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## CONTENTS

	Page
<b>1. INTRODUCTION.....</b>	<b>3</b>
<b>2. SUPPORTING CLAUSES .....</b>	<b>3</b>
2.1 SCOPE .....	3
2.1.1 Purpose.....	4
2.1.2 Applicability.....	4
2.2 NORMATIVE/INFORMATIVE REFERENCES .....	4
2.2.1 Normative.....	4
2.2.2 Informative .....	5
2.3 DEFINITIONS .....	5
2.3.1 Disclosure Classification .....	5
2.4 ABBREVIATIONS .....	5
2.5 ROLES AND RESPONSIBILITIES .....	6
2.5.1 Design and Specifications Engineering Manager.....	6
2.5.2 Auxiliary Engineering Manager.....	6
2.5.3 Auxiliary System Engineer.....	6
2.6 PROCESS FOR MONITORING .....	6
2.7 RELATED/SUPPORTING DOCUMENTS .....	6
<b>3. WORKS INFORMATION FOR THE CONSTRUCTION OF AN ANTI-TUNNELLING SYSTEM.....</b>	<b>6</b>
3.1 GENERAL.....	6
3.2 ANTI-TUNNELING SYSTEM.....	6
3.2.1 Design Requirements .....	6
3.2.2 Tutuka Island Security Fence Anti-tunnelling specifications .....	6
3.3 GATES.....	7
3.3.1 Mesh .....	7
3.3.1.1 Wire .....	7
3.3.1.2 Panel.....	7
3.3.1.3 Gates .....	8
3.4 QUALITY CONTROL AND ASSURANCE.....	8
3.5 PLANT LABELLING AND CONFIGURATION.....	8
3.6 CONSTRAINTS ON HOW THE <i>CONTRACTOR</i> PROVIDES THE WORKS .....	8
3.7 RESPONSIBILITY MATRIX.....	9
<b>4. ACCEPTANCE .....</b>	<b>9</b>
<b>5. REVISIONS.....</b>	<b>9</b>
<b>6. DEVELOPMENT TEAM .....</b>	<b>9</b>
<b>7. ACKNOWLEDGEMENTS .....</b>	<b>9</b>

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## 1. INTRODUCTION

The Tutuka island perimeter covers a total distance of roughly 4km. Currently there is no high security fence around the island perimeter. By not having a security fence puts the station at risk. In order to reduce this risk a fence must be constructed which will act as a deterrent to any would be criminals.

As Tutuka is considered a national key point it must comply with the National Key Points Act 102 of 1980 as well as the National Key Points Security Plan (Standards, Policy, Manual and Procedures).

This works information details the island perimeter layout and the technical requirements for the fence.

