10.6 Vegetation Management Work

Purpose
This instruction outlines the minimum requirements for all Horizon Power Workers who undertake Vegetation Management Work.

Scope
The scope of this instruction is to inform all Horizon Power Workers, and including Workers operating, servicing, and/or maintaining (MPS) Micro Power Systems electrical equipment (inclusive of all generating methodologies) of the key safety requirements when undertaking vegetation control near live or de-energised power lines and assets.

Safety
Before commencement of work, a risk assessment must be carried out using the Risk Analysis Procedure (OSH-3.6-1-02), to identify and document the hazards and risks associated with the task and ensure appropriate control measures are implemented.

It is important that, appropriate control measures must be identified, documented and implemented in order to control hazards to As Low as Reasonable Practicable (ALARP).

Personal Protective Equipment (PPE)
Vegetation management work near live or de-energised overhead power lines, all vegetation management workers must wear the appropriate PPE.

Training
All Horizon Power workers involved in vegetation control must complete and meet the outcomes of Horizon Power approved training courses in vegetation management.

These courses are designed for people whose work comprises the inspection and pruning of vegetation near overhead power lines.

Training must be competency based, aligned to the Electricity Supply Industry National Training Package standards and documented for individuals.

All persons who undertake Vegetation Management Work training must be monitored during the training program to assess their understanding of the work processes and to assess their ability to perform the work task responsibly with maturity, concentration and the ability to work within a team.

The training for vegetation management workers must be provided by a Registered Training Organisation (RTO) and must include the mandatory units:

- Construction Site Safety Awareness (CPCCOHS2001A)
- Basic Emergency Life Support (HLTAID002)
- Apply OHS Regulations and Codes of Practice (UEENEEE101A)
- Comply with Sustainable, Environmental and Incidental Response Policies and Procedures (UETTDREL13A)
- Working Safely Near Live Electrical Apparatus as a Non-Electrical Worker (UETTDREL14A)
- Plan the Removal of Vegetation up to Vegetation Exclusions Zone Near Live Electrical Apparatus (UETTDRVC23A)
Field Instruction

- Monitor Safety compliance of Vegetation Control work in the ESI Environment (UETTDRVC27A)

- Perform EWP Rescue Where the Safety Observer will be at a work site where an EWP is being used (UETTDRRF03B)

For the Low Voltage (LV) Vegetation worker, they must provide evidence of have being assessed as a competent safety observer and also be assessed as competent in the following mandatory units:

- Apply First Aid (HLTFA301C)
- Apply Pruning Techniques to Vegetation Control Near Live Electrical Apparatus (UETTDRVC33A)
- Cut Vegetation at Ground Level Near Live Electrical Apparatus (UETTDRVC26A)
- Use EWP to Cut Vegetation Above Ground Level Near Live Electrical Apparatus – LV Component (UETTDRVC25A)
- Undertake Release and Rescue from a Tree Near Live Electrical Apparatus (UETTDRVC34A)
- Use Climbing Techniques to Cut Vegetation Above Ground Level Near Live Electrical Apparatus – LV Component (UETTDRVC21A)
- Undertake Standard Climbing Techniques (AHCARB204A)

High Voltage (HV) Vegetation Management workers must also provide evidence of having completed 150 hours of vegetation management near live power lines as an LV Vegetation Management worker and be assessed as competent in the following mandatory units:

- Use EWP to Cut Vegetation Above Ground Level Near Live Electrical Apparatus – HV Component (UETTDRVC25A)

  OR

- Use Climbing Techniques to Cut Vegetation Above Ground Near Live Electrical Apparatus – HV Component (UETTDRVC21A)

The training courses will also provide knowledge and skills for not only tree pruning but the reasons for doing so and consequences of not complying.

