INTRODUCTION

This document provides the details for performing the Aerial Visual Inspections of National Grid Transmission and Sub-Transmission assets. The procedure shall be executed by Qualified Personnel as determined by training specific to the task.

Table 1 lists the type of asset, location, frequency of inspection and the group responsible for developing the work plan, scheduling, coordination and execution of the aerial inspection:

Table 1

ASSET	LOCATION	FREQUENCY	RESPONSIBLE GROUP
Transmission	New England	Bi-annual	T&D Maintenance and Electric Operations
Transmission	New York [1]	Annual [2]	T&D Maintenance and Electric Operations
Sub-Transmission	New York	Annual	Inspections

[1] Per agreement with the NY PSC the following lines or line segments are subject to enhanced inspection. This enhancement consists of flying these lines in both directions allowing complete inspection of all painted surfaces of the structures.

- 115kV Spier Falls to Ballston #302
- 115kV Rotterdam to Ballston #1
- 115kV Spier falls to Rotterdam #2 sections running parallel to the two lines listed above

[2] 6 month frequency per order of the NY PSC

1. Edic – New Scotland 14
2. Athens – Pleasant Valley 91
3. Leeds – Pleasant Valley 92
4. New Scotland – Leeds 93
5. New Scotland – Leeds 94
6. Leeds – Athens 95

PURPOSE

The purpose of this procedure is to outline the requirements for Aerial Visual Inspections on National Grid Transmission and Sub-Transmission assets. The inspection is an overview of the circuit for issues or defects which may result in the failure of a structure, its components or interruption of the circuit

ACCOUNTABILITY

Specific planned work performed under this procedure will be coordinated by following work groups via a Work Plan document to be released prior to the start of each fiscal year

1 T&D Work Methods
   - A Update procedure as necessary

2 Project Management & Complex Construction / Electric Operations
   - A Ensure that this procedure is understood and implemented
   - B Ensure that all personal are trained in this procedure
   - C Repair problems found during inspections according to follow-up prioritization criteria

3 T&D Maintenance / Electric Operations / Inspections
   - A Schedule and coordinate inspections for transmission and sub-transmission assets
   - B Ensure inspections as outlined in the fiscal year work plan are safely executed according to the stated procedures and performed in a timely manner
   - C Ensure worker understanding and comprehension of the requirements of this EOP

4 Employee
   - A Demonstrate the understanding of this procedure
   - B Comply with the requirements of this procedure

COORDINATION

National Grid Project Management & Complex Construction
T&D Maintenance
Electric Operations
Inspections

REFERENCES

NG-EOP T007.00 Inspection and Maintenance Activities
NG-EOP T007.01 Ground Level Visual Inspection
NG-EOP T007.09 Comprehensive Inspection
NG-EOP T010 Steel Lattice Tower Inspection
National Grid Employee Safety Handbook

DEFINITIONS

Assets: Transmission or sub-transmission Line facilities and equipment.

Inspection: A careful viewing of assets to find defects and other problems that require maintenance or monitoring.

Inspection and Maintenance Program: Planned program for inspecting and maintaining transmission and sub-transmission lines.

Inspector: Qualified personnel who identify defects via a specific type of inspection.

Maintenance: Work to correct defects or other problems, often identified through the inspection process.

Maintenance Management System (MMS): A computer application that schedules and tracks inspections and/or maintenance work.

Qualified Personnel: Personnel trained to safely perform a specific inspection.

Transmission Line GIS Software: Software referencing the helicopter's position, including the structure number, line name, latitude and longitude.

Work Plan: A document published each fiscal year listing all inspection and maintenance scheduled for the year

TRAINING

Provided by L&D upon request by user department

DOCUMENT CONTENTS

Table of Contents

1.0 GENERAL

1.1 All applicable National Grid Employee Safety Handbook and environmental rules shall be followed when executing these Inspections.

1.2 The inspector shall be properly trained and competent.

1.3 National Grid transmission and sub-transmission lines/circuits shall be visually inspected in accordance to the respective time schedules.