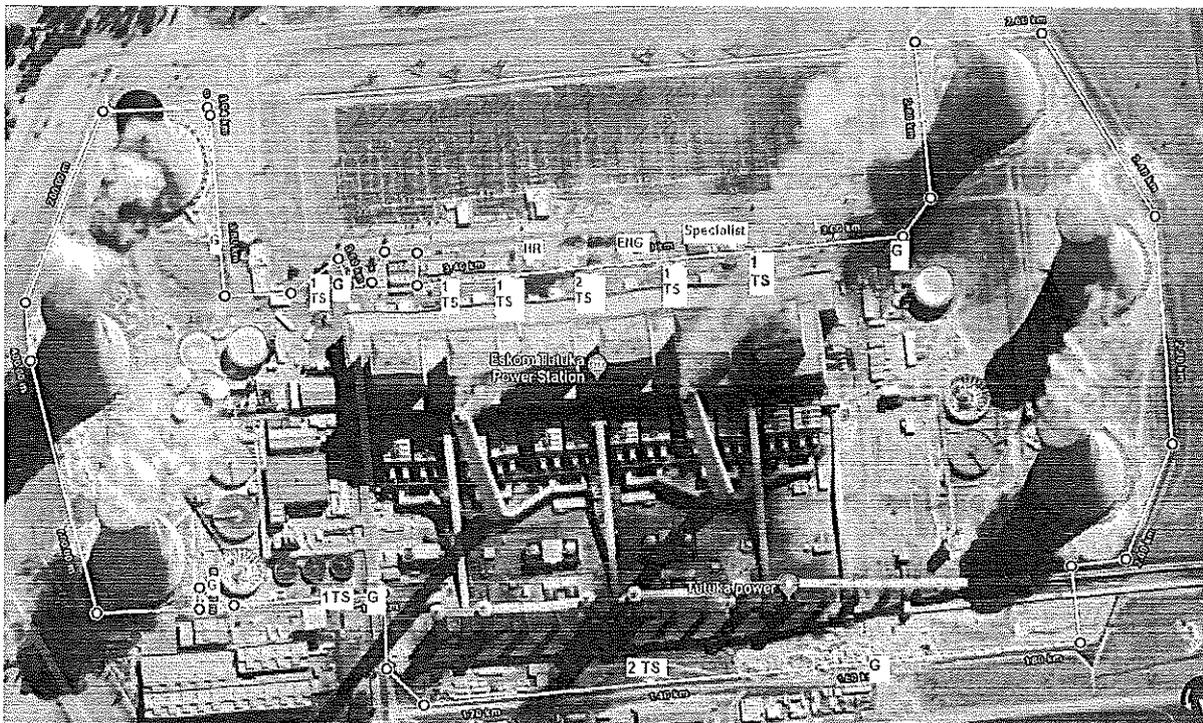


Figure 1-1: Illustration of fence outline and gate/turnstile locations at Tutuka Power Station (G=Gate, TS= Turnstile)

## 2. SUPPORTING CLAUSES

### 2.1 SCOPE

The Contractor is required to supply all necessary tools, equipment, formwork, labour (including supervisors) and material required to construct an anti-tunnelling system around the island fence in the required areas (see Figure 1-1). The construction of the anti-tunnelling system will include all excavations. Extreme care must be taken so as to not damage the existing fence when excavating. All work is to be in accordance with SABS 1200 series.

The distance of the required anti-tunnelling system is approximately 4km.

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The depth of the concrete into the soil must be 200mm, 150mm wide and a minimum of 100mm above the ground as per Figure 2-1.

The fence must be cast into the concrete a minimum of 100mm.

The concrete must be a minimum of 15MPa.

Concrete cubes must be sent for testing to confirm the strength.

The Contractor will also be responsible for supplying a quality control plan for the approval by the Employer.

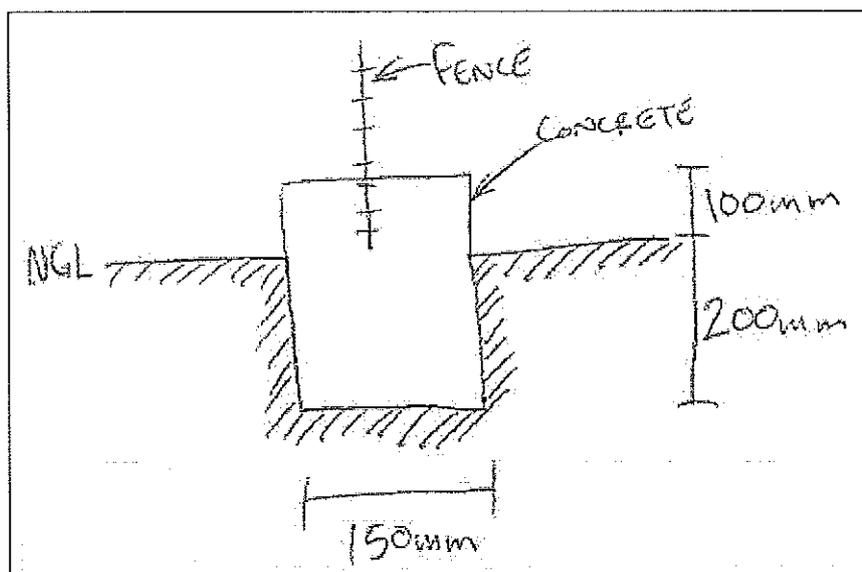


Figure 2-1: Schematic of concrete anti-tunnelling system

In addition to the anti-tunnelling system the contractor is to design, manufacture, supply and install two gates.

### 2.1.1 Purpose

The purpose of this document is to provide the technical requirements for the scope of work for the Tutuka Island Security Fence Anti-Tunnelling and gates.

### 2.1.2 Applicability

This document shall apply to Tutuka Power station.

