		REFERENCE	REV
TITLE	**STANDARD FOR MAINTENANCE OF SWITCHING YARDS, SUBSTATION YARDS AND TRANSMISSION SERVITUDES**	**CP_NISSP_002**	**0**
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		PAGE: **1**	OF **17**

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FOREWORD

This specification was prepared by the following work group members:

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INTRODUCTION

The need for a standard on the maintenance of switching yards, substation yards and transmission servitudes and clearance of foliage in close proximity to City Power transmission overhead lines, substations yards and switching yards has been identified. This is necessary order to address the problem of poor network performance due to interference of foliage, vandalised earthing, faulty isolators and faulty surge arrestors. Standardisation of switching yards, substation yards and transmission servitudes maintenance Contractor services specification has become vital to optimise contractor selection, performance appraisal and to normalise a price list for such services.

1 SCOPE

This document describes the minimum standards to be adhered to when maintaining switching yards, substation yards and Transmission servitudes.

2 NORMATIVE REFERENCES

The following documents contain provisions that, through reference in the text, constitute requirements of this standard. All standards and specifications are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the documents listed below.

CP_TSSTAN_033, Operating safety precaution standard

Occupational Health and Safety act 85 of 1993.

NEMA National Environmental Management Act 107 of 1998

NFA National Forest Act 84 of 1998

32-736 Bio Diversity Policy

32-815 Land and Biodiversity standard

Occupational Health and Safety Act 85 of 1993.

Informative

Commercial Timber Growers Guideline for: Maintenance and management agreement in forest plantation areas and servitude areas

ISO 14001: 2015 Environmental Management System

ISO 45000: 2018 Occupational Health and Safety Management

ISO 9001: 2015 Quality Management System

The Electrical Machinery Regulations, 2011 under Section 43 of the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993).

3 DEFINITIONS AND ABBREVIATIONS

3.1 **Substation yard**: a part of an electrical substation where high voltage lines are connected, switched, and transformed.

3.2 **Switching yard**: a substation without a transformer that functions at a single voltage level.

3.3 **Surge arrestor**: a protective device that limits a voltage on electrical equipment by diverting or discharging surge current.

3.4 **Earthing**: a system that provides a low resistance path for fault current to flow safely into the ground.

3.5 **Isolator**: is a mechanical switch used to isolate part of electrical circuit from the power supply for safety during maintenance and repair.

3.6 **Transmission Overhead Lines**: An aerial cable that consists of cores twisted together.

3.7 **Clearance space:** a space surrounding an overhead line which must be clear of foliage at all times.

3.8 **Inspection space:** a space beyond the clearance space that must be cleared to allow for anticipated foliage regrowth in between the clearing periods.

3.9 **Plantation:** Plantation of any trees planted and managed by commercial timber growers for commercial purpose

3.10 **Servitude:** City Power servitudes registered in the Deeds Office as well as rights obtained in terms of signed wayleave agreement.

3.11 **PPE:** Full Personal Protective Equipment

3.12 **HV:** Hight Voltage

3.13 **MV:** Medium Voltage

3.14 **PPM:** Planned Preventative Maintenance

3.15 **TPOs**: Tree protection orders

4 REQUIREMENTS

4.1. Accessing land

The City Power contractor shall as a minimum:

a) Always work under an issued City Power permit;

b) Remain on all existing roads and tracks and within the servitude area and not deviate there from;

c) Provide the pictures depicting the before and after;

d) The work area shall always be barricaded when working inside the yards;

e) The work area shall always have signage and barricading;

c) Keep City Power gates locked and leave property owners' gates as found;

d) Not interfere with the property owners' activities;

e) Provide appropriate mobile toilet facilities;

f) Not make fires;

g) Not litter;

h) Not drop fences;

i) Not collect firewood without consent; and

j) Not disturb or remove stones/rock from the site (e.g. archaeological and heritage sites);

k) On completion of the work, City Power official shall sign-off that work was completed to their satisfaction.

5 SAFETY

5.1 Safe working practices shall be followed at all times ensuring personal safety and safety to fellow workers and members of the public.

