

## Maintenance Plan - Easements and Access Tracks

### Summary

This plan applies to the maintenance of TransGrid's transmission line easements and access tracks.

### Document Control

<b>Revision no:</b>	8	<b>HP TRIM no:</b>	D2003/2398	<b>Approval/ Reviewed date:</b>	28/10/16
		<b>Document no:</b>	GM AS L1 002		
<b>Business function:</b>	Manage Strategic Asset Management			<b>Document type:</b>	Policy
<b>Process owner:</b>	Asset Strategy				
<b>Author:</b>	Robert Alcaro – Transmission Lines and Cables Asset Strategist				
<b>Reviewers:</b>	Jeffree Cairns – Transmission Lines and Cables Asset Strategist Steve Stavropoulos – Transmission Lines and Cables Asset Manager David Donehue – Corporate Environment Manager				
<b>Approver:</b>	Lance Wee – Manager Asset Strategy				

A printed copy of this document may not be the current version. Please refer to the Wire to verify the current version.

# Contents

<b>Contents</b>	<b>2</b>
<b>1. Purpose</b>	<b>4</b>
<b>2. Scope</b>	<b>4</b>
<b>3. Definitions</b>	<b>4</b>
<b>4. Positioning Within the Asset Management Framework</b>	<b>6</b>
<b>5. Introduction</b>	<b>6</b>
<b>6. References</b>	<b>7</b>
<b>7. Actions and Responsibilities</b>	<b>7</b>
7.1 General Principles	7
7.1.1 Lands Administered by the National Parks and Wildlife Service	8
7.1.2 Lands within the Australian Capital Territory (ACT)	8
7.2 Vegetation Management	8
7.2.1 Vegetation Maintenance Outcomes	8
7.2.2 Vegetation Clearance Requirements	8
7.2.3 Vegetation Maintenance Requirements	9
7.2.4 Lighting of Fires	10
7.2.5 Easement Maintenance Process	10
7.2.6 Regulatory Information Notice (RIN) compliance	11
7.3 Easement Maintenance Tasks	11
7.3.1 LiDAR Inspections	11
7.3.2 Aerial Inspections	12
7.3.3 Scheduled Easement Inspection and Vegetation Maintenance	12
7.3.4 Condition Based Vegetation Maintenance	12
7.3.5 Vegetation Defect Maintenance	13
7.3.6 Easement and Vegetation Maintenance Frequency	14
7.4 Easement Encroachments	15
7.5 Public Safety Signage	16
7.5.1 Low Spans	16
7.5.2 Recreational Areas	16
7.6 Access Track Maintenance	16
7.6.1 Outcomes and Requirements	16
7.6.2 Condition Based Access Track Maintenance	16
<b>8. Dependencies for Achievement of this Plan</b>	<b>16</b>
<b>9. Roles and Responsibilities in Relation to this Plan</b>	<b>17</b>

A printed copy of this document may not be the current version. Please refer to the Wire to verify the current version.

10. Implementation .....	17
11. Change from previous version .....	17
12. Appendices .....	18
Appendix A – Easement Vegetation Maintenance Process Map .....	18

A printed copy of this document may not be the current version. Please refer to the Wire to verify the current version.

## 1. Purpose

This document describes the maintenance activities and sets out the plan for transmission line easements and access tracks.

## 2. Scope

This plan applies to the maintenance of all TransGrid transmission line easements and access tracks. It includes the following:

- (a) Management of vegetation clearance to conductors;
- (b) Methods and frequency of vegetation control;
- (c) Identification of easement encroachments; and
- (d) Maintenance of access tracks.

## 3. Definitions

Term	Definition
<b>Aerial Inspection</b>	Refer <a href="#">Maintenance Plan – Transmission Line Assets</a>
<b>Compliance Inspection</b>	Refer <a href="#">Maintenance Plan – Transmission Line Assets</a>
<b>Corrective Maintenance</b>	Actions required to address an out-of-specification condition identified through preventative maintenance, alarms, operating failure or asset management review. The condition, if left unattended, may affect the performance or reliability of plant and equipment. This includes non-routine tasks such as maintenance of substation buffer zones that are completed on a condition basis rather than on a programmed basis. Also known as <i>defect</i> maintenance.
<b>Constrained Easement</b>	A site that has been minimally maintained (i.e. pruned) which has property owner, stakeholder or environmental constraints. Likelihood of regrowth of vegetation is generally 1-3 years.
<b>Easement</b>	The area of land specified in an actual easement right granted to TransGrid on a title of land, or where an easement right does not exist, to a corridor of land centred on the transmission line. Typical easement widths are:  500kV – 70m 330kV – 60m 220kV – 50m 132kV – 45m
<b>Environmental Impact</b>	Any change to the environment, whether adverse or beneficial, wholly or partially resulting from TransGrid's activities.
<b>Hazard Tree</b>	A tree with the potential to impact or come within electrical clearances of the transmission line or its structures should it or parts of it fall. In many cases, hazard trees are outside the easement. Also known as Danger Tree. The potential to impact is generally calculated at Maximum Line Operating Conditions

A printed copy of this document may not be the current version. Please refer to the Wire to verify the current version.