## 2.2 NORMATIVE/INFORMATIVE REFERENCES

### 2.2.1 Normative

The applicable reference documents are listed below. These documents (latest revision) form part of this specification to the extent as specified in this specification. In the event of a conflict between the text of this specification and the applicable parts of the Eskom documents listed below, the text of this specification takes precedence. However, this specification does not supersede applicable laws and regulations (including the SANS standards), unless a specific exemption has been obtained from the relevant authorities.

[1] 240-50317699: Manage Technical Queries Procedure

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- [2] 240-76368574: High Security Mesh Fencing
  - [3] 240-53113685: Design Review Procedure
  - [4] 240-53114186: Document and Records Management
  - [5] 240-53665024: Engineering Quality Manual
  - [6] ISO 9001: Quality Management Systems
  - [7] 240-66920003: Documentation Management Review and Handover Procedure for Gx Coal Projects
  - [8] 240-76992014: Project / Plant Specific Technical Documents and Records Management Work Instruction
  - [9] SANS 1200 DM: Standardised specification for civil engineering construction section DM: Earthworks (roads, subgrade)
  - [10] SANS 1200 M: Standardized specification for civil engineering construction section M: Roads (general)
  - [11] SANS 1200 ME: Standardized specification for civil engineering construction section ME: Subbase
  - [12] SANS 878: Ready mix concrete
  - [13] SANS 5860: Concrete tests – Dimensions, tolerances and uses of cast test specimens
  - [14] SANS 5861-2 and 3: Concrete tests – Sampling of freshly mixed concrete and making and curing of test specimens
  - [15] SANS 5863: Concrete tests – compressive strength of hardened concrete

### 2.2.2 Informative

- [16] OHSA: Occupational Health and Safety Act 85 of 1983

## 2.3 DEFINITIONS

N/A

### 2.3.1 Disclosure Classification

**Controlled Disclosure:** Controlled Disclosure to external parties (either enforced by law, or discretionary)

## 2.4 ABBREVIATIONS

Abbreviation	Description
AKZ	Anlagen Kennzeichnung System
EDWL	Engineering Design Work Lead
HV's	Heavy Vehicles
Mpa	Mega Pascal
OHS	Occupational Health and Safety
SANAS	South African National Accreditation System
SANS	South African National Standards

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## 2.5 ROLES AND RESPONSIBILITIES

### 2.5.1 Design and Specifications Engineering Manager

- Authorizes the report

### 2.5.2 Auxiliary Engineering Manager

- Reviews the report

### 2.5.3 Auxiliary System Engineer

- Compiles the specifications requirements for Tutuka Island Security Fence Anti-Tunnelling and Civil Works.
- Develops the all the required documents for this modification and arranges for a review session.
- Performs the functions of EDWL
- Support the Project Manager with regards to Civil and Mechanical related issues during the execution of the project

## 2.6 PROCESS FOR MONITORING

The primary process used for monitoring the application of this document is the Design Review Procedure (240-53113685) [3].

## 2.7 RELATED/SUPPORTING DOCUMENTS

- 15 ENG GEN 932 – Scope of Work for Tutuka Island Security Fence Anti-Tunnelling

## 3. WORKS INFORMATION FOR THE CONSTRUCTION OF AN ANTI-TUNNELLING SYSTEM

### 3.1 GENERAL

The following are the general requirements for the Island Security Fence Anti-Tunnelling at Tutuka PowerStation:-

The construction of the anti-tunnelling system will include all excavations. Extreme care must be taken so as to not damage the existing fence when excavating. All work is to be in accordance with SABS 1200 series

### 3.2 ANTI-TUNNELING SYSTEM

#### 3.2.1 Design Requirements

- The *Contractor* must supply the following approved civil designs:
  - Foundations and excavations

#### 3.2.2 Tutuka Island Security Fence Anti-tunnelling specifications

- The distance of the required anti-tunnelling system is approximately 4 km.

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- The fence must be cast into the concrete a minimum of 100mm.
- The concrete must be a minimum of 15MPa.
- Concrete cubes must be sent for testing to confirm the strength.
- The Contractor will also be responsible for supplying a quality control plan for the approval by the Employer.
- Anti-tunnelling designs to be reviewed and accepted by Eskom prior to commencement of any work as per [3].

### **3.3 GATES**

Two gates are to be designed, manufactured, supplied and installed at Tutuka power station. One gate is to be installed behind the medical station. The other gate is to be installed next to cooling tower one.