Contractors who deal with members of the public must undertake appropriate training in public relations and conflict resolution, as approved by Horizon Power.
Minimum Work Crew Size

The minimum number of workers required on-site for Vegetation Management near live or de-energised overhead power lines is as follows:

<table>
<thead>
<tr>
<th>Voltage</th>
<th>EWP</th>
<th>Ground</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contractors 1 day:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LV: Tree Pruning Near</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Power Lines Course</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HV:</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Contractors 3 day:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LV: High Voltage Vegetation Work Course</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>HV:</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Horizon Power Qualified Linesperson</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LV</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>HV</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>All Ground Work</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Ground Operated Tree Cutting Equipment</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>

All workers who are required to operate a EWP must hold a High Risk Work Licence.

The ground worker must have attended the one day EWP Emergency Operations Course to operate the EWP in case of an emergency, or hold a EWP High Risk Work Licence.

- Trainee(s) may assist a vegetation management worker but under direct supervision of that vegetation management worker
- Trainee(s) may assist a ground worker, but must not be used as the sole ground worker.

Safety Observer

A trained Safety Observer must be assigned at all work sites by the recipient in charge, and specifically instructed that their sole function is to ensure that all persons, tools, plant and equipment remain outside the minimum safe approach distance.

The Safety Observer must:

- Ensure all persons, tools, plant, equipment remain outside the SAD and GAD unless performing a rescue using approved procedures
- Ensure all hazards and control methods are documented and being managed
- Must be in position to observe work at all times, and change position if required
- Only observe one work activity at a time
- More than one safety observer will be required for multiple crews
- Must immediately inform workers of unsafe or dangerous situations
- Have constant and effective means of communications at all times
Field Instruction

- Not perform any other task while observing workers aloft
- Have the authority to suspend all work if dangerous, changing position or having to leave the work site
- Must be trained, authorised and physically capable to undertake a rescue if required

Note: A trained Safety Observer can be a Horizon Power Worker who has attended:
- The one day Tree Pruning near Power Lines
- The three day High Voltage Vegetation Work course
- The half-day Working Safely Near Overhead Power Lines

EWP Requirements

- EWP’s must be electrically rated, tested and certified for use by the manufacturer for the voltage being worked on
- Only used on or near overhead power lines energised at a voltage equal to or less than the rating of the EWP
- When using an EWP in the vicinity of an overhead power line that comprises of High Voltage and Low Voltage conductors, the EWP must be rated for the highest voltage
- EWP’s must be electrically tested every 6 months, pass that test and the electrical test sticker placed in the cab of the vehicle for auditing purposes
- EWP’s working near live overhead electrical apparatus must be fitted with an Emergency Descent Device (EDD). Two EDD’s for a two-person basket and one for a single person basket
- Each EDD must be fitted with sufficient rope to reach the ground from the maximum elevated position
- The bollards must be stamped with SWL and the attachment points onto the basket must withstand a force of 15kN without failure
- Any EWP that has not been tested and has no or out-of-date test certificate / sticker, must be classified as uninsulated and the safe approach distances and vegetation clearances in Tables 3 & 4 must apply
- When cutting branches from trees, they must not be roped to any part of the basket or boom of the EWP
- EWP’s must not be operated in constant wind velocities above 45 km/h

EWP and Vehicle Earthing Requirements

All EWP’s and Cranes involved in Vegetation Management Work near live or de-energised High Voltage overhead power lines must be earthed using tested, rated and tagged portable vehicle earthing leads before the commencement of work, as per Field Instruction 2.7 Safety Requirements When Working from an EWP and Field Instruction 2.13 Vehicle and Plant Earthing Requirements.
Insulated Tools and Equipment

All High Voltage insulated tools and equipment must be:

- Designed, tested and certified for use by the manufacturer for work near live overhead lines
- Rated for the voltage of the relevant overhead power line
- Tested at intervals of not more than 6 months. This testing interval should be reduced (tested every 3 months) for tools & equipment with high usage or when used in a dirty environment
- Display an expiry test date 6 months forward from the date tested. The expiry date must be clearly visible and consist of the month and the year
- Withdrawn from service if the test date has expired and not re-used until it is re-tested and correctly dated
- Visually inspected and cleaned each day prior to use

Prohibited Work Methods

The following work methods are prohibited:

