | Satisfactory          | 0.35   | 14                     | N/A  | N/A          | N/A      | N/A    |

|    |   |   |   |   |                 |       |    |        |      |             |      |    |  |              |      |   |     |     |     |     |
|----|---|---|---|---|-----------------|-------|----|--------|------|-------------|------|----|--|--------------|------|---|-----|-----|-----|-----|
| 5  | Raw Water / Panfontein Site Camp & Project Site | Welfare Facilities                              | Inadequate ablution/eating/showering facilities   | Poor health and hygiene, infections, illnesses and diseases                     | Environmental   | Major | 50 | Medium | 0.60 | Very Likely | 0.82 | 25 | Septic tank available, provision of temporary ablution and dining facilities and consultation with employees for requirement of showering facilities.  | Satisfactory | 0.35 | 9 | N/A | N/A | N/A | N/A |
| 6  | Raw Water / Panfontein Project Site             | Clearing and grubbing at Project Site           | Existing services, equipment, insects and animals, noise and dust,  | Fauna and flora impact, electrocution, leaks, property damage, injury, fatality | Health          | Major | 50 | Medium | 0.60 | Likely      | 0.59 | 18 | supervision, procedures, checklists, operator competency, plans, wayleaves and authorisations, medical certificates, legal appointments, machinery maintenance records, spill kits and trip trays                                      | Satisfactory | 0.35 | 6 | N/A | N/A | N/A | N/A |
| 7  | Raw Water / Panfontein Project Site             | Setting up sites                                | Hand tools, dust, poor housekeeping around dam areas  | Property damage, defective tools, incorrect setting up of site, injuries        | Health & Safety | Major | 50 | Medium | 0.60 | Very Likely | 0.82 | 25 | supervision, procedures, checklists, operator competency, plans, wayleaves and authorisations, medical certificates, legal appointments, machinery maintenance records, calibration certificates,                                      | Satisfactory | 0.35 | 9 | N/A | N/A | N/A | N/A |
| 8  | Raw Water / Panfontein Project Site             | Placement of key project team personnel on site | Incompetent Construction Manager/Supervisor/s/Safety Officer appointed. Construction Safety Officer appointed on a part time basis, Unregistered Construction Safety Officer. | Legal non-compliance, poor supervision of employees, injuries, fatalities       | Health & Safety | Major | 50 | High   | 0.80 | Likely      | 0.59 | 24 | submission of SHE file for approval prior to site establishment. SHE file contains competencies of key personnel   | Satisfactory | 0.35 | 8 | N/A | N/A | N/A | N/A |
| 9  | Raw Water / Panfontein Project Site             | Emergency Preparedness/response                 | Inadequate emergency procedure, failure to communicate to employees, inadequate signage, poor coordination, emergency threats, inadequate warning systems,                    | Injuries, fatalities, production losses, property damage, financial losses,     | Safety          | High  | 25 | High   | 0.80 | Very Likely | 0.82 | 16 | procedures, emergency alarms, legal appointments, emergency contact list, awareness, PPE, fire drills, disaster management plan, contractors to have a site specific emergency plan. Site Emergency Preparedness Plan QMS 00508F Rev 1 | Satisfactory | 0.35 | 6 | N/A | N/A | N/A | N/A |
| 10 | Raw Water / Panfontein Project Site             | Working at extreme and adverse conditions       | Exposure extreme temperatures,  | sun burns, heat stroke, skin cancer, hypothermia, dehydration, fatality         | Safety          | Major | 50 | High   | 0.80 | Likely      | 0.59 | 24 | Awareness, sunscreen, PPE, Procedures, certificate of fitness, proper scheduling of work according to the season   | Satisfactory | 0.35 | 8 | N/A | N/A | N/A | N/A |
| 11 | Raw Water / Panfontein Project Site             | Working in the veld                             | Snakes (rinkels & puffadders are common), bees, wasps   | Insects/ snakes bites, injuries, fatalities                                     | Safety          | High  | 25 | High   | 0.80 | Likely      | 0.59 | 12 | Training and awareness, PPE,   | Satisfactory | 0.35 | 4 | N/A | N/A | N/A | N/A |
| 12 | Raw Water / Panfontein Project Site             | Working with petrol, diesel, concrete           | Inhalation, indigestion, congestion, spillages  | Slippery, injuries, fatalities, disorientation, dizziness, vomiting, nausea     | Safety          | Major | 50 | Medium | 0.60 | Very Likely | 0.82 | 25 | Bunded area to contain spillages, Permits are required should capacity of flammable substances stored on site exceed 1000lts, Training and awareness, emergency procedure, PPE, alarms, MSDS, windsocks                                | Satisfactory | 0.35 | 9 | N/A | N/A | N/A | N/A |