1.3.1 See Table 1

1.4 The inspection of assets which are along public, paved roadways may be inspected from the ground if appropriate.

1.5 This inspection shall locate and document issues or defects which may result in failure of a structure, its components or interruption of the circuit.

1.5.1 Items included for review are:

a. Broken or flashed insulators

b. Leaning or damaged structures

c. Broken hardware

d. Damaged or broken conductors

e. Tree conditions

f. ROW encroachment, erosion or damage

g. Conductor clearance problems

1.6 Optical stabilized binoculars are recommended to assess suspect defects.

1.7 All defects shall be documented in detail using:

1.7.1 The hand-held data recording device

1.7.2 The Aerial Visual Inspection worksheet

a. See Appendix A

1.7.3 Digital camera

1.7.4 Tape recorder

1.8 Items that shall be reviewed and evaluated during the Aerial Visual Inspection:

1.8.1 Avian

a. Inspect for:

1. Nests

1.8.2 Pole

a. Inspect for:

1. Broken Pole
2. Burning Pole
3. Rotting Pole
4. Woodpecker Damage
5. Leaning Pole
6. Lightning Damage

1.8.3 Cross Arm

a. Inspect for:

1. Broken Arm
2. Cracked Arm
3. Rotted Arm

1.8.4 Structure

a. Inspect for:

1. Damaged Steel
2. Rusted Steel
3. Bent or Deflected Steel
4. Leaning Structure

1.8.5 Conductor

a. Inspect for:

1. Bird Caging
2. Broken Strands
3. Sag Issues
4. Tree Clearance Issues

1.8.6 Insulator

a. Inspect for:

1. Broken insulators
    i. List quantity broken and total in string
2. Flashed insulators
    i. List quantity flashed and total in string
3. Out of plumb insulators
4. Hardware problems

b. Table 2 shall be used as to determine the reporting level for the number of defective insulators in a string:

Table 2

Insulators in String	Damaged Insulators in String			
	Level 1	Level 2	Level 3	Level 4
5	2 or more	1		
6	2 or more	1		
7	3 or more	2	1	
8	3 or more	2	1	
9	3 or more	2	1	
10	4 or more	3	2	1
11	4 or more	3	2	1
12	4 or more	3	2	1
13	4 or more	3	2	1
14	5 or more	3 or 4	2	1
15	5 or more	4	2 or 3	1
16	5 or more	4	2 or 3	1
17	6 or more	4 or 5	2 or 3	1
18	6 or more	4 or 5	2 or 3	1
19	6 or more	4 or 5	3	1 or 2
20	6 or more	5	3 or 4	1 or 2
21	7 or more	5 or 6	3 or 4	1 or 2

1.8.7 Right of Way

a. Encroachments

b. Erosion

1.8.8 Tree Clearance

a. Record any danger trees that may cause an interruption to the circuit.

1. Forestry conducts annual patrols of bulk and 1/3 of system per year.

b. Table 3 shall be used to determine the minimum vertical or horizontal tree clearance based on the nominal kV of the circuit.

Table 3

TREE CLEARANCE	
Level 1 Clearance Criteria	
Nominal Voltage - kV	**Horizontal or Vertical Clearance**
23 kV -46 kV	4 feet or less
69 kV	6 feet or less
115 kV	10 feet or less
230 kV	14 feet or less
345 kV	18 feet or less

2.0 DOCUMENTATION

2.1 If the hand-held data recording device is not used during the aerial inspection, documentation shall occur as follows:

2.1.1 Defects shall be documented using the Transmission Aerial Survey Worksheet.

a. Appendix A

2.1.2 The inspection deficiency codes and grading levels may be determined later.

2.1.3 Comments and/or pictures shall be descriptive enough to enter the appropriate code and grading level into the transmission MMS database.