- While standing on a metal ladder
- Working near High Voltage conductors or working on vegetation that is near High Voltage conductors while standing on a wood or fibreglass ladder
- Working between phases or between un-insulated Low and High Voltage conductors
- Working when an electrical storm is observed in the vicinity of the work site
- Working when it is raining or in mist or fog
- Working when there is excessive wind such that the safe approach distances and vegetation clearances cannot be maintained

Vicinity Authority Permit

A Vicinity Authority permit must be issued where any person, tool, equipment or vehicle or any part of the vegetation is within or may come within the Danger Zone as per the Western Australian Occupational Safety and Health Regulations 1996 s3.64 “Restrictions on Working in the Vicinity of Overhead Power Lines”.

Vegetation management work must not commence near live or de-energised High Voltage overhead power lines until:

- The automatic reclosing device (AR) controlling the High Voltage overhead power line where the vegetation management work is to be carried out, is disabled and switched to single shot manually or by HPCC
- A Vicinity Authority permit is issued to the Recipient in Charge

A Recipient in Charge must be on-site to receive and remain on-site to be in charge of any permits issued.
Field Instruction

The Recipient in Charge must ensure that all members of the vegetation management work team have read and understood the conditions of the vicinity authority permit.

Each vegetation management work team using a vicinity authority must establish a reliable on-site two-way communications link with and approved by the network operator/issuing officer, the link must be continuously available.

**Note**: Contract vegetation workers also require a VA when working near live or de-energised LV conductors.

**Instruction**

**General Work Requirements**

Vegetation must be cut, felled or pruned using controlled movements. The vegetation can be controlled by hand, controlled by hand using insulated stick with gripping tool or cut so that it will fall away from the power line.

Where such control is not possible, the vegetation must be supported or controlled by ropes, or cut into small pieces by feather cutting, this prevents damage to or shorting out of the live conductors.

Care must be taken when removing vegetation that is touching or between low voltage conductors to ensure that the low voltage conductors do not move towards each other.

Vegetation Management Contractors must notify Horizon Power:

- Before commencing work near live or de-energised overhead power lines where the clearances shown in Tables 2, 3, 4, and 5 cannot be maintained
- Where there is a risk of the vegetation coming in contact with High Voltage lines either before or during vegetation management work, where the work practices cannot be amended to remove that risk
- Immediately if any fault/damage occurs to Horizon Power property
- All incidents resulting in Workers Compensation Claims or public liability claims
- The Recipient in Charge must ensure that all the vegetation management work team understand and comply with all the requirements of this instruction and any permit issued
- Vegetation Management Contractors must ensure at least two of their personnel at each work site are trained and hold a current Basic First Aid certificate

**Safe Approach Distance and Vegetation Clearances**

The safe approach distance (SAD) and vegetation clearances used for vegetation management work near live or de-energised overhead power lines are based on the danger zone principle. This principle defines an area around the electrical apparatus into which no part of an untrained person, mobile plant or equipment may encroach.

The SAD and vegetation clearances shown in Tables 1 – 5 are the minimum safe working requirements for Vegetation Management Work near live or de-energised overhead power lines for all classes of persons.

- Vegetation clearance distances for above and beside live or de-energised HV have been derived from the maximum switching surge distance plus an inadvertent movement allowance of 300 mm
Field Instruction

- Vegetation clearance distances for below beside live or de-energised HV have been derived from the maximum switching surge distance plus an inadvertent movement allowance of 200 mm

- Insulated tool and stick distances have been derived from the maximum switching surge distance plus an inadvertent movement allowance of 300mm for HV Distribution lines and 400mm for HV Transmission lines

Ordinary & Ground Workers Persons

Ordinary persons are able to undertake tree cutting away from overhead live power lines providing they do not encroach the Safe Approach Distance (SAD) as outlined in the (Table 1 below)

Ordinary and ground workers persons are not permitted to:

- Operate mobile plant above overhead power lines
- Cut any vegetation which is vertically above overhead power lines