5.2 Full Personal Protective Equipment (PPE) shall be worn whenever maintenance work is performed and this shall include, but not be limited to, the following:

a) Safety shoes/boots;

b) Hard hat;

c) Overalls;

d) Full length leather gloves/gauntlets;

e) Protective eyewear (face shields);

f) Protective leg wear (leggings);

g) Safety belts (harness); and

h) Earmuffs.

5.3 Every situation shall be carefully assessed and correct procedures taken. These may include:

a) Using traffic cones and markers where operation may affect traffic;

b) Using danger tape to barricade/demarcate an area where debris may fall; and

c) Isolating the affected bare lines.

5.4 Only personnel who have received the relevant accredited training shall perform tree cutting and foliage clearance.

5.5 Transmission and foliage management will be notified of the intention to conduct foliage control and obtain approval prior to any work being undertaken.

5.6 Where work is to be carried out within safety clearance of MV/HV overhead lines, the line must be isolated, tested and earthed in accordance with CP_TSSTAN_033. Pylons may not be climbed in order to clear the foliage.

5.7 No work shall be carried out without the prior execution of a risk assessment. A record of the risk assessment shall be kept in the Health and Safety file or Health and Safety section of the project file.

5.8 First Aid and Facilities

i. The Principal Contractor shall ensure that a certified first aider/s are appointed and on site when work is executed.

ii. Taking into account the type of injuries that are likely to occur on site, the nature of the activities performed and the number of employees at such a work site, the Principal Contractor shall ensure that the first aid box contains the minimum requirements in accordance with the General Safety Regulations.

iii. First aid kits or boxes shall not contain anything besides material for first aid emergencies.

5.9 Hazardous Chemical Substances (Act 36 of 1947)

i. If the Principal Contractor's activities in performing the work, involve the handling of any hazardous chemicals or substances the Contractor shall implement such precautionary measures as may be required by the relevant legislation.

ii. The Principal Contractor must conduct an assessment to determine which employees are exposed to which hazardous chemical substances and shall provide the affected employees with the required training and personal protective equipment.

iii. Training shall also be provided by the Principal Contractor on the correct use, care and limitations of such personal protective equipment.

iv. In terms of Act 36 of 1947, only a registered pest control operator may apply herbicides on a commercial basis. All commercial applications of herbicides shall be carried out under the supervision of a registered pest control operator. The following was agreed with the Registrar in August 2005.

v. A daily register shall be kept of all relevant details of herbicide usage as stipulated in Act 36 of 1947 and a copy be given to City Power on completion of work.

5.10 Information and Training

i. The training of Principal Contractor employees in occupational health and safety matters relevant to their work is the responsibility of the Principal Contractor.

ii. The Principal Contractor shall ensure that his officials and employees are acquainted with all relevant provisions of the Occupational Health and Safety Act, the Regulations and the requirements of all relevant Environmental Legislation.

iii. The Principal Contractor shall provide his/her employees with information on potential health and safety hazards to which they may be exposed to in their workplace.

iv. The Principal Contractor shall instruct and train his/her employees in the measures available for prevention, control and protection against those hazards.

v. No person shall be employed in any work at a construction site unless that person has received the necessary information, instruction and training so as to be able to do the work competently and safely.

vi. The information, instruction and training shall be given in a language understood by the worker and written, oral, visual and participative approaches should be used to ensure that the worker has assimilated the material.

vii. The Principal Contractor shall provide his employees with all personal protective equipment and the appropriate tools required for the safe and proper execution of the work.

viii. The Principal Contractor shall, if requested to do so by the Procurement Department, demonstrate to the satisfaction of the Risk Management Department, that his employees and any sub-contractors have completed site and job orientation and any other qualifications and safety training that may be required by City Power.

ix. The responsible official shall ensure that the Principal Contractor and his staff undergo compulsory on site safety induction prior to commencing work on City Power work sites.

x. Symbolic Safety Signs: The Principal Contractor shall display all the necessary health and safety warning signs in accordance with the identified hazards for the applicable work site. (General Administration Regulation 13)

xi. Communication: The Principal Contractor shall have a system in place to ensure the immediate communication to his/her employees and the on-site application, of any new Legislation, Regulations or relevant City Power Standard that may come into effect during the course of the contract.