2.1.4 When the field inspection has been completed:

a. Defects shall be entered into the transmission MMS database.

b. Use appropriate codes and grading levels

1. Per this EOP

2.1.5 All identified defects shall be entered within one month of the inspection.

2.2 The worker entering data into the Transmission MMS database shall be trained and competent in:

2.2.1 NG-EOP T007.01

2.2.2 This EOP

2.3 Level 1 reporting procedure:

2.3.1 Reported ASAP

a. Not more than two hours after discovery

2.3.2 National Grid workers shall notify the appropriate Control Room:

a. New York – 315-460-2110

b. New England – 508-421-7217 or 800-382-7260

2.3.3 Contract workers shall contact their National Grid representative who will then follow Section 2.3.2 above.

2.3.4 Level 1 defect reports include:

a. Inspector (name, company affiliation, work headquarters)

b. Telephone number

c. Details

1. Problem found
2. Line and Structure number
3. Street address, GPS coordinates or any other information to help locate the structure
   i. Cross streets or access information
4. Standing by or not

3.0 FOLLOW UP PRIORITIZATION

3.1 All defects shall be graded based on worst critical member/location or discrete area, i.e. the weakest link of the asset.

3.2 Once reported, defects shall be addressed within:

3.2.1 Level 1 – Address within 7 total days

a. Begins the day after the problem is discovered

3.2.2 Level 2 * – Address within 1 year from date entered into database

3.2.3 Level 3 *– Address within 3 years from date entered into database

3.2.4 Level 4 – Monitor condition or use for studies

* Unless a Project to address the defects is imminent

4.0 REVISION HISTORY

Version	Date	Description of Revision
1.0	06/01/15	Supersedes PR 06.01.601.002 dated 04/18/11. Put into standard EOP outline format, clarify wording throughout, updated department names

Appendix A - Aerial Visual Inspection Worksheet

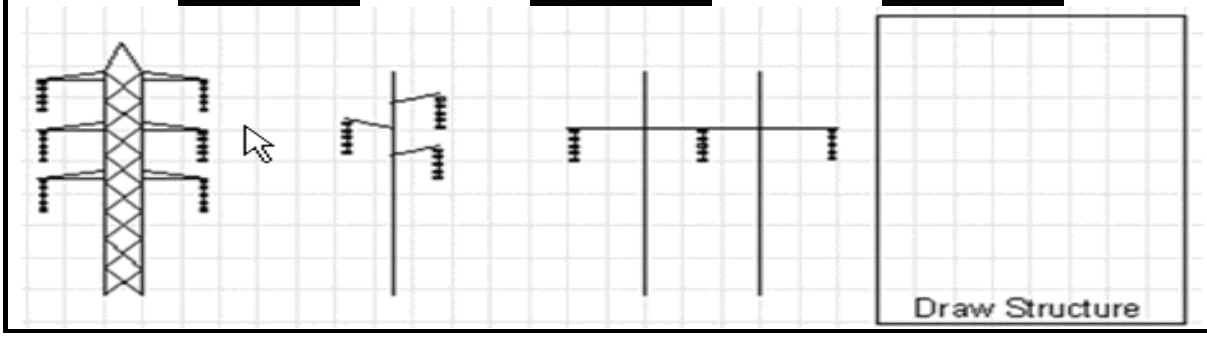
Aerial Visual Inspection Worksheet

Line #

Str #

Notes:

Avian	Pole	Crossarm	Structure	Conductor	Insulator	ROW
Nests	Crack/Rot	Crack/Rot	Damage	Birdcaged	Broken	Encroachment
Perching	Burned	Broken	Rust	Broken	Flashed	Tree
Other	Leaning	Other	Bent	Sag	Not Plumb	Other
	Woodpecker		Leaning	Other	Hardware	
	Other		Other		Other	