Table 1 - SAD Vegetation Clearances for Ordinary & Ground Workers Persons

<table>
<thead>
<tr>
<th>Phase to Phase Voltage (ac)</th>
<th>Persons, Tools &amp; Equipment (mm)</th>
<th>Mobile Plant (mm)</th>
<th>Cannot Cut Vegetation Closer Than (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LV Insulated</td>
<td>3000</td>
<td>3000</td>
<td>500</td>
</tr>
<tr>
<td>LV Bare</td>
<td>3000</td>
<td>3000</td>
<td>1000</td>
</tr>
<tr>
<td>1000 – 33,000</td>
<td>3000</td>
<td>3000</td>
<td>3000</td>
</tr>
<tr>
<td>66,000 – 132,000</td>
<td>6000</td>
<td>6000</td>
<td>3000</td>
</tr>
<tr>
<td>Above 132,000</td>
<td>6000</td>
<td>6000</td>
<td>6000</td>
</tr>
</tbody>
</table>

Note: Ground workers are considered as Ordinary Persons

Authorised and Instructed Vegetation Management Workers

Vegetation Management Workers who perform vegetation management work from within the tree or from the ground near live overhead power lines, must be trained, authorised and instructed and must maintain the SAD in table 2 below.

Tree climbers who perform vegetation management must not climb where any part of the tree or part that may move during their work activity could come within the SAD in column D in table 2 below.

Tree climbers must be attached at all times using a climbing rope, which must be inspected for damage before use.

The tree climber must also position themselves in such a way that they cannot fall or swing and contact live overhead conductors or apparatus while performing work activity.

A Safety Observer must be used to warn the tree climber of any possible SAD encroachment or any other hazards, and enable a rescue if required.
### Table 2: SAD and Vegetation Clearances for Vegetation Management Workers

<table>
<thead>
<tr>
<th>Phase to Phase Voltage (ac)</th>
<th>Vegetation Management Worker / Climber (mm) A</th>
<th>Insulated Tool (mm) B</th>
<th>Uninsulated Tool (mm) C</th>
<th>Vegetation Below and Beside Overhead Power Line (mm) D</th>
<th>Vegetation Overhanging Overhead Power Line E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulated LV</td>
<td>200</td>
<td>200</td>
<td>No Clearance</td>
<td>No Clearance</td>
<td></td>
</tr>
<tr>
<td>Bare LV</td>
<td>1000</td>
<td>200</td>
<td>1000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6,600</td>
<td>1200</td>
<td>700</td>
<td>1200</td>
<td>700</td>
<td>Not Permitted</td>
</tr>
<tr>
<td>11,000</td>
<td>1200</td>
<td>700</td>
<td>1200</td>
<td>700</td>
<td></td>
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<td>700</td>
<td>1200</td>
<td>700</td>
<td></td>
</tr>
<tr>
<td>33,000</td>
<td>1200</td>
<td>700</td>
<td>1200</td>
<td>700</td>
<td></td>
</tr>
<tr>
<td>66,000</td>
<td>1400</td>
<td>1000</td>
<td>1400</td>
<td>1000</td>
<td></td>
</tr>
<tr>
<td>132,000</td>
<td>1800</td>
<td>1200</td>
<td>1800</td>
<td>1200</td>
<td></td>
</tr>
</tbody>
</table>

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Figure 1: SAD for Vegetation Workers (refer to Table 2)
Uninsulated Mobile Plant, Tools and Equipment

Table 3: SAD and Vegetation Clearances for Vegetation Management Workers using Uninsulated Mobile Plant and Uninsulated Tools and Equipment

