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Baseline Risk Assessment and Hazard Identification

Project:

Supply, Delivery, Install and Commissioning of a backup generator, automatic mains failure panel, and diesel trailer for the VGOS radio telescope at the Hartebeesthoek Radio Astronomy Observatory

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The baseline risk assessment based on Occupational Health and Safety issues relevant to the supply and installation of a backup electric generator, automatic mains failure panel, and diesel trailer.

Executive Summary

A baseline risk assessment is required which identifies possible hazards and the risks involved with the work to be undertaken. In this document these risks are identified in order for contractors to plan for and mitigate all risks to ensure a safe working environment.

Description of Work

A new radio telescope is being built at the Hartebeesthoek Radio Astronomy Observatory situated on Farm 502JQ, Broederstroom rd, Hartbeesthoek, Gauteng. The civil works have already been completed on site and a mini-sub is currently providing power to the installation. The equipment will eventually be used on a 24/7 basis and it is necessary to have a backup/standby generator installed in the case of power failures.

The work entails:

- The supply of a 400 kVA backup diesel, self-enclosed generator delivered, offloaded and installed on site.
- The supply and connection of an Automatic Mains Failure panel which will switch between the generator and Eskom feed lines.
- The supply of a diesel trailer which will be used to store additional fuel and fill up the generator reservoir as needed.

Description of Site

The Hartebeesthoek Radio Astronomy Observatory is located on Farm 502JQ, Broederstroom road, Hartebeesthoek, 1739 just north of Krugersdorp in the Gauteng province.

Figure 1 indicates the layout of the site with figure 2 showing a photo of the buildings. The mini-sub is located outside the fenced area.

Existing services

- Clean, drinkable water is available on-site.
- The mini-sub currently has a single-phase socket for equipment and circuit breakers are already installed (i.e. 3-phase electricity is available if the connections are made to the circuit breakers).
- The as-built drawings will be provided to the successful bidder and the services will be shown.