5.11 Reporting of incidents and accidents

i. Incidents, accidents and diseases shall be reported to the relevant authorities as stipulated in the Occupational Health and Safety Act, the Compensation for Occupational Injuries and Diseases Act and the various Environmental Legislation.

ii. These incidents shall also be reported to the official responsible within 24 hours after the incident, who will be responsible for reporting it to the relevant City Power Risk Manager.

iii. The Principal Contractor shall collect all safety-related statistics and shall report it to the City Power responsible official at the end of each month.

5.12 Investigations of incidents and accidents

i. All incidents and accidents shall be investigated as stipulated in the Occupational Health and Safety Act.

ii. Thereafter, corrective actions and recommendations agreed upon shall be followed up on to assess the effectiveness of the remedial measures taken.

iii. Damage Incidents: All damage to City Power or Contractor buildings, structures, vehicles equipment and the environment shall be reported to the City Power responsible official and investigated promptly by the Contractor to ensure that action is taken to minimize possible production delays.

iv. Monthly Incident/Accident Statistical Information Reports: At the end of each month the Principal Contractor on site shall submit the following information to the responsible official and forward a copy to the relevant City Power Risk Co-coordinator/Practitioner.

5.13 Injury types

i. The number of fatal incidents.

ii. The number of diagnosed and reported occupational diseases.

iii. The number of disabling injuries.

iv. The number of medical incidents.

v. The number of first aid incidents

5.14 Incident types

i. The number of electrical contact incidents.

ii. The number of public incidents.

iii. The number of vehicle incidents.

iv. The number of environmental incidents.

v. The number of damage incidents.

vi. The number of near-miss incidents.

vii. The Principal Contractor shall, briefly, provide the relevant details for each incident reported monthly.

The Identification of Occupational Health and Safety Hazards: The Principal Contractor shall, before proceeding with work, visit and inspect the site and shall establish whether there are any additional hazards to the health and safety of persons involved, in any work, which is to be performed there. The Principal Contractor shall report any additional hazards identified to the Team Leader.

Each person working on a site or visiting a site, and the surrounding community shall be made aware of the dangers likely to arise from operations at the site and the precautions to be observed to avoid or minimise those dangers. The necessary signage shall be posted at all times.

On Site Risk Assessments: A risk assessment shall be conducted in accordance with Regulation 7 of the Construction Regulations.

An Onsite toolbox talk including a risk assessment shall be conducted prior to the commencement of work. The team leader, after conducting pre-task planning and after facilitating the onsite risk assessment shall share all the tasks at hand, the identified risks and control measures with all his team members before commencing a specific task. This shall be done to ensure common understanding of the tasks, risks and control measures required.

6 INSPECTION AND MAINTANANCE AT SUBSTATIONS YARDS AND SWITCHING YARDS

6.1 General

6.1.1 The service provider shall provide a full Planned Preventative Maintenance (PPM) horticulture service across the Site. This shall include, but not be limited to:

6.1.1.1 Shrub uprooting;

6.1.1.2 Hedge cutting;

6.1.1.3 Tree uprooting;

6.1.1.4 Lawn care including mowing and edging;

6.1.1.5 Weeding and proactive weed control;

6.1.1.6 Weed control with chemicals i.e. biodegradable and environmental friendly.

6.1.2 The service provider shall provide a comprehensive maintenance service across the Substations and inside the switching yards. This shall include but not be limited to:

6.1.2.1 Roads and pathways within the substations;

6.1.2.2 Boundary walls and fences;

6.1.2.3 Lawns, open areas (including rough grass);

6.1.2.4 Tree protection orders (TPOs) if applicable;

6.1.2.5 Maintenance of stones in the switching yards;

6.1.2.6 Removal of weed inside switching yards and paving using environmentally friendly chemical as prescribed on 5.9 above;

6.1.2.7 Painting of steel structures inside the yards;

6.1.2.8 Repairing or maintenance of HV Links and surge arrestors inside the Switching yards; and

6.1.2.9 Maintenance of earthing and earth integrity test.

6.1.3 The Service provider shall include the supply of materials and consumables for the proper execution of all work,

6.1.3.1 Deep valleys and environmentally sensitive areas that restrict vehicle access, or legally protected areas, shall not be cleared of foliage provided that the foliage poses no threat to the safe operation and reliability of the substation.