#### **3.3.1 Mesh**

##### **3.3.1.1 Wire**

The minimum requirements for the steel grade wire:

- Ultimate tensile strength: 500 MPa (prior to welding)
- Wire diameter: 4mm (+/-0.06mm)

##### **3.3.1.2 Panel**

The mesh shall be produced by electrical resistance welding at every line wire/cross wire intersection. The welded mesh panel shall have the following features:

- Dimensions
  - Panel height: Mesh height above ground level: 2.4m (+/- 1%)
  - Panel width: 3 to 3.5m (Standard panels)
  - Shorter lengths will be allowed for stepping purposes
  - The distance between the ground the bottom of the panel must be less than 20mm. The bottom of the panel must be secured with a steel bar that is fixed to the concrete foundation (see section 3.2 for concrete specs)
- Aperture:
  - Category two according to [2]. Thus, the aperture design must be such that it is difficult to cut and climb
- Welding shear strength: test to be conducted in accordance with SANS 23-4. The shear strength for any welded section shall not be less than 75% of the ultimate strength of the wire diameter under testing.
- Coatings:
  - Non-ferrous metallic coatings. Either Zinc (hot dip galvanizing) or ZN95Al5 (Galfan)

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- Minimum mass of Zinc alloy coating = 275 g/m<sup>2</sup> (SANS 10244 Part 2)
- Minimum mass of Zinc coating = 505 g/m<sup>2</sup> (SANS 121)
- Post galvanising polymeric coating to be added

### **3.3.1.3 Gates**

- Gates to be manufactured from either S275JR or S355JR grade steel according to BS EN 10025-2. The use of alternative steel grades must be accepted by Eskom.
- All metal to be hot dipped galvanised in accordance with SANS 121. Minimum coating thickness required is 75µm.
- All manufacturing process to be completed prior to hot dip galvanising.
- All openings that will result in water entrapment to be closed.
- Gate to be 5m wide sliding gate (the gate shall be motorised at a later stage)
- All rails and runners should be fitted for later motorization.
- All rails and concrete work for sliding gates to be done by the Contractor.
- Sweepers to be included on sliding gates
- All earthing connection points to form part of the pillar. Motorized gates are to be earthed in the open and closed position.
- All gate and rail designs to be reviewed by Eskom as per the Eskom Design review Procedure [3].

### **3.4 QUALITY CONTROL AND ASSURANCE**

- The Contractor shall produce and submit a method statement, project plan and quality plan to the Employer one week before work commences.
- The quality plan must indicate relevant hold and witness points to be agreed upon by the EDWL System Engineer.

### **3.5 PLANT LABELLING AND CONFIGURATION**

The Contractor shall manufacture and install labels according to the Tutuka AKZ Plant Labelling Guideline (240-62937990).

### **3.6 CONSTRAINTS ON HOW THE CONTRACTOR PROVIDES THE WORKS**

- The contractor must comply with the Speed limit on site of 40KM/H
- There are animals on site, so contractor must be very careful when driving on site.
- During rainy season in Standerton can flood, with the concrete work to be done this can cause delays.
- Damages to the fence installed will lead to penalty.
- To execute this job contractor must use local labour only.
- Around the Cooling towers most of the time it become wet, this might delay the excavation around the cooling towers.

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- Contractor will have to do Cable detection to detect ground services.

### 3.7 RESPONSIBILITY MATRIX

Responsibility Matrix	Contractor	Eskom
Detailed Designs & Drawings	X	
Excavation On the anti-tunnelling	X	
Concrete and cement	X	
Mixing and Casting of concrete	X	
Design Review and Acceptance		X
Health and Safety	X	X
Quality Control and Assurance	X	X
Signing of the works by Registered Professional Engineer	X	
Training	X	
System commissioning, testing and verification	X	

### 4. ACCEPTANCE

This document has been seen and accepted by:

Name	Designation
Kyle Enslin	Auxiliary System Engineer
Monyane Mokoena	Auxiliary Engineering Manager
Dakalo Nemangaya	Project Leader
Edwin Mudau	Project Manager
Soso Ntungwa	Project Leader
Karlheinz von Bentheim	Group Engineering Manager

### 5. REVISIONS

Date	Rev.	Compiler	Remarks
07 March 2019	0	Kyle Enslin	First Draft

### 6. DEVELOPMENT TEAM

The following people were involved in the development of this document:

- Kyle Enslin

### 7. ACKNOWLEDGEMENTS

- Nomkhosi Vilane

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