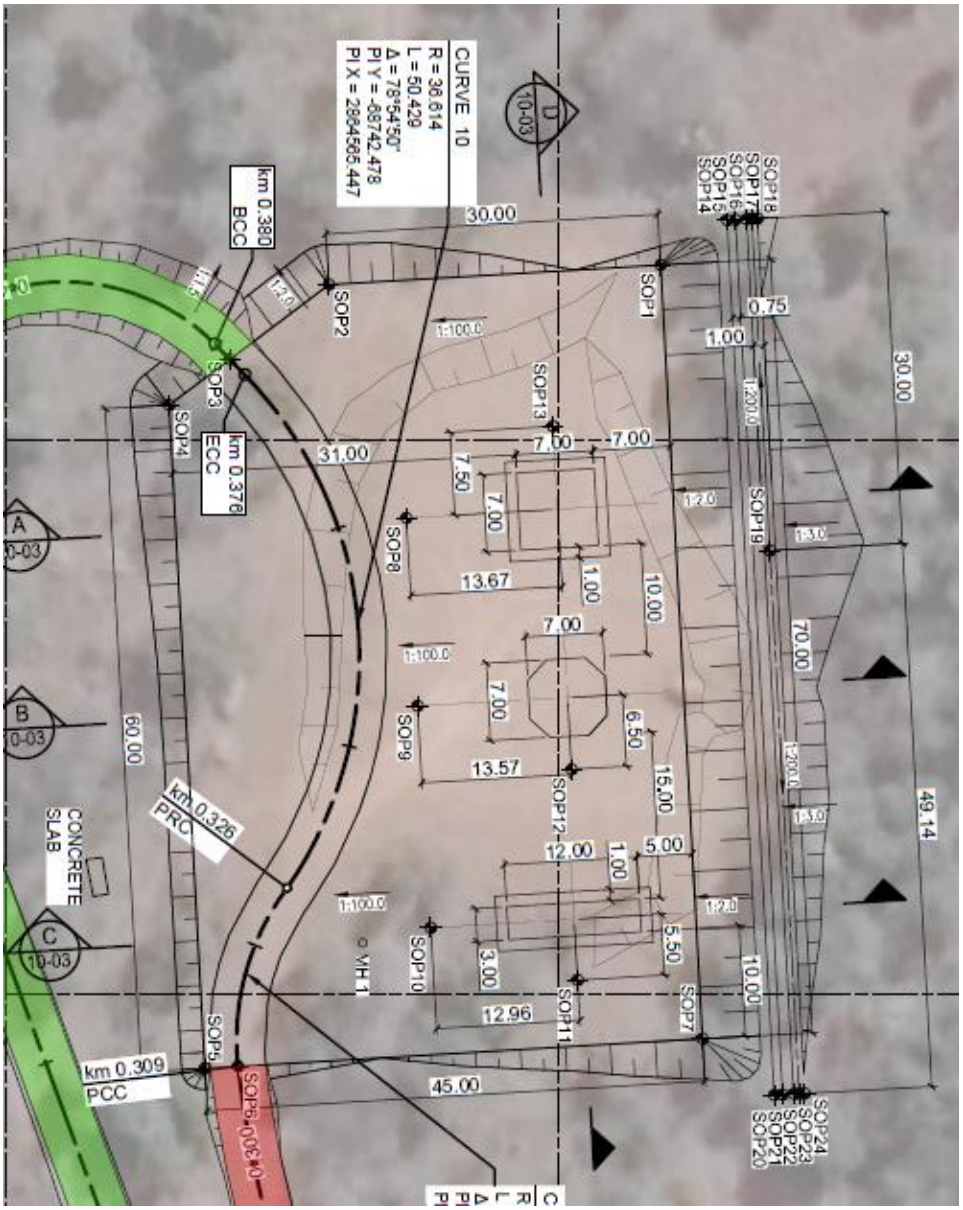

Figure 1: Location of mini-sub, and proposed generator, is indicated by the "Concrete Slab" white block to the West (left)

Figure 2: Recent photo of the site (Feb 2017)

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Hazard Identification and Risk Assessment (HIRA)

During the hazard identification and risk assessment the presence of occupational health stresses and safety factors were considered. The following terms have been used for the risk assessment.

Consequence	The potential degree of harm, potential severity of injuries and/or health; and/or the number of people potentially affected.
Exposure	How often and for how long people are exposed to a hazard.
Frequency	Or **Likelihood.** Chance per unit time. Frequency = Exposure X Probability.
Harm	Injuries, occupational diseases or losses.
Hazard	Conditions, circumstances or objects with the potential to cause harm.
Probability	Chance that a person or persons will be harmed during the exposure.
Risk	Likelihood that harm from a particular hazard will occur. Risk = Consequence X Frequency

To determine the risk factor the consequence, exposure and probability of occupational disease and injury were assessed and weights allocated on a scale of 1 – 5, with 1 being the highest risk and 5 the lowest risk. Each of these weights carries a certain point value as follows.

Category	Consequence	Exposure	Probability
1	40	10	10
2	15	6	6
3	7	3	3
4	3	2	1
5	1	1	0.5

The risk profile is obtained by multiplying the associated weights. E.g. a fire hazard can have high consequence (40) with a low exposure (2) and medium probability (3) will result in 40 x 2 x 3 = 240 risk score which is classified as a high risk. This classification is as follows.

More than 400	Very High Risk	Consider stopping action
200 - 400	High Risk	Immediate remedial action
70 – 200	Substantial Risk	Remedial action required
20 – 70	Low Risk	Attention necessary
Below 20	Possibility of risk	Risk is possible, but acceptable

Results

The above HIRA process was followed based on the works to be done on site for this project, i.e. the installation of a generator and automatic mains failure panel on site. The following risks were identified.

High Risk (200 – 400 points)

- Heavy equipment can fall on persons or be placed upon person's limbs. E.g. offloading of the generator and AMF panel.
- Electrocution during installation. E.g. Electrical cables need to be connected to the generator as well as AMF panel.
- Fire. E.g. there are trees and savannah grass nearby the mini-sub and generator which can catch fire if there is an electrical short.
- Explosions. E.g. The generator, and diesel trailer, may have fuel which can be ignited and under certain conditions explode.
- Contact with plant and equipment during operation. E.g. The generator will be tested and commissioned on site and will therefore be in operation with people close by.

Substantial Risk (70 – 200 points)

- Noise and fumes from equipment (generator) and tools used during installation can pose a health risk.
- Weather conditions – rain during installation can increase the likelihood of electrocution.

Low Risk (20 - 70 points)

- As the site is located on a farm, there is some wildlife (warthogs, various types of buck, jackals, baboons, and monkeys) roaming around.
- Snakes, scorpions, bees, wasps, ticks and spiders have also been spotted on the farm.

Conclusion

From the HIRA investigation there are predominantly physical hazards (crushing, electrocution, entanglement) that are high risk factors. For each of these items the risk can be eliminated or controlled to a safe level. Correct PPE should be worn for offloading and installation of equipment. The electricity supply should be switch off when connecting the electrical cables and installing the AMF panel.

Noise from equipment (generator) and tools used during installation poses a substantial risk but can be mitigated by using the correct PPE (ear plugs, etc.) The electrocution probability which is increased in wet conditions can also be mitigated by postponing the installation/physical electrical connections to a time when it does not rain.

Finally, there is a possibility of spotting local wildlife (though no big predators) and also some venomous animals. These animals are not known to attack of their own accord, only when agitated or surprised. Care must be taken to be observant when walking around site and a safe distance should be kept from any such animal.