6.1.3.2 Trees, shrubs, grass, natural features and topsoil, which are not removed during the foliage control operations, shall be protected from damage during operation of the substation.

6.1.3.3 It shall be ascertained from the property owners concerned whether they wish to retain the cut foliage. If not, it shall be removed or disposed of in an appropriate manner to the satisfaction of the owner. Burning shall not be permitted under any circumstance.

7 INSPECTIONS AND MAINTAINANCE OF OVERHEAD LINES

All overhead lines shall be inspected in accordance with the relevant maintenance planning strategy. Any foliage clearance that needs to be done shall be reported back to the responsible Maintenance team leader who in turn shall generate a work order for the work to be performed.

Should any person, whether a City Power employee or a member of the public, identify a line/circuit that requires urgent foliage clearing, he/she shall submit the information (pole number, street address, etc.) to the Maintenance team leader or to the appropriate City Power area depot so that immediate corrective action can be taken.

8 CLEARANCE SPACE DIMENSIONS

8.1 General

All foliage management work shall comply with all relevant legislation.

8.2 Overhead line clearance space dimensions are associated with the following factors (see Table 1):

a) Operating voltage

The line voltage influences the potential for electrical discharge. The higher the voltage, the greater the potential and hence the need for a greater clearance space.

b) Overhead line construction

The various configurations and constructions of conductor (bare or insulated) are significant factors for clearance dimensions.

c) Span length

Sag is directly proportional to span length, hence mid span vertical clearances need to be greater. Overhead lines also move laterally in the wind which means that the foliage horizontal clearance dimensions should be greater along the mid-span section (2/3 of the span length) than at the supporting pole structure itself [refer to Fig 1(b)].

All the clearance dimensions given in Tables 1 and 2 account for sag and wind sway of the conductors. The anticipated “whip” of the trees in high winds is also taken into account.

Conductor Type and Voltage	Clearance at pole to nearest conductor (metres)		Clearance along middle 2/3 of span to nearest conductor in rest position (meters)	
	Urban	Bushfire Risk Area	Urban	Bushfire Risk Area & Urban Spans > 100m
>22 kV to 66 kV Bare Conductor	2.0	2.0	3.0	4.0 #
> 66 kV to 88 kV Bare Conductor	3.0	3.0	4.0	5.0 #
> 88 kV to 275kV Bare Conductor	4.0	4.0	5.0	5.0 #
Around supports such as poles (all voltages)	2.0			
Around stay wires (all voltages)	2.0			

Table 1: Foliage Trimming – Minimum Clearances

Notes for Table 1:

Trim any foliage which is encroaching within the clearance envelope or which will encroach within the clearance envelope during the growing/inspection cycle (typically one year).

Trim or remove foliage where required to facilitate access to support structures for construction, maintenance and operation of the network.

9 POWER LINES

a) Foliage safety clearances for power lines must be in accordance with Table 2, and the relevant requirements indicated in the figures and notes of this section.

b) Where it is deemed necessary, taking into consideration the strategic importance of the tower line, grass cutting and reed management shall be performed. Tower line servitudes that require grass cutting and reed management shall be identified as a part of the tower line routine inspection.

Construction	**Span length (metres)**	**Clearance at tower to nearest conductor (metres)**	**Clearance along middle 2/3 of span to nearest conductor in rest position (metres)**
Feeder conductors and earth wires	<200	6.0	6.0
	200 – 400	6.0	7.0
	>400	6.0	8.0
Steel Towers		11.0 m from centre line of tower	

Table 2: Foliage Safety Clearances for Tower Lines

Notes for Table 2

1. All species under the power lines shall be cut.

2. Trim any foliage which is encroaching within the clearance envelope or will encroach within the growing/inspection cycle (typically one year).

3. remove foliage where required to facilitate access to support structures for construction, maintenance and operation of the network.

