Standard FAC-003-1	Proposed Standard FAC-003-2 RBS Draft 4	Observations
Definitions of Terms **Right of Way** A corridor of land on which electric lines may be located. The Transmission Owner may own the land in fee, own an easement, or have certain franchise, prescription, or license rights to construct and maintain lines.	**Definitions of Terms Used in Standard** **Right-of-Way (ROW)** The corridor of land under a transmission line(s) needed to operate the line(s). The width of the corridor is established by engineering or construction standards as documented in either construction documents, pre-2007 vegetation maintenance records, or by the blowout standard in effect when the line was built. The ROW width in no case exceeds the Transmission Owner's legal rights but may be less based on the aforementioned criteria. The current glossary definition of this NERC term is modified to address the issues set forth in Paragraph 734 of FERC Order 693.	This definition is intended to more clearly recognize the establishment of the Right of Way thought documentation.
Vegetation Inspection The systematic examination of a transmission corridor to document vegetation conditions.	**Vegetation Inspection** The systematic examination of vegetation conditions on a Right-of-Way and those vegetation conditions under the Transmission Owner's control that are likely to pose a hazard to the line(s) prior to the next planned maintenance or inspection. This may be combined with a general line inspection.	This definition is intended to explain the reason for Vegetation Inspections, and to make clear that entities may perform other inspections at the same time as the Vegetation Inspection.

Standard FAC-003-1	Proposed Standard FAC-003-2 RBS Draft 4	Observations
	The current glossary definition of this NERC term is modified to allow both maintenance inspections and vegetation inspections to be performed concurrently. Current definition of Vegetation Inspection: The systematic examination of a transmission corridor to document vegetation conditions.	
	Minimum Vegetation Clearance Distance (MVCD) The calculated minimum distance stated in feet (meters) to prevent flash-over between conductors and vegetation, for various altitudes and operating voltages.	This definition was added to ensure a consistent understanding of the phrase.
3. Purpose: To improve the reliability of the electric transmission systems by preventing outages from vegetation located on transmission rights-of-way (ROW) and minimizing outages from vegetation located adjacent to ROW, maintaining clearances between transmission lines and vegetation on and along transmission ROW, and	**3. Purpose:** To maintain a reliable electric transmission system by using a defense-in-depth strategy to manage vegetation located on transmission rights of way (ROW) and minimize encroachments from vegetation located adjacent to the ROW, thus preventing the risk of those vegetation-related outages that could lead to Cascading.	Results based purpose, driven by Needs and Goals. NEED: To maintain a reliable electric transmission system , preventing the risk of those vegetation-related outages that could lead to Cascading. GOAL: To manage vegetation located on transmission rights of way (ROW) and minimize encroachments from vegetation located adjacent to the ROW

Standard FAC-003-1	Proposed Standard FAC-003-2 RBS Draft 4	Observations
reporting vegetation related outages of the transmission systems to the respective Regional Reliability Organizations (RRO) and the North American Electric Reliability Council (NERC).		
4. Applicability: **4.1.** Transmission Owner **4.2.** Regional Reliability Organization **4.3.** This Standard shall apply to all transmission lines operated at 200 kV and above and to any lower voltage lines designated by the RRO as critical to the reliability of the electric system in the region.	4.1. Functional Entities: 4.1.1 Transmission Owners 4.2. Facilities: Defined below (referred to as "applicable lines"), including but not limited to those that cross lands owned by federal , state, provincial, public, private, or tribal entities: 4.2.1. Each overhead transmission line operated at 200kV or higher. 4.2.2. Each overhead transmission line operated below 200kV identified as an element of an IROL under NERC Standard FAC-014 by the Planning Coordinator. 4.2.3. Each overhead transmission line operated below 200 kV identified as an element of a Major WECC Transfer Path in the Bulk Electric System by WECC. 4.2.4. Each overhead transmission line identified above (4.2.1 through 4.2.3) located outside the fenced area of the switchyard, station or substation and any portion of the span of the transmission line that is crossing the substation fence.	4.1.1 replaces 4.1. 4.2 has been removed, as the requirements related to the RRO have been addressed in the compliance section of the standard. 4.2 replaces 4.3. This is superior, as it raises the bar on what lines need to be included within the applicability of this standard. To the extent the areas not covered in 4.2.4 need to be addressed, they should do so under another project and possibly in a separate standard, as the requirements for vegetation management performed in these areas by the GO and DP may be somewhat different than those performed by a Transmission Owner.