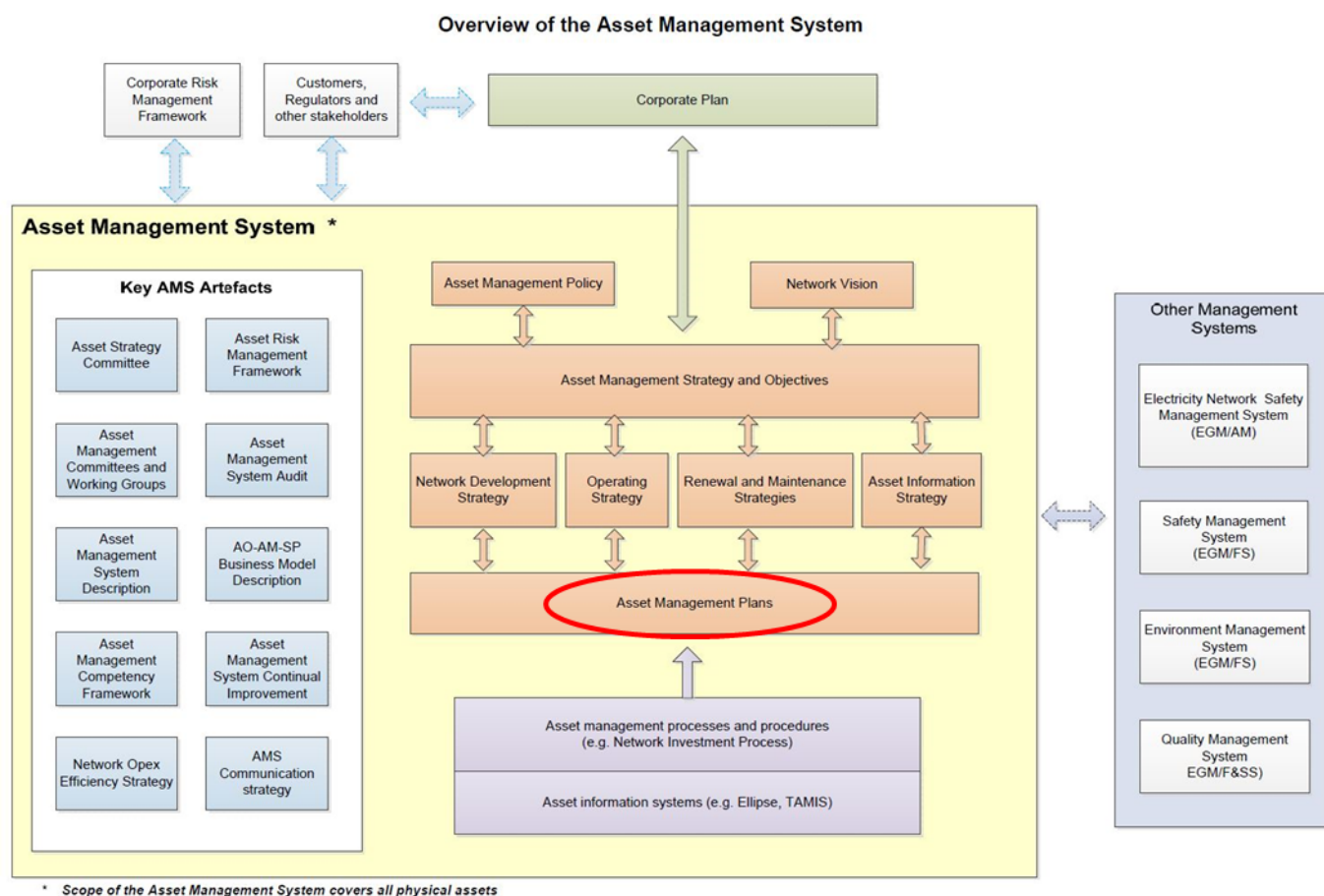
Term	Definition
<b>Hot Spot</b>	An area of fast growing vegetation. Likelihood of regrowth of vegetation is generally high and required maintenance interval is shorter than the overall easement Scheduled Vegetation Maintenance cycle.
<b>LiDAR</b>	<b>L</b> ight <b>D</b> etection <b>A</b> nd <b>R</b> anging – In this document, LiDAR is taken to be the whole process of 3D laser scanning of ground, electricity infrastructure and vegetation, comparing the laser point data to PLS-CADD® transmission line models to determine the vegetation clearance to wire at nominal line temperature, maximum operating temperature and blowout conditions.
<b>Machine Work</b>	Work that involves the use of machinery such as backhoes, bobcats, excavators, and the like for site development or vegetation management that could disturb the soil.
<b>Managed Easement</b>	A site that has been regularly maintained. Likelihood of regrowth of vegetation is generally within the specified cycle of the transmission line maintenance plan.
<b>Maximum Line Operating Conditions</b>	The maximum sag and sway (or blowout) conditions for a transmission line. The maximum sag will occur with maximum line current load on a still hot day and relates to the line rating available for use by TransGrid System Operations, and the maximum sway that will occur at high wind conditions.
<b>Minimum Safe Working Distance</b>	Safe Approach Distances to Persons as defined in Power System Safety Rules (PSSR).
<b>Nil Vegetation Concerns</b>	Pasture land, previously cleared easement, or urban area where it is unlikely that vegetation maintenance is required.
<b>Optimally Managed Easement</b>	A site that has been fully maintained with tall growing vegetation removed and regularly maintained applying least cost practice options (e.g. spraying, minor hand clearing etc.). Likelihood of regrowth of vegetation is generally two frequency cycles without the probability of conductor encroachment.
<b>Preventative Maintenance</b>	All planned repetitive activities (including inspections) that are programmed to check the performance or maintain the serviceability of an item of plant or equipment. Also known as routine maintenance.
<b>Probability of Failure (PoF)</b>	The chance of a hazardous event occurring.
<b>Risk</b>	The effect of uncertainty on achieving TransGrid's objectives. Risk is measured in terms of impact and likelihood. Uncertainty can have positive and negative effects on objectives.
<b>Tall Growing Vegetation</b>	Vegetation species with a likelihood of infringing safe electrical clearances at Maximum Line Operating Conditions at that location. Hazard Trees within the easement are by nature Tall Growing Vegetation.
<b>TSS</b>	TransGrid Spatial System.
<b>Vegetation Clearance Requirements</b>	Clearance required at all times to conductors at Maximum Line Operating Conditions.
<b>Work</b>	Any physical maintenance, survey or construction/augmentation activities with the potential to have an adverse <i>environmental impact</i> .