Aerial Visual Inspection Worksheet

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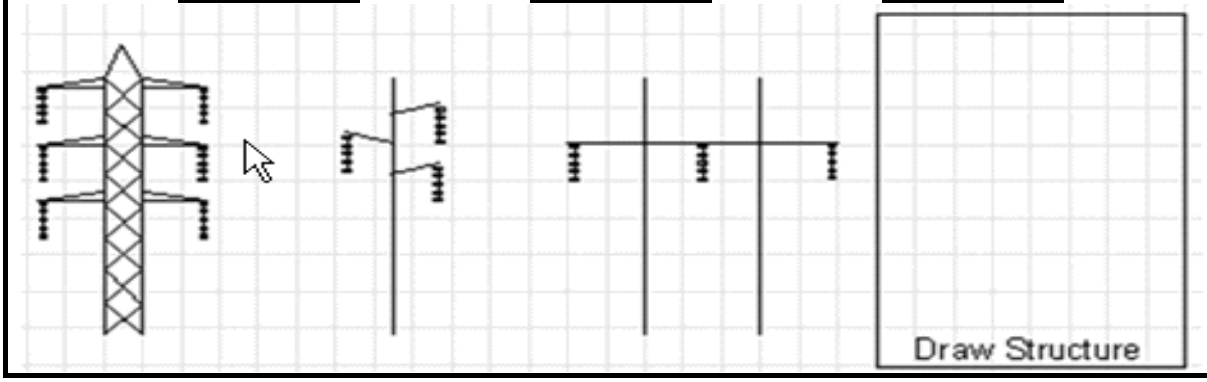
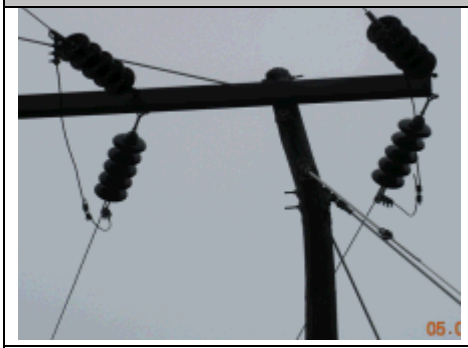
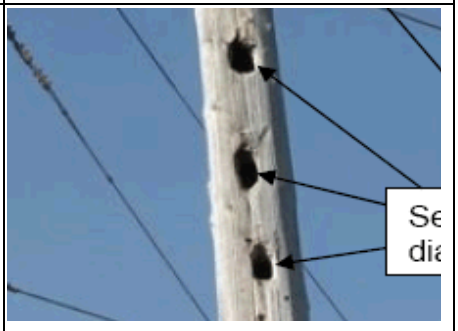
Perching	Burned	Broken	Rust	Broken	Flashed	Tree
Other	Leaning	Other	Bent	Sag	Not Plumb	Other
	Woodpecker		Leaning	Other	Hardware	
	Other		Other		Other	

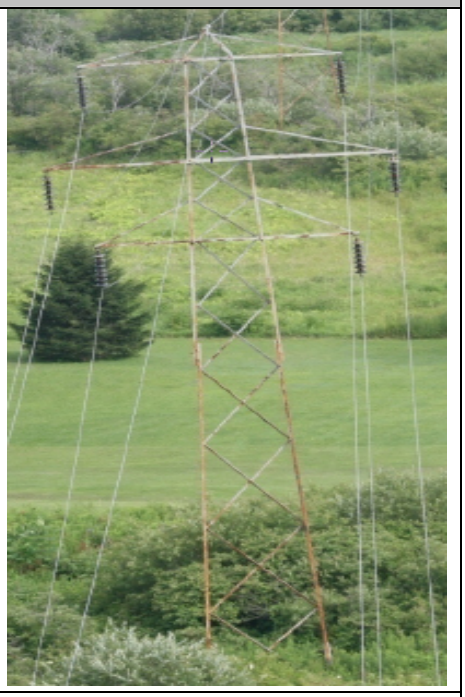


Appendix B – Typical Defects

AVIAN		
		
Nests	**Nests**	**Perching**

Poles		
		
Broken structure members	**Burned pole top**	**Burned pole top.**
		
Rotted w/vegetation in pole top.	**Rotted pole top.**	**Woodpecker damage**

Crossarm	
	
Cracks/Woodpecker holes	**Cracks**

STRUCTURE		
		
Rusted steel	**Bent/deflected steel**	**Leaning**

CONDUCTOR

Bird Caging

Broken Strands

Broken Strands

INSULATORS

Broken

Flashed

Flashed

Out Of Alignment

Hardware Problem

ROW ISSUES	
	
Encroachments	**Encroachments**