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	Rationale The areas excluded in 4.2.4 were excluded based on comments from industry for reasons summarized as follows: 1) There is a very low risk from vegetation in this area. Based on an informal survey, no TOs reported such an event. 2) Substations, switchyards, and stations have many inspection and maintenance activities that are necessary for reliability. Those existing process manage the threat. As such, the formal steps in this standard are not well suited for this environment. 3) NERC has a project in place to address at a later date the applicability of this standard to Generation Owners. 4) Specifically addressing the areas where the standard does and does not apply makes the standard clearer.	

R1. The Transmission Owner shall prepare, and keep current, a formal transmission vegetation management program (TVMP). The TVMP shall include the Transmission Owner's objectives, practices, approved procedures, and work specifications**1**.	**R3.** Each Transmission Owner shall have documented maintenance strategies or procedures or processes or specifications it uses to prevent the encroachment of vegetation into the MVCD of its applicable lines that include(s) the following: **Rationale** The documentation provides a basis for evaluating the competency of the Transmission Owner's vegetation program. There may be many acceptable approaches to maintain clearances. Any approach must demonstrate that the Transmission Owner avoids vegetation-to-wire conflicts under all Ratings and all Rated Electrical Operating Conditions. See Figure 1 for an illustration of possible conductor locations.	R3 replaces R1.
R1.1. The TVMP shall define a schedule for and the type (aerial, ground) of ROW vegetation inspections. This schedule should be flexible enough to adjust for changing conditions. The inspection schedule shall be based on the anticipated growth of vegetation	R6. Each Transmission Owner shall perform a Vegetation Inspection of 100% of its applicable transmission lines (measured in units of choice - circuit, pole line, line miles or kilometers, etc.) at least once per calendar year and with no more than 18	R6 replaces R1.1. R6 is superior because it requires entities to take action (perform the inspection), rather than just create a schedule.

and any other environmental or operational factors that could impact the relationship of vegetation to the Transmission Owner's transmission lines.	calendar months between inspections on the same ROW.1 **Rationale** Inspections are used by Transmission Owners to assess the condition of the entire ROW. The information from the assessment can be used to determine risk, determine future work and evaluate recently-completed work. This requirement sets a minimum Vegetation Inspection frequency of once per calendar year but with no more than 18 months between inspections on the same ROW. Based upon average growth rates across North America and on common utility practice, this minimum frequency is reasonable. Transmission Owners should consider local and environmental factors that could warrant more frequent inspections.	
R1.2. The Transmission Owner, in the TVMP, shall identify and document clearances between vegetation and any overhead, ungrounded supply conductors, taking into consideration transmission line voltage, the effects of ambient temperature on conductor sag under maximum design	**R3.** Each Transmission Owner shall have documented maintenance strategies or procedures or processes or specifications it uses to prevent the encroachment of vegetation into the MVCD of its applicable lines that include(s)accounts for the following	Requirement R3 and Parts 3.1 and 3.2 replace the concept of "Clearance 1," as discussed in R1.2 and R1.2.1.

[1] When the Transmission Owner is prevented from performing a Vegetation Inspection within the timeframe in R6 due to a natural disaster, the TO is granted a time extension that is equivalent to the duration of the time the TO was prevented from performing the Vegetation Inspection.

loading, and the effects of wind velocities on conductor sway. Specifically, the Transmission Owner shall establish clearances to be achieved at the time of vegetation management work identified herein as Clearance 1, and shall also establish and maintain a set of clearances identified herein as Clearance 2 to prevent flashover between vegetation and overhead ungrounded supply conductors. **R1.2.1.** Clearance 1 — The Transmission Owner shall determine and document appropriate clearance distances to be achieved at the time of transmission vegetation management work based upon local conditions and the expected time frame in which the Transmission Owner plans to return for future vegetation management work. Local conditions may include, but are not limited to: operating voltage, appropriate vegetation management techniques, fire risk, reasonably anticipated tree and conductor movement, species types and growth rates, species failure characteristics, local climate and rainfall patterns, line terrain and elevation, location of the vegetation within the span, and worker approach distance requirements. Clearance 1 distances shall be greater than those defined by Clearance 2 below.	**3.1** Movement of applicable line conductors under their Rating and all Rated Electrical Operating Conditions; **3.2** Inter-relationships between vegetation growth rates, vegetation control methods, and inspection frequency.	