<table>
<thead>
<tr>
<th>Phase to Phase Voltage (ac)</th>
<th>Uninsulated Mobile Plant (mm) A</th>
<th>Vegetation Management Worker (mm) B</th>
<th>Uninsulated Tool (mm) C</th>
<th>Vegetation Below and Beside Power Line (mm) D</th>
<th>Vegetation Overhanging the Overhead Power Line (mm) E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulated LV</td>
<td>200</td>
<td>200</td>
<td>200</td>
<td>No Clearance</td>
<td>No Clearance</td>
</tr>
<tr>
<td>Bare LV</td>
<td>1000</td>
<td>1000</td>
<td>1000</td>
<td>Physical Clearance</td>
<td>Not Permitted</td>
</tr>
<tr>
<td>6,600</td>
<td>1200</td>
<td>1200</td>
<td>1200</td>
<td>700</td>
<td></td>
</tr>
<tr>
<td>11,000</td>
<td>1200</td>
<td>1200</td>
<td>1200</td>
<td>700</td>
<td></td>
</tr>
<tr>
<td>22,000</td>
<td>1200</td>
<td>1200</td>
<td>1200</td>
<td>700</td>
<td></td>
</tr>
<tr>
<td>33,000</td>
<td>1200</td>
<td>1200</td>
<td>1200</td>
<td>700</td>
<td></td>
</tr>
<tr>
<td>66,000</td>
<td>1400</td>
<td>1400</td>
<td>1400</td>
<td>1000</td>
<td></td>
</tr>
<tr>
<td>132,000</td>
<td>1800</td>
<td>1800</td>
<td>1800</td>
<td>1200</td>
<td></td>
</tr>
</tbody>
</table>

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Figure 2: SAD for Uninsulated Mobile Plant, Tools and Equipment (refer to Table 3)
### Uninsulated Mobile Plant using Insulated Tools and Equipment

**Table 4: SAD and Vegetation Clearances for Vegetation Management Workers Using Uninsulated Mobile Plant with Insulated Tools and Equipment**

<table>
<thead>
<tr>
<th>Phase to Phase Voltage (ac)</th>
<th>Uninsulated Mobile Plant (mm)</th>
<th>Vegetation Management Worker (mm)</th>
<th>Insulated Tool (mm)</th>
<th>Vegetation Below and Beside Power Line (mm)</th>
<th>Vegetation Overhanging the Overhead Power Line (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>Insulated LV</td>
<td>200</td>
<td>200</td>
<td>No Clearance</td>
<td>No Clearance</td>
<td>No Clearance</td>
</tr>
<tr>
<td>Bare LV</td>
<td>1000</td>
<td>1000</td>
<td>Physical Clearance</td>
<td>No Clearance</td>
<td>Not Permitted</td>
</tr>
<tr>
<td>6,600</td>
<td>1200</td>
<td>1200</td>
<td>300</td>
<td>300</td>
<td></td>
</tr>
<tr>
<td>11,000</td>
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<td>1200</td>
<td>300</td>
<td>300</td>
<td></td>
</tr>
<tr>
<td>22,000</td>
<td>1200</td>
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<td>132,000</td>
<td>1800</td>
<td>1800</td>
<td>800</td>
<td>800</td>
<td></td>
</tr>
</tbody>
</table>

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**Figure 3: SAD for Uninsulated Mobile Plant with Insulated Tools and Equipment (refer to Table 4)**
Field Instruction

Insulated Mobile Plant and Insulated Tools and Equipment

Table 5: SAD and Vegetation Clearances for Vegetation Management Workers Using Insulated Mobile Plant, Tools and Equipment

<table>
<thead>
<tr>
<th>Phase to Phase Voltage (ac)</th>
<th>Insulated Mobile Plant (mm) A</th>
<th>Vegetation Management Worker (mm) B and GAD</th>
<th>Insulated Tool (mm) C</th>
<th>Vegetation Below and Beside Power Line (mm) D</th>
<th>Vegetation Overhanging the Overhead Power Line (mm) E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulated LV</td>
<td>Physical Clearance 200</td>
<td>No Clearance</td>
<td>No Clearance</td>
<td>No Clearance</td>
<td>Physical Clearance</td>
</tr>
<tr>
<td>Bare LV</td>
<td>Physical Clearance 700</td>
<td>No Clearance</td>
<td>No Clearance</td>
<td>No Clearance</td>
<td>Physical Clearance</td>
</tr>
<tr>
<td>6,600</td>
<td>700</td>
<td>1000</td>
<td>300</td>
<td>100</td>
<td>700</td>
</tr>
<tr>
<td>11,000</td>
<td>700</td>
<td>1000</td>
<td>300</td>
<td>100</td>
<td>700</td>
</tr>
<tr>
<td>22,000</td>
<td>700</td>
<td>1000</td>
<td>350</td>
<td>150</td>
<td>700</td>
</tr>
<tr>
<td>33,000</td>
<td>700</td>
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<td>400</td>
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<td>66,000</td>
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<td>600</td>
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<tr>
<td>132,000</td>
<td>1200</td>
<td>1400</td>
<td>800</td>
<td>800</td>
<td>1200</td>
</tr>
</tbody>
</table>