A printed copy of this document may not be the current version. Please refer to the Wire to verify the current version.

## 4. Positioning Within the Asset Management Framework

This Maintenance Plan sits as a subset of the Network Renewal and Maintenance Strategy – Transmission Lines in the asset management system framework as highlighted in Figure 1 below:

**Figure 1: Asset Management System Document Hierarchy**



## 5. Introduction

The maintenance of safe clearances from conductors to vegetation is essential to mitigate the risk of lines causing bushfires through flashover to vegetation, to maximise the safety of the public, and to maintain high levels of system reliability. This document specifies the minimum standards for easement maintenance that are aimed at satisfying these requirements.

Access tracks are used for access to transmission lines and structures for emergency repairs, routine maintenance, inspection or construction. This document specifies the maintenance requirements for access tracks. Maintenance works on access tracks is limited to existing tracks. Creation of new tracks is not maintenance works and is outside the scope of this Maintenance Plan.

Nothing in this standard diminishes the responsibility of a service provider to consult with all parties having an interest in easement and access track maintenance practices. TransGrid aims to ensure a high level of community consultation and satisfaction in regards to these maintenance practices. It cannot be assumed that TransGrid has automatic rights within a transmission line corridor to carry out maintenance.

Further, under the Energy Services Corporations Act, TransGrid “has the special objective of minimising the environmental impact on land of activities authorised by easements for transmission facilities created in favour of the energy transmission authority. In implementing this special objective, the transmission operator

A printed copy of this document may not be the current version. Please refer to the Wire to verify the current version.

is bound by all relevant laws (such as those concerning native vegetation, soil conservation and easement management) applying at the time.”

## 6. References

---

[Maintenance Plan – Transmission Line Assets](#)

[Transmission Line and Easement Condition Data Collection Instruction](#)

[Power System Safety Rules](#)

[Bush Fire Risk Management Plan](#)

[Environmental Handbook](#)

[Environmental Assessment Framework](#)

[Use of Pesticides](#)

[GM AS G2 020 – Defect Work Orders – Business Rules](#)

GD EN G2 010 – [Noxious Weed Control](#)

Hot Work and Fire Risk Work Procedure

Non-Routine Maintenance Process

TransGrid Fencing Guidelines - Earthing and Isolation of Fences in Easements

[Easement Development Guidelines](#)

[Protocol](#) between the NSW National Parks and Wildlife Service and TransGrid for the Undertaking of Inspection, Maintenance and Emergency Works on TransGrid Network Assets and Associated Infrastructure on Land reserved and acquired under the National Parks and Wildlife Act 1974

[Site Management Agreement](#) for Public Land (Nature Reserves, Special Purpose Reserves and National Park between the Conservator of Flora and Fauna and TransGrid - For the inspection and maintenance of TransGrid infrastructure in the ACT

Energy Services Corporations Act 1995 No 95 – Section 6B

Rural Fires Act 1997 – Part 4, Division 5

## 7. Actions and Responsibilities

---

### 7.1 General Principles

Vegetation management in easements is carried out on a regular planned basis to minimise the need to react to vegetation that may pose a more immediate threat to transmission line services. This minimises the risk of vegetation posing a threat to transmission line safety or security.

Scheduled Vegetation Maintenance shall occur at the frequencies defined in the Transmission Line Maintenance Plan. The work practices used in easement maintenance are to be guided by the expected vegetation probability of failure timeframes as detailed in section 7.3.6.

The annual aerial inspection of each line, any LiDAR based vegetation inspections, and any ground based inspections as described in the Transmission Line Maintenance Plan are expected to identify any defects that require targeted vegetation work outside the routine maintenance periods.

Access track maintenance is to be performed on an ‘as required’ basis using funds allocated under an operating budget.

A printed copy of this document may not be the current version. Please refer to the Wire to verify the current version.

### 7.1.1 Lands Administered by the National Parks and Wildlife Service

Lands administered by the National Parks and Wildlife Service include national parks, nature reserves, historic sites, aboriginal areas, game reserves, state recreational areas and any other areas gazetted under the National Parks and Wildlife Act.

All easement and access track maintenance activities within these lands shall be carried out in accordance with the Protocol between TransGrid and the NPWS.

### 7.1.2 Lands within the Australian Capital Territory (ACT)

Within the ACT, easement and access track activities are to be carried out in accordance with "Site Management Agreement for Public Land, Nature Reserves, Special Purpose Reserves and National Park between the Conservator of Flora and Fauna and TransGrid - For the inspection and maintenance of TransGrid infrastructure in the ACT".

## 7.2 Vegetation Management

### 7.2.1 Vegetation Maintenance Outcomes

In order to meet the requirements of TransGrid's Bush Fire Risk Management Plan and Asset Management System, the following maintenance outcomes are required for vegetation maintenance:

- > Any Tall Growing Vegetation that cannot be removed due to constraints shall be pruned with an allowance for growth at that location that will not lead to the vegetation encroaching on clearance requirements prior to the next Scheduled Vegetation Maintenance activity.
- > Any vegetation identified by LiDAR that encroaches the clearance requirements at Maximum Line Operating Conditions (TMAX and 240Pa Blowout):
  - is considered to be a violation of this Maintenance Plan and shall be addressed as defect vegetation with a priority assigned relative to the risk of interference prior to the next Scheduled Vegetation Maintenance activity; and
  - shall be maintained with an allowance for growth at that location that will not lead to the vegetation being reported in subsequent LiDAR reports prior to the next Scheduled Vegetation Maintenance activity.
- > Any vegetation identified by LiDAR as encroaching the clearance requirements at nominal line temperature (50°C no wind):
  - shall be maintained within a month (P2);
  - where this has been reported as an 'urgent' intrusion as per the contract conditions, this may require a more expedited response, but always within one month; and
  - any vegetation encroaching on minimum safe working distances shall be maintained within 24 hours (P1). An outage will be required to safely manage the vegetation.
- > If the vegetation maintenance outcomes are successfully achieved, with allowance for growth until the next Scheduled Vegetation Maintenance activity, no vegetation should be identified by LiDAR, and the risk of vegetation interfering with electricity works (Ref sect 48 of the NSW Electricity Act 1995) is eliminated.
- > LiDAR is to be used as both a maintenance validation tool and a risk identification tool.