|    |                                     |  |   |   |        |       |    |           |      |             |      |    |   |              |      |    |     |     |     |     |
|----|-------------------------------------|--|---|---|--------|-------|----|-----------|------|-------------|------|----|---|--------------|------|----|-----|-----|-----|-----|
| 13 | Raw Water / Panfontein Project Site | Exposure to various specified products containing hazardous chemical substances. | Hazardous chemicals as per HCSR   | Infection to worker's respiratory system, Inhalation of toxic chemicals, Fire, Explosion, excessive occupational exposure levels. | Safety | High  | 25 | High      | 0.80 | Likely      | 0.59 | 12 | Training, MSDS-availability and adherence, Correct storage, Correct disposal, RequiredPPE.  | Satisfactory | 0.35 | 4  | N/A | N/A | N/A | N/A |
| 14 | Raw Water / Panfontein Project Site | Natural disasters  | Flooding, earth tremors   | Delays in work, injuries, drowing, fatalities, property damage, soil pollution  | Safety | Minor | 6  | Low       | 0.40 | Unlikely    | 0.42 | 1  | Insurances, training and awareness, alternate road available  | Satisfactory | 0.35 | 0  | N/A | N/A | N/A | N/A |
| 15 | Raw Water / Panfontein Project Site | Riots/strike   | Employees, third parties  | Delays in work, injuries  | Safety | High  | 25 | Medium    | 0.60 | Likely      | 0.59 | 9  | Training and awareness, Insurances such as social agreement contract, stakeholder meetings  | Satisfactory | 0.35 | 3  | N/A | N/A | N/A | N/A |
| 16 | Raw Water / Panfontein Project Site | Power interruptions  | Machinery going off,  | Delays in project completion, unexpected shutting and starting of machinery   | Safety | High  | 25 | Low       | 0.40 | Unlikely    | 0.42 | 4  | Back up generators, People to stay clear from electrical machinery/equipment  | Satisfactory | 0.35 | 1  | N/A | N/A | N/A | N/A |
| 17 | Raw Water / Panfontein Project Site | Emergency Overtime Work  | Long working hours, inadequate emergency coordination, incompetent personnel  | Injuries, fatalities, property damage, theft, fatigue   | Safety | High  | 25 | Medium    | 0.60 | Likely      | 0.59 | 9  | after hours forms, procedure, awareness, adequate breaks or time off work, night work is prohibited   | Satisfactory | 0.35 | 3  | N/A | N/A | N/A | N/A |
| 18 | Raw Water / Panfontein Project Site | Pedestrian traffic during and after works.                                       | No safe roadway for pedestrians   | Injuries, fatalities  | Safety | Major | 50 | Medium    | 0.60 | Likely      | 0.59 | 18 | Provide temporary safe means during construction to ensure segregation of vehicles and pedestrians, limit manpower/labour on site, high visibility vests to be worn, designated walkways, hosts to accompany visitors, one way roads for construction vehicles                      | Satisfactory | 0.35 | 6  | N/A | N/A | N/A | N/A |
| 19 | Raw Water / Panfontein Project Site | Working with mobile plant and Equipment /cranes                                  | Speeding, uneven roads, adverse weather conditions, incompetent personnel, faulty mobile plant, medically unfit personnel, unauthorised mobile plant on site, fatigue, inadequate | Accidents, fatality, financial claims, environmental contamination, property damage, injuries                                     | Safety | Major | 50 | Very High | 1.00 | Very Likely | 0.82 | 41 | Traffic management plan, awareness, maintenance records, vehicle road worthiness, medical fitness records, controlled access, regular breaks, inductions, load test certificates, operator licences, industrial skills cards, legal appointments, checklists, procedures,drip trays | Satisfactory | 0.35 | 14 | N/A | N/A | N/A | N/A |
| 20 | Raw Water / Panfontein Project Site | Working close to drying beds   | Falling into drying bed, biological hazards   | Fatalities, injuries, sicknesses, diseases  | Safety | Major | 50 | High      | 0.80 | Likely      | 0.59 | 24 | Awareness, PPE, Procedure and inspections, medical surveillance   | Satisfactory | 0.35 | 8  | N/A | N/A | N/A | N/A |
| 21 | Raw Water / Panfontein Project Site | Working near sludge dams (under operations)                                      | Dams at full capacity   | Drowning, property damage, soil pollution   | Safety | Major | 50 | High      | 0.80 | Very Likely | 0.82 | 33 | Follow project programme, Site emergency plan, Site monitoring by operations personnel, Contractor site emergency plan  | Satisfactory | 0.35 | 11 | N/A | N/A | N/A | N/A |
| 22 | Raw Water / Panfontein Project Site | Sludge Handling  | Hazardous and non-hazardous waste, contact with skin  | Ground pollution, water pollution, poor housekeeping, Dermatitis  | Safety | Major | 50 | High      | 0.80 | Very Likely | 0.82 | 33 | Waste management plan and pollution prevention programmes. Sludge is filled to a height of 2.5m. Waste shall be disposed to registered waste sites. Housekeeping inspections.   | Satisfactory | 0.35 | 11 | N/A | N/A | N/A | N/A |
| 23 | Raw Water / Panfontein Project Site | Gas and electrical welding and cutting   | Gas, Fire, sparks   | Fire or explosion, electrocution, respiratory infections/diseases   | Safety | Major | 50 | High      | 0.80 | Likely      | 0.59 | 24 | Use work permits, proper storage  | Satisfactory | 0.35 | 8  | N/A | N/A | N/A | N/A |
| 24 | Raw Water / Panfontein Project Site | Working at Heights   | Falling objects, equipment  | Injuries to workers, damage to equipment  | Safety | Major | 50 | High      | 0.80 | Likely      | 0.59 | 24 | Training for working at heights, Fall protection plan.  | Satisfactory | 0.35 | 8  | N/A | N/A | N/A | N/A |
| 25 | Raw Water / Panfontein Project Site | Work on scaffolds and ladders  | Openings in the floor boards, waste not removed on the floor boards,  | Property and equipment damage, body harm and time delays  | Safety | Major | 50 | High      | 0.80 | Likely      | 0.59 | 24 | Training and appointment of scaffold inspector, no unauthorized modification of the scaffold, safe/use of unsafe tags and work permit for working at heights  | Satisfactory | 0.35 | 8  | N/A | N/A | N/A | N/A |
| 26 | Raw Water / Panfontein Project Site | Compacting Bedding   | Moving machinery, noise, vibration, dust, unstable side walls, inadequate compaction of material, use of troxler machine, inclement weather                                       | Side walls collapsing, injuries, NIHL, white finger and whole body vibration syndrome, radiation exposure                         | Safety | High  | 25 | Very High | 1.00 | Very Likely | 0.82 | 21 | supervision, procedures and checklists, inspection and testing of G3 and drying bed wall integrity, operator competency, plans, medical certificates, legal appointments, machinery maintenance records   | Satisfactory | 0.35 | 7  | N/A | N/A | N/A | N/A |