10 EQUIPMENT AND TOOLS

10.1 Hand Tools and Safeguarding of Machinery. Machinery and equipment should:

i. Be of good design and construction, taking into account, as far as possible, health and safety and ergonomic principles;

ii. Be maintained in good working order;

iii. Be operated only by workers who have been authorized and given appropriate training;

iv. Be provided with protective safety devices including guards, shields, earths, tools, barricades, vehicles, chains, ropes, and all relevant safety signs.

v. As far as practicable, safe operating procedures established and used for all machinery and equipment.

vi. Operators of machinery and equipment shall not be distracted while work is in progress.

vii. Machinery and equipment shall be switched off when not in use and isolated before any major adjustment, cleaning or maintenance is done.

viii. Where trailing cables or hose pipes are used they shall be kept as short as practicable and not allowed to create a safety hazard.

ix. The Principal Contractor shall be responsible for inspecting and maintaining all his own tools, equipment and personal protective equipment.

x. The Principal Contractor shall enforce the correct application, maintenance and use of the equipment and tools.

xi. The tools used shall be well maintained and routinely checked to ensure safe operation.

11 QUALITY MANAGEMENT

A quality management system shall be set up in order to ensure the quality during installation, removal, transportation, and disposal. Guidance on the requirements for a quality management system may be found in the following standards: ISO 9001:2015. The details shall be subject to an agreement between the purchaser and supplier.

12 HEALTH AND SAFETY

A health and safety plan shall be set up in order to ensure proper management and compliance during installation, removal, transportation, and disposal. Guidance on the requirements of a health and safety plan shall be found in ISO 45001:2018 standards. The details shall be subject to an agreement between City Power and the Supplier.

13 ENVIRONMENTAL MANAGEMENT

An environmental management plan shall be set up in order to ensure the proper environmental management and compliance is adhered to during installation, removal, transportation, and disposal. Guidance on the requirements for an environmental management system shall be found in ISO 14001:2015 standards. The details shall be subject to an agreement between City Power and the Supplier. This is to ensure that the asset created conforms to environmental standards and City Power SHERQ Policy.

Annex A - Bibliography

NS 179: Energy Australia Standard for vegetation Safety Clearances

Durban Metro Electricity Code of Practice: vegetation Clearance and Management

SCSASAAZ9: Eskom Distribution Standard for Clearing and Maintenance of Servitude Routes

EPC 32-247 Environmental Procedure: Procedure for vegetation clearance and maintenance within overhead power lines servitudes and on Eskom owned land

NRS 089-3-1 Maintenance of Electricity Networks Part 3: Substations Section 1: General

41-927 Contract Specification for vegetation Management Services on Eskom Networks

Annex B - Revision information

DATE	REV. NO.	NOTES
May 2025	0	First issue

BILL OF QUANTITY

ITEM	DESCRIPTION	UNIT OF MEASURE	ESTIMATED QUANTITY	UNIT PRICE	TOTAL PRICE
1	**SUPPLY AND INSTALL**				
1.1	**Transmission switching yard**				
	Bracing main members of gantries	Kg	1		
	Base plates	Kg	1		
	Switch yards/station stones	Kg	1		
	Biodegradable herbicide	kg	1		
	Earthing conductor	m	1		
	6.6kV surge arrestor	each	1		
	22kV surge arrestor	each	1		
	33kV surge arrestor	each	1		
	44kV surge arrestor	each	1		
	88kV surge arrestor	each	1		
	132kV surge arrestor	each	1		
	275kV surge arrestor	each	1		
	Isolator – male knife contact	each	1		
	Isolator – female knife contact	each	1		
	Isolator arcing horn	each	1		
	Link box - electrical	each	1		
	Link box - manual	each	1		
	High Voltage Bird spikes	each	1		
	Concrete slabs	each	1		
1.2	**Anti-Vandalism nuts and bolts-** Break away nuts				
	16mm	each	1		
	20mm	each	1		
	24mm	each	1		
2	**Miscellaneous**				

	Uprooting tree under the line	each	1		
	Uprooting tree inside the switching yard	each	1		
	Foliage removal	M^2	1		
	Greasing of links and link box	each	1		
	Galvanizing of structure	litre	1		
	Colour coding of phases	each	1		
3	**Emergency call out fee**				
	During normal working hours	Per event	1		
	After normal working hours	Per event	1		
4	**Prime cost sum for special material**	each	1		