### 7.2.2 Vegetation Clearance Requirements

The vegetation clearance required at all times to conductors at Maximum Line Operating Conditions is specified in Table 1.



**Table 1 – Vegetation Clearance Requirements**

Nominal System Voltage	Vegetation Clearance at Maximum Line Operating Conditions (minimum safe working distance <sup>1</sup> + regrowth allowance)
Up to 132kV	1.2m + regrowth allowance
220kV	1.8m + regrowth allowance
330kV	3.0m + regrowth allowance
500kV	3.9m + regrowth allowance

The regrowth allowance shall allow for vegetation growth and/or regrowth between Scheduled Vegetation Maintenance activities. The regrowth allowance shall be determined by the best local knowledge estimates for the particular vegetation species being maintained. General vegetation regrowth rates to be considered are given in Table 2.

**Table 2 – General Vegetation Regrowth Rates**

Species growth rate	Annual regrowth rate
Slow	Less than 1.1m/year
Moderate	Between 1.1m/year and 1.65m/year
Fast	Greater than 1.65m/year

### 7.2.3 Vegetation Maintenance Requirements

The vegetation maintenance requirements are:

- > Vegetation maintenance requires completion of the Environmental Moderate Risk Checklist (Vegetation Management) under the Environmental Assessment Framework.
- > Special requirements for vegetation maintenance for transmission lines covered by an Environmental Impact Statement or an Operational Environmental Management Plan shall be adhered to in the assessment of vegetation to be removed. The service provider shall include these requirements within TSS.
- > Subject to the Environmental Assessment Framework, the preferred method of vegetation control is to remove, rather than prune, Tall Growing Vegetation that will eventually infringe the vegetation clearance requirements in 7.2.2 above.
- > Vegetation shall be managed to minimise impact on the land's existing use.
- > If stumps cannot be treated with herbicide, these shall be removed to prevent regrowth.
- > Where herbicide is planned to be used, it shall be used strictly in accordance with the "Use of Pesticides" procedure.
- > Removal of Hazard Trees identified with disease, instability or other problems that increase the likelihood of them impacting on the electricity infrastructure.

<sup>1</sup> Safe Approach Distances to Persons as per Power System Safety Rules (PSSR) Rev 5.1.

- > Structure based vegetation is to be cleared at structures to create a safe and suitable work area. Where OPGW joint boxes are installed in bushfire prone areas, additional inspection and maintenance of these structure bases may be required immediately prior to the bushfire season.
- > Vegetation control shall be carried out in the safest and most cost effective and environmentally acceptable manner, in consultation with property owners or managers, and other statutory authorities, local councils and special interest groups as necessary.
- > The use of approved vegetation control techniques at any specific location shall be strictly in accordance with local soil conservation, climatic and environmental requirements. Accordingly, some techniques are not suitable in all circumstances.
- > Vegetation control requires approval in accordance with the Environmental Framework..
- > The use of techniques other than those described in this section, are not precluded. Approval shall be obtained from Corporate Environment Manager regarding the acceptability of the environmental impacts before any other techniques are applied.
- > Retain and prune as required hollow bearing trees or other vegetation specifically selected for it's habitat value as locally significant fauna habitat. Vegetation shall be managed in accordance with Section 7.2.2 and may be poisoned (if appropriate) to prevent regrowth. Pesticide application needs to be carried out in accordance with the procedure *Use of Pesticides*.
- > Maintain vegetation adjacent to a prescribed stream, river or watercourse in accordance with the Environmental Framework and Environmental Handbook.
- > Retain and trim as required selected vegetation to provide screening at sites specifically nominated as visually sensitive. Retained vegetation may be subject to subsequent progressive replacement strategies with more suitable species.
- > Retain and trim as required any cultural heritage tree, e.g. scar tree that could not be avoided during the route selection phase. Appropriate approval in accordance with the Environmental Framework shall be obtained.
- > Retain individual plants and surrounding habitat of threatened species, listed under the NSW Threatened Species Conservation Act 1995, NSW Native Vegetation Act 2003 or Commonwealth Environment Protection and Biodiversity Conservation Act 1999, that do not have potential to infringe safe clearances.

#### 7.2.4 Lighting of Fires

Where timber needs to be burnt, all necessary permits shall be obtained under Part 4, Division 5 of the Rural Fires Act 1997. The local Rural Fire Service should be notified. The work shall be undertaken in accordance with the Hot Work and Fire Risk Work Procedure. The lighting of fires is not standard practice.

#### 7.2.5 Easement Maintenance Process

The easement maintenance process involves the following 10 phases:

1. Routine planning and inspections, review of LiDAR results, review of any open vegetation defect work orders
2. Review of schedule and work required
3. Environment Assessment (EA) preparation
4. Scoping and EA review and approval
5. Work package handover
6. Undertake maintenance work
7. Invoicing
8. Work close out
9. Performance and feedback
10. Performance and quality auditing

A printed copy of this document may not be the current version. Please refer to the Wire to verify the current version.

Many steps of the process can and should be carried out in parallel, while some activities may be carried out more than once as new/updated information comes to hand. The process has been set up to continually improve the Easement Maintenance process by improving quality and timeliness of output, reducing unnecessary hand-offs, and eliminating rework and failure; thus keeping costs to a minimum, and customer (*Asset Manager*) and job satisfaction to a maximum.

A flowchart showing these phases is outlined in appendix A.