R1.2.2. Clearance 2 — The Transmission Owner shall determine and document specific radial clearances to be maintained between vegetation and conductors under all rated electrical operating conditions. These minimum clearance distances are necessary to prevent flashover between vegetation and conductors and will vary due to such factors as altitude and operating voltage. These Transmission Owner-specific minimum clearance distances shall be no less than those set forth in the Institute of Electrical and Electronics Engineers (IEEE) Standard 516-2003 (*Guide for Maintenance Methods on Energized Power Lines*) and as specified in its Section 4.2.2.3, Minimum Air Insulation Distances without Tools in the Air Gap. **R1.2.2.1** Where transmission system transient overvoltage factors are not known, clearances shall be derived from Table 5, IEEE 516-2003, phase-to-ground distances, with appropriate altitude correction factors applied. **R1.2.2.2** Where transmission system	**R1.** Each Transmission Owner shall manage vegetation to prevent encroachments into the MVCD of its applicable line(s) which are either an element of an IROL, or an element of a Major WECC Transfer Path; operating within its Rating and all Rated Electrical Operating Conditions of the types shown below[2] [*Violation Risk Factor: High*] [*Time Horizon: Real-time*]: 1. An encroachment into the MVCD as shown in FAC-003-Table 2, observed in Real-time, absent a Sustained Outage **R2.** Each Transmission Owner shall manage vegetation to prevent encroachments into the MVCD of its applicable line(s) which are <u>not</u> either an element of an IROL, or an element of a Major WECC Transfer Path; operating within its Rating and all Rated Electrical Operating Conditions of the types shown below[2] [*Violation Risk Factor:*	R1 item 1 and R2 item 2 replace Clearance 2 with the Gallet Equations. These are performance based, and superior to the existing standard, as they require the entities to perform an action (manage vegetation) rather than creating a document.

[2] This requirement does not apply to circumstances that are beyond the control of a Transmission Owner subject to this reliability standard, including natural disasters such as earthquakes, fires, tornados, hurricanes, landslides, wind shear, fresh gale, major storms as defined either by the Transmission Owner or an applicable regulatory body, ice storms, and floods; human or animal activity such as logging, animal severing tree, vehicle contact with tree, or installation, removal, or digging of vegetation. Nothing in this footnote should be construed to limit the Transmission Owner's right to exercise its full legal rights on the ROW.

[3] If a later confirmation of a Fault by the Transmission Owner shows that a vegetation encroachment within the MVCD has occurred from vegetation within the ROW, this shall be considered the equivalent of a Real-time observation.

transient overvoltage factors are known, clearances shall be derived from Table 7, IEEE 516-2003, phase-to-phase voltages, with appropriate altitude correction factors applied.	*Medium*] [*Time Horizon: Real-time*]: 1. An encroachment into the MVCD as shown in FAC-003-Table 2, observed in Real-time, absent a Sustained Outage[3],	
R1.3. All personnel directly involved in the design and implementation of the TVMP shall hold appropriate qualifications and training, as defined by the Transmission Owner, to perform their duties.		R1.3 is ambiguous (what is "appropriate") and unenforceable (what if the Transmission Owner defines no qualifications or training), and was not included in the new version of the standard.
R1.4. Each Transmission Owner shall develop mitigation measures to achieve sufficient clearances for the protection of the transmission facilities when it identifies locations on the ROW where the Transmission Owner is restricted from attaining the clearances specified in Requirement 1.2.1.		R5 replaces R1.4. It is superior because it requires the Transmission Owner to take action (take corrective action), rather than to simply develop mitigation measures.
	R5. When a Transmission Owner is constrained from performing vegetation work on applicable transmission lines operating within their Rating and all Rated Electrical Operating Conditions, and the constraint may lead to a vegetation encroachment into the MVCD prior to the implementation of the next annual work plan, then the Transmission Owner shall take corrective action to ensure continued vegetation management to prevent encroachments	