|    |                                     |  |   |  |        |          |    |        |      |             |      |    |   |              |      |   |     |     |     |     |
|----|-------------------------------------|--|---|--|--------|----------|----|--------|------|-------------|------|----|---|--------------|------|---|-----|-----|-----|-----|
| 27 | Raw Water / Panfontein Project Site | Environmental rehabilitation done by Environmental Management Services | Equipment & machinery, handtools, use of ladders, abnormal activities and emergencies, storm water drainage, paving, seedings, lawn planting, hazardous chemicals and | Injuries, fatality, property damage, environmental spillage, landslides, soil erosion  | Safety | High     | 25 | High   | 0.80 | Unlikely    | 0.42 | 8  | EMP, Site environmental authorisation, HD Liners on drying bed walls and floors   | Satisfactory | 0.35 | 3 | N/A | N/A | N/A | N/A |
| 28 | Raw Water / Panfontein Project Site | Removal, transportation and disposal of vegetation                     | Moving equipment and machinery, loading and off loading, noise and dust, poor housekeeping, inadequate stacking and storage, insects and reptiles                     | Fauna and flora impact, leaks, property damage, injury, fatality, respiratory diseases | Safety | Major    | 50 | Medium | 0.60 | Likely      | 0.59 | 18 | supervision, procedures, checklists, operator competency, plans, medical certificates, legal appointments, machinery maintenance records, spill kits and drip trays, designated area for vegetation to be dumped, no disposal of vegetation outside Rand Water premises | Satisfactory | 0.35 | 6 | N/A | N/A | N/A | N/A |
| 29 | Raw Water / Panfontein Project Site | De-establishment of site   | Site clearing, removal of site camp, containers, fencing, temporary road signs. Removal of key staff during decommissioning.  | Injuries, fatalities, reduction in legal compliance,                                   | Safety | Moderate | 13 | High   | 0.80 | Very Likely | 0.82 | 9  | Risk Assessments and Method Statements. No key employees to be removed including site agent, and H&S Officer. Ensure coverage available for defect liability period.  | Satisfactory | 0.35 | 3 | N/A | N/A | N/A | N/A |
| 30 | Raw Water / Panfontein Project Site | Hand Over of Site  | Valves failing under pressure test, use of generators and pumps   | Injuries, fatalities, noise, fumes, loss of water                                      | Safety | High     | 25 | High   | 0.80 | Likely      | 0.59 | 12 | Competent person/company to be used for pressure testing, induction training, PPE   | Satisfactory | 0.35 | 4 | N/A | N/A | N/A | N/A |
| 31 | Raw Water / Panfontein Project Site | Covid-19 management and prevention                                     | SARS CoV 2 on surfaces (tables, chairs, paper etc) & COVID-19 infected persons  | Health effects, local transmission of COVID-19   | Health | Major    | 50 | High   | 0.80 | Very Likely | 0.82 | 33 | RW Specification & BOQ regarding the management of Covid-19 on site; Contractor Covid- Management Plan & Risk Assessment for approval before commencement; Screening of employees; PPE; social distancing measures; Client induction; Awareness on Covid;               | Good         | 0.20 | 7 | N/A | N/A | N/A | N/A |