## **Environmental Requirements**

An environmental assessment must be undertaken, and appropriate approval granted, prior to any work being performed within an easement or on an access track. This assessment shall be carried out in accordance with GD EN G2 010 – Noxious Weed Control and associated Environment Assessment Framework requirements.

### **7.2.6 Regulatory Information Notice (RIN) compliance**

Amongst various parameters, as part of the annual AER Regulatory Information Notice (RIN) TransGrid is required to report on;

- Average number of trees per maintenance span
- Total length of maintenance spans

In order to adequately report on the number of trees maintained, the following approach is used:

- > Where practical, persons undertaking vegetation management are to provide documented tree counts at regular intervals of vegetation removal and pruning, particularly, when a small number of trees are being removed or pruned.
- > Otherwise, during the scoping stage of maintenance works attempt shall be made to gauge the number of trees being removed, pruned and/or mulched or sprayed by selecting an indicative square metre area that best represents the average vegetation cover within the span and then simply counting the number of trees within the selected area. This number of trees is then multiplied by the total number of square metres to obtain the total number of trees to be maintained in the span.
- > Only trees greater than 3 metres in height (measured from the ground) which could grow to a height such that it may impinge on the vegetation clearance space of power lines are to be included in the count.
- > Tree counts shall be on a span by span basis, not a span range, to avoid non maintenance spans being included in the count.

This requirement to log vegetation work completed also applies to vegetation maintenance work completed with internal resources.

## **7.3 Easement Maintenance Tasks**

### **7.3.1 LiDAR Inspections**

Airborne 3D laser scanning of the transmission line, vegetation, other above ground improvements and ground is carried out with the main function of confirming there is sufficient clearance to the transmission line from any vegetation.

The requirements for this are to scan the transmission line route with sufficient laser point density ( $> 20$  points per  $m^2$ ) to capture vegetation with the potential to interfere with the transmission line, and compare the scan with the PLS-CADD<sup>®</sup> model of the transmission line to check for proximity at the line operating scenarios defined in Section 7.2.1.

The LiDAR shall report on:

- > All trees violating clearance requirements at normal line temperature.
- > The closest tree violating clearance requirements per span for Maximum Line Operating Conditions.

A printed copy of this document may not be the current version. Please refer to the Wire to verify the current version.

- > Fences within 30 metres of a transmission line structure.
- > Easement encroachments of structures/objects installed by others with a height above ground greater than 4.3m.

A mapping display such as Google Earth KML files shall be prepared showing all violation points for each conductor operating scenario.

The reporting requirements of LiDAR are detailed in the [Transmission Lines and Easements Condition Data Collection Instruction](#).

### 7.3.2 Aerial Inspections

An *Aerial Inspection* shall be carried out each year on all lines to check for any activity or circumstances likely to affect the safety or reliability of the line. In particular, *Aerial inspections* shall be scheduled so as to provide a high degree of assurance that the easements and transmission lines do not pose a bushfire risk.

Where flight restrictions do not allow *aerial inspections* to be undertaken on a section of a line, a follow up *compliance inspection* of the missed section(s) shall be performed within 3 months. Alternatively, where the flight restrictions are well known in advance, the scheduling of an *aerial inspection* may be substituted by a scheduled *compliance inspection*.

Refer to [Maintenance Plan – Transmission Line Assets](#) for the requirements of *Aerial Inspections* and *Compliance Inspections*.

### 7.3.3 Scheduled Easement Inspection and Vegetation Maintenance

This type of maintenance is preventative maintenance. It involves an inspection of the easement and existing vegetation at the site to determine:

- > Maintenance work required to meet the Vegetation Maintenance Outcomes in section 7.2.1
- > Tree to conductor clearance encroachments (estimated at maximum sag)
- > Vegetation type, density and extent
- > Date by which work must be completed
- > Easement encroachments

The reporting requirements of easement inspections are detailed in the [Transmission Lines and Easements Condition Data Collection Instruction](#).

Maintenance shall address expected growth rates prior to the next scheduled vegetation maintenance, as well as cost efficiencies, to determine the extent of work to be carried out.

For specific locations on a line such as river/creek crossings, isolated national parks, etc. where more frequent constrained or *hot spot* maintenance is required to meet the Vegetation Maintenance Outcomes, a separate maintenance scheduled task is required noting these specific locations (refer Section 7.3.5).

The frequency of scheduled easement inspection and maintenance for each line is specified in the [Maintenance Plan – Transmission Line Assets](#).

### 7.3.4 Condition Based Vegetation Maintenance

This type of maintenance is based on regular inspection and the identification of potential/current vegetation risks. Any vegetation identified that will require maintenance work to meet the Vegetation Maintenance Outcomes prior to the next inspection shall be addressed through an appropriately prioritised defect work order as per Section 7.3.5.

The frequency of vegetation *hot spot* inspection for each line is specified in the [Maintenance Plan – Transmission Line Assets](#).

A printed copy of this document may not be the current version. Please refer to the Wire to verify the current version.

### 7.3.5 Vegetation Defect Maintenance

This type of corrective maintenance refers to vegetation that has been identified through LiDAR or any other inspection as likely to violate the Vegetation Maintenance Outcomes prior to the next Scheduled Easement Inspection visit or Condition Based Vegetation Maintenance inspection. Any suspect vegetation noted during the line inspections undertaken as part of the [Maintenance Plan – Transmission Line Assets](#) is considered a vegetation defect. There may be instances where vegetation defects are identified when staff are on site for other works.

Vegetation defects that are identified shall have a work order raised in Ellipse, with a priority code allocated as per the table below. For slow growth rate vegetation defects in spans with long periods to the next Scheduled Vegetation Maintenance, it is allowable to use Ellipse Priority 5 for a vegetation defect that requires action within 24 months.

The Ellipse priority codes relate to the likelihood of the vegetation violating the Vegetation Maintenance Outcomes within the timeframes defined in Table 3 (taking into account regrowth and expected conductor sag).