	Rationale Legal actions and other events may occur which result in constraints that prevent the Transmission Owner from performing planned vegetation maintenance work. In cases where the transmission line is put at potential risk due to constraints, the intent is for the Transmission Owner to put interim measures in place, rather than do nothing. The corrective action process is not intended to address situations where a planned work methodology cannot be performed but an alternate work methodology can be used.	
R1.5. Each Transmission Owner shall establish and document a process for the immediate communication of vegetation conditions that present an imminent threat of a transmission line outage. This is so that action (temporary reduction in line rating, switching line out of service, etc.) may be taken until the threat is relieved.	**R4.** Each Transmission Owner, without any intentional time delay, shall notify the control center holding switching authority for the associated applicable line when the Transmission Owner has confirmed the existence of a vegetation condition that is likely to cause a Fault at any moment. *[VRF – Medium] [Time Horizon – Real-time]*	R4 replaces R1.5. It is superior because it requires the Transmission Owner to take action (notify the control center) rather than document a process.

	Rationale This is to ensure expeditious communication between the Transmission Owner and the control center when a critical situation is confirmed.	
R2. The Transmission Owner shall create and implement an annual plan for vegetation management work to ensure the reliability of the system. The plan shall describe the methods used, such as manual clearing, mechanical clearing, herbicide treatment, or other actions. The plan should be flexible enough to adjust to changing conditions, taking into consideration anticipated growth of vegetation and all other environmental factors that may have an impact on the reliability of the transmission systems. Adjustments to the plan shall be documented as they occur. The plan should take into consideration the time required to obtain permissions or permits from landowners or regulatory authorities. Each Transmission Owner shall have systems and procedures for documenting and tracking the planned vegetation management work and ensuring that the vegetation management work was completed according to work specifications.	**R7.** Each Transmission Owner shall complete 100% of its annual vegetation work plan of applicable lines to ensure no vegetation encroachments occur within the MVCD. Modifications to the work plan in response to changing conditions or to findings from vegetation inspections may be made (provided they do not allow encroachment of vegetation into the MVCD) and must be documented. The percent completed calculation is based on the number of units actually completed divided by the number of units in the final amended plan (measured in units of choice - circuit, pole line, line miles or kilometers, etc.) Examples of reasons for modification to annual plan may include • Change in expected growth rate/ environmental factors • Circumstances that are beyond the control of a Transmission Owner[3] • Rescheduling work between growing seasons • Crew or contractor availability/ Mutual assistance agreements	R7 replaces R2. It is superior because it requires entities to takes specific action (complete 100% of its plan) rather than more generic language (implement its plan). Entities that do not have a plan would be unable to meet this requirement, as they would have no evidence to demonstrate compliance.

[3] Circumstances that are beyond the control of a Transmission Owner include but are not limited to natural disasters such as earthquakes, fires, tornados, hurricanes, landslides, ice storms, floods, or major storms as defined either by the TO or an applicable regulatory body.

	• Identified unanticipated high priority work • Weather conditions/Accessibility • Permitting delays • Land ownership changes/Change in land use by the landowner • Emerging technologies **Rationale** This requirement sets the expectation that the work identified in the annual work plan will be completed as planned. It allows modifications to the planned work for changing conditions, taking into consideration anticipated growth of vegetation and all other environmental factors, provided that those modifications do not put the transmission system at risk of a vegetation encroachment.	
R3. The Transmission Owner shall report quarterly to its RRO, or the RRO's designee, sustained transmission line outages determined by the Transmission Owner to have been caused by vegetation. **R3.1.** Multiple sustained outages on an individual line, if caused by the same vegetation, shall be reported as one outage regardless of the actual number of outages within a 24-hour period. **R3.2.** The Transmission Owner is not required to report to the RRO, or the RRO's designee, certain