### Factors used in Key Risk Analysis

Each risk is evaluated in terms of potential loss, likelihood of occurrence and the effectiveness of controls in place to manage the risks according to the criteria set out below

| IMPACT SCALE |         |  |                             |  |                           |   |                        |
|--------------|---------|--|-----------------------------|--|---------------------------|---|------------------------|
|              | Level   | Outcome description<br>(Business Risk)   | Impact Values(Basis points) | Safety   | Health                    | Environment   | Quality                |
| 1            | Extreme | Extreme event with the potential to lead to collapse of business and is fundamental to the achievement of objectives.<br>Non achievement of Rand Water mandate | 100                         | Multiple Fatalities , Very serious irrevesable injury from 10 people and above                       | May cause multiple deaths | Transboundary/National environmental disaster with long term or irreversible ecological impacts with high risk of legal and public liability. | Total system failure   |
| 2            | Major   | Major event which can be endured but which may have a prolonged negative impact and extensive consequences.  | 50                          | Fatality,Multiple Major injuries or disability, Significant irreversable injuries to up to 10 people | Life threatening affects  | National environmental disaster with long term ecological impacts with high risk of legal and public liability.                               | Repeat non-conformance |

|   |               |   |    |   |   |   |  |
|---|---------------|---|----|---|---|---|--|
| 3 | High          | High impact events, which can be managed but requires additional resources and management effort. | 25 | Single major injury or disabling reportable | Irreversible significant health effects | Event that leads to environmental contamination (failure to manage appropriately, but contained within Rand Water boundaries)   | Needs immediate corrective action within 2 weeks |
| 4 | Moderate      | Event which can be managed under normal operating conditions.                                     | 13 | Minor injuries, lost time,                  | Reversible significant health effects   | Event which can be contained. Is limited to immediate area of occurrence associated with short term ecological disturbances, and/or is a transgression of internal standard | Needs immediate corrective action within 1 month |
| 5 | Minor         | Events of which consequences can readily be absorbed under normal operating conditions.           | 6  | Minor injuries, no lost time                | Reversible minor health effects         | Minor negative impact, no corrective action necessary. Must be monitored.   | Corrective action not required but monitored     |
| 6 | Insignificant | Frequent minor risks that do not disrupt business, or with no adverse health effect or injuries.  | 3  | No Health effects                           | Negligible                              | Negligible  | Does not require corrective action               |