**Table 3 – Classification of Vegetation Defects**

Ellipse Priority Code	Timeframe	Line Operating Scenario	Defect Criteria
1	24 Hours	Nominal line temperature	Within minimum safe working distance
2	1 Month	Nominal line temperature	Within minimum safe working distance + regrowth allowance
3	3 Months	Maximum line operating conditions	Within Vegetation Clearance Requirements
4	12 Months	Maximum line operating conditions	Within Vegetation Clearance Requirements allowing for two years of regrowth
5	24 Months	Maximum line operating conditions	Within Vegetation Clearance Requirements allowing for four years of regrowth
6	Monitor only	Maximum line operating conditions	Greater than Vegetation Clearance Requirements allowing for four years of regrowth

If the vegetation is determined to be within safe approach distances to conductors as per the Power System Safety Rules, an outage to safely manage the vegetation clearance will be required. This may mean that a priority 1 issue takes more than 24 hours to rectify. The Easements Maintenance Team Leader and/or Manager shall be consulted for the safest method of managing an emergency situation.

A review of defect frequencies on each line will guide any decision on modification to the frequency of the work on a line or section of line.

*Defects* shall be reported and actioned in accordance with the Non-Routine Maintenance Process.

### 7.3.6 Easement and Vegetation Maintenance Frequency

The available frequencies of each type of maintenance for vegetation control for different types of easements are shown in the table below. The frequency of vegetation maintenance for each line and line section is recorded in the [Maintenance Plan – Transmission Line Assets](#).

Type of Maintenance	Present state of Easement	Available Frequencies (time between Maintenance Works)	Work Practices to meet Vegetation Maintenance Outcomes based on span probability of vegetation encroachment prior to next Scheduled Vegetation Maintenance task	
<b>Scheduled Easement Inspection and Maintenance</b>	<i>Optimally Managed</i>	3-6 years	High	Maintain full easement
			Medium	Maintain 80% of easement
			Low	Condition based and defect maintenance
	<i>Managed</i>	1-3 years	High	Maintain full easement
			Medium	Maintain 80% of easement
			Low	Condition based and defect maintenance
	<i>Constrained</i>	1-3 years	High	Maintain full easement within constraints
			Medium	Maintain 80% of easement within constraints
			Low	Condition based and defect maintenance
<b>Condition based</b>	<i>Hot Spot</i>	1-3 years	High	When required, maintain full easement
			Medium	When required, maintain 80% of easement
			Low	When required, remove vegetation concerns
	<i>Nil Vegetation Concerns</i>	When required, as assessed during routine inspections	High	When required, maintain full easement
			Medium	When required, maintain 80% of easement
			Low	When required, remove vegetation concerns
	<i>Reactive</i>	Continual works	As required	
<b>Defect Maintenance</b>	All	N/A	Implement as per defect notice	
<b>LIDAR</b>	All	1-3 years	N/A	
<b>Aerial Inspection</b>	All	1 year	N/A	

A printed copy of this document may not be the current version. Please refer to the Wire to verify the current version.

## 7.4 Easement Encroachments

Easement encroachments shall be identified during routine easement inspections and reported to the Field Services Property Planning and Developments Manager. Easement encroachments, where the encroachment has not been approved in writing by TransGrid, include the following when located within the easement:

- > Any structure, object or thing greater than 4.3m in height above ground or will require an accredited person or Elevated Work Platform to access.
- > Any building (including portable and temporary buildings) or substantial structure which has electricity or other service connected to it, or has a floor space greater than 8m<sup>2</sup>, or is within 20 meters of a structure.
- > The storage of flammable, corrosive or explosive materials, including portable carriers or containers.
- > Any fixed plant and equipment.
- > Any mobile plant or equipment having a height when fully extended which would encroach the conductor clearance requirements set out in the [WorkCover NSW 'Work Near Overhead Power Lines' Code of Practice \(2006\)](#) at Maximum Line Operating Conditions.
- > The placing of garbage, refuse or fallen timber.
- > The storage of anything within the tower base or within 10m of a structure or guy-wire.
- > The placing of obstructions within 20 meters of any part of a transmission line structure or guy-wire.
- > Any obstruction or object on the easement or access track which restricts maintenance access or could create an unsafe work area for TransGrid staff.
- > Any excavation within 15 meters of a pole structure or guy wire or within 20 meters of a tower.
- > Any change in ground levels which reduces the clearance to the conductors.
- > The attachment of any fence, signage, or other thing to a structure or guy wire.
- > Any fencing not compliant with the TransGrid Fencing Guidelines - Earthing and Isolation of Fences in Easements.
- > Flying of any manned or unmanned aircraft within 60m of any part of a transmission line.
- > Any work which generates significant amounts of dust or smoke that can compromise the high voltage insulation.
- > Any camping or the parking of caravans within the easement.
- > Any services (e.g. electricity, water, gas, communications, sewerage, pipeline, conveyor) above or below ground, which have not been approved in writing by TransGrid, and traverse the easement (those within 30m of a structure present a high risk) or run parallel to the easement for a significant length (generally greater than two spans).
- > Swimming pools (those encroaching the easement more than 4 meters or located within 30m of a structure present a higher risk).
- > Newly constructed roads, tracks, pathways and car parks.

Further details are given in TransGrid's [Easement Development Guidelines](#).



## 7.5 Public Safety Signage

### 7.5.1 Low Spans

Warning signage is installed on transmission line spans violating clearance requirements where the violation is deemed to be of a low enough risk that remediation is not required. During routine easement inspections the signage shall be checked and a *defect* raised if any sign is missing, damaged, faded or illegible and the signage replaced within one month (P2 priority code).

Low span signage is as per drawing TL-900019. Project Services/Engineering are to be contacted for advice where required.