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Figure 4: SAD for Insulated Mobile Plant, Tools and Equipment (refer to Table 5)

Note: Keep falling materials clear of vegetation clearing exclusion zone.
Field Instruction

High Voltage Live Work, G&B and High Voltage Insulated Stick

High Voltage Live Work, G&B and High Voltage Insulated Stick are specialised work techniques used by trained linespersons for working on live uninsulated high voltage conductors.

High Voltage Live Work personnel carrying out vegetation management work using high voltage insulated stick work procedures are authorised to work within the limit of approach and vegetation clearances as shown in Table 5.

High Voltage Live Work personnel will use work techniques, such as moving live high voltage conductors or vegetation to obtain the necessary vegetation clearances. These work techniques are not available to personnel who have successfully completed the one-day Tree Pruning Near Power Lines, or the three-day High Voltage Vegetation Work course.

Physical clearance must be maintained between the vegetation and the High Voltage conductor at all times.

The minimum number of workers required onsite when carrying out High Voltage Vegetation Management Work using High Voltage Insulated stick work procedures is three (3), two (2) trained High Voltage Live Work and one (1) trained High Voltage Live Work ground worker.

A safety observer must be positioned before commencement of the work and in a position that gives an unobstructed view of the distances between any part of a person, tool, plant or equipment and the conductor of the power line.

The safety observer must be equipped with a device that allows instant contact with the personnel in the EWP basket e.g. Compressed Air Horn, Pea Whistle or a walkie-talkie type voice activated two way radio.

Vegetation management work must not commence near live or de-energised High Voltage overhead power line until:

- The automatic reclosing device (AR) controlling the high voltage overhead power line near where the vegetation management work is to be carried must be set to one shot, either manually or by HPCC
- A Vicinity Authority (VA) permit has been issued to the Recipient In Charge

Special Insulated Ground Operated Plant

Specialised insulated plant is permitted to operate from the ground only if the operator is trained, authorised and competent. The operator must be totally enclosed within the plant itself or can remotely operate the plant and must maintain the SAD at all times as per (Table 5 Column C). In either situation, a Safety Observer is required and all workers must maintain the minimum ground approach distance (GAD) from the plant as per (Table 5 Column B) and outside of the danger zone and drop zone.
References

- Occupational Safety & Heath Act 1984
- Occupational Safety & Health Regulations 1996
- SHMS OSH-3.6-1-02 Job Risk Analysis (JRA) Procedure
- SHMS OSH-3.6-1-26 Personal Protective Equipment
- SHMS OSH-3.6-1-11 Elevating Work Platform Procedure
- Electrical Safety Standards
- Switching Process and Rules
- High Voltage Live Work Manual
- Vegetation Management Manual
- Code of Practice for Vegetation Control Work Near Live Power Lines (Energy Safety July 2012 & ENA)
- Field Instruction 2.7 Safety Requirements when Working from an EWP
- Field Instruction 2.6 Worksite Clothing / Personal Protective Equipment Requirements
- Field Instruction 2.13 Vehicle and Plant Earthing Requirements
- Field Instruction 2.17 Safe Approach Distances
- Field Instruction 2.23 Job Hazard and Risk Management (JRA)
- Field Instruction 2.27 Safety Observer Role
- Field Instruction 8.21 System Access Permits
- Field Instruction 8.22 Switching Activities