| QUALITATIVE ASSESSMENT OF PROBABILITY/ LIKELIHOOD OF OCCURRENCE |   |            |
|---|---|------------|
| Likelihood/ Probability rating                                  | Description   | Percentage |
| Almost certain  | The event is expected to occur in most circumstances  | 100%       |
| Very likely   | The event will probably occur in most circumstances   | 67% -96%   |
| Likely  | The event should occur at sometime                    | 51% -66%   |
| Unlikely  | The event could occur at sometime                     | 34% -50%   |
| Very unlikely   | The event may occur only in exceptional circumstance. | 2% - 33%   |
| Almost impossible   | The event may never occur                             | 1%         |

| QUALITATIVE ASSESSMENT OF CONTROLS |  |           |
|------------------------------------|--|-----------|
| Level                              | Description  | Factor    |
| Very good                          | Controls are totally effective, efficient and implemented. | 81% - 99% |
| Good                               | Most risks are effectively controlled and mitigated        | 66% - 80% |
| Satisfactory                       | There is room for some improvement in                      | 41% - 65% |
| Weak                               | Some risks appear to be controlled but                     | 21%-40%   |
| Unsatisfactory                     | The control system is ineffective                          | <20%      |

| RATING MATRIX |           |            |            |            |             |
|---------------|-----------|------------|------------|------------|-------------|
| 1%            | 2% to 33% | 34% to 50% | 51% to 66% | 67% to 96% | 97% to 100% |



|               |              | Almost Impossible | Very Unlikely | Unlikely | Likely | Very Likely | Almost Certain |
|---------------|--------------|-------------------|---------------|----------|--------|-------------|----------------|
|               | Basis Points | 1%                | 18%           | 42%      | 59%    | 82%         | 100%           |
| Extreme       | 100          | 1.0               | 17.5          | 42.0     | 58.5   | 81.5        | 100.0          |
| Major         | 50           | 0.5               | 8.8           | 21.0     | 29.3   | 40.8        | 50.0           |
| High          | 25           | 0.3               | 4.4           | 10.5     | 14.6   | 20.4        | 25.0           |
| Moderate      | 13           | 0.1               | 2.3           | 5.5      | 7.6    | 10.6        | 13.0           |
| Minor         | 6            | 0.1               | 1.1           | 2.5      | 3.5    | 4.9         | 6.0            |
| Insignificant | 3            | 0.0               | 0.5           | 1.3      | 1.8    | 2.4         | 3.0            |

| Exposure |               |                                 |               |             |           |             |             |
|----------|---------------|---------------------------------|---------------|-------------|-----------|-------------|-------------|
| Factor   | Rating        | Prescribed legal limits (PLL)** | Frequency     | Duration    | Extent    | Environment | Quality     |
| 1.00     | Very high     | >200%                           | 2 X per Shift | <40Hrs      | over 101m | Extensive   | Extensive   |
| 0.80     | High          | 101%-200%                       | 1 X per Shift | <8hrs>40Hrs | 51-100m   | Widespread  | Widespread  |
| 0.60     | Medium        | 75%-100%                        | Weekly        | <2hrs>8 Hrs | 11-50m    | Significant | Significant |
| 0.40     | Low           | 50%-75%                         | Monthly       | <1Hrs>2Hrs  | 6-10m     | Restricted  | Restricted  |
| 0.20     | Insignificant | < 50%                           | Annually      | > 1 hr      | 1-5m      | Negligible  | Negligible  |

| Colour Code | Detail         | Basis Point Range |
|-------------|----------------|-------------------|
|             | Tolerable risk | 0 to 3            |
|             | Medium risk    | 3.1 to 24.9       |
|             | High risk      | 25 to 100         |