### 7.5.2 Recreational Areas

Transmission line easements which traverse public recreational areas shall have signage installed in accordance with Stock Code 3585148. During routine easement inspections the signage shall be checked and a *defect* raised if any sign is missing, damaged, faded or illegible and the signage replaced within one month (P2 priority code).

## 7.6 Access Track Maintenance

### 7.6.1 Outcomes and Requirements

The access track maintenance outcomes and requirements are:

- > Access track maintenance requires completion of the Environmental Moderate Risk Checklist (Access Track Maintenance) under the Environmental Assessment Framework.
- > Access shall be available to all structures. Vehicular access need not be provided to all structures for routine activities. In an emergency, track construction activities may be required to provide vehicular access for heavy plant.
- > Maintenance requirements on access tracks shall be determined by a number of factors, including:
  - Frequency of use
  - Use by third parties – e.g. public, National Parks, Fire Trails etc.
  - Types of vehicles required for upcoming maintenance or routine activities
  - Cost/benefit of track maintenance
  - Environmental concerns
  - Safety.

### 7.6.2 Condition Based Access Track Maintenance

This is based on regular inspection and the identification of potential or existing access risks. The regular inspections shall comply with the [Maintenance Plan – Transmission Line Assets](#).

Access track *defects* shall be assessed using standard *defect* codes as defined in [GM AS G2 020](#) – Defect Work Orders – Business Rules.

Access track condition ranking and risk profiling is currently under development for eventual inclusion in TSS.

## 8. Dependencies for Achievement of this Plan

---

Completion of this plan is dependent on adequate resources from the service provider Field Services.



## 9. Roles and Responsibilities in Relation to this Plan

The Manager/Asset Strategy is responsible for approval of this maintenance plan. Any specific departures from this plan shall be approved in writing by Manager/Asset Strategy.

The Transmission Lines and Cables Asset Manager is responsible for preparing, reviewing and updating this plan.

Field Services are the service provider responsible for the maintenance of easements and access tracks in accordance with this plan and shall implement the specific actions outlines in this plan.

Responsibility for managing the service agreement in implementing this maintenance plan lies with the Maintenance Delivery Manager.

## 10. Implementation

The Transmission Lines and Cables Asset Manager shall notify the Field Services/Maintenance Manager and the Easements Maintenance Manager of the amendments to the previous issue of this plan, drawing their attention to their responsibilities in implementing the requirements of the plan. This shall be carried out in writing within a week following issue.

Field Services are the primary service provider for maintenance on TransGrid assets and are engaged by Manager/Portfolio Office through a service agreement. The requirements of this Maintenance Plan will be executed through that agreement.

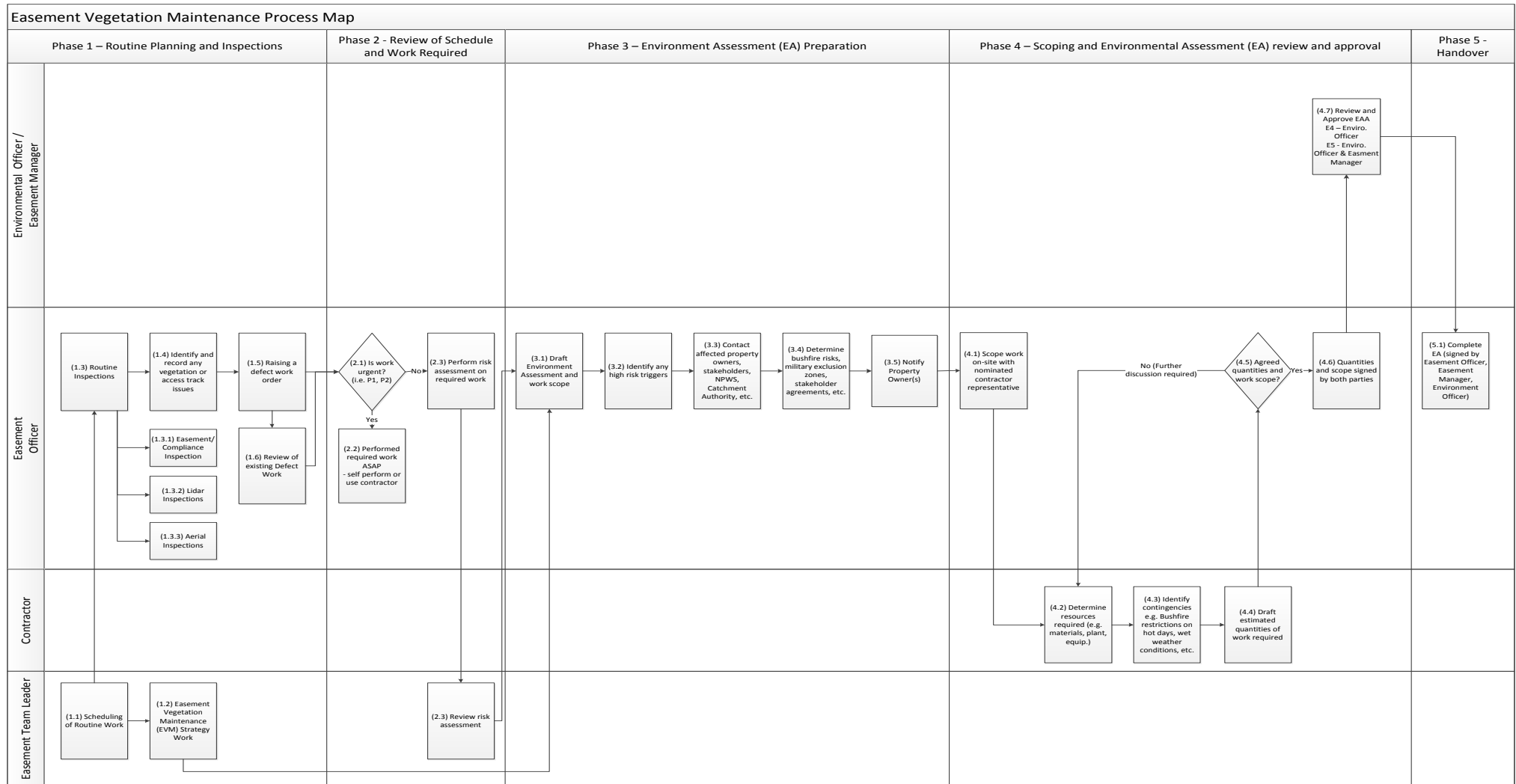
## 11. Change from previous version

Revision no	Approved by	Amendment
7	Mark Jones – A/Manager Asset Strategy	<ul style="list-style-type: none"><li>• Document re-formatted to new template</li><li>• Inclusion of new definitions</li><li>• Changes to easement maintenance process and flow chart</li><li>• Updates to supporting documentation / references</li><li>• Inclusion of additional vegetation maintenance requirements (taken from GD AS G3 015 which has been withdrawn)</li><li>• Change to use of defect priorities</li><li>• Inclusion of work practices based on span risk rating in section 7.3.6 Vegetation Maintenance Frequency</li><li>• Addition of easement encroachment reporting</li></ul>
8	Lance Wee – Manager Asset Strategy	<ul style="list-style-type: none"><li>• Vegetation clearance requirements updated</li><li>• Vegetation maintenance requirements updated</li><li>• Easement maintenance tasks clarified</li><li>• Classification of vegetation defects clarified</li><li>• Easement encroachment activities included</li><li>• Public safety signage section introduced</li><li>• Relevant sections from Maintenance Plan – Transmission Line Assets moved to this Maintenance Plan</li></ul>

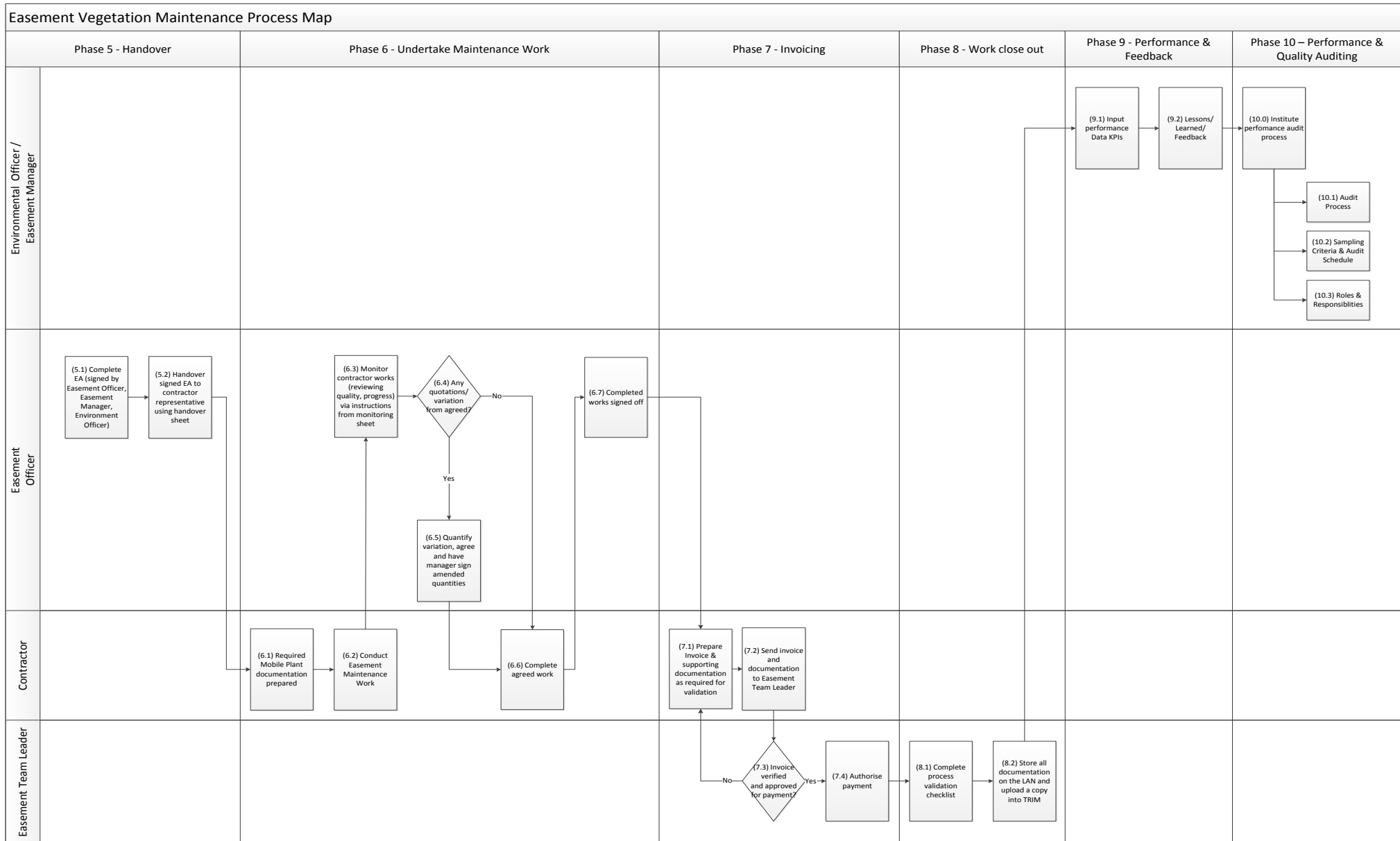
A printed copy of this document may not be the current version. Please refer to the Wire to verify the current version.

## 12. Appendices

### Appendix A – Easement Vegetation Maintenance Process Map



A printed copy of this document may not be the current version. Please refer to the Wire to verify the current version.



A printed copy of this document may not be the current version. Please refer to the Wire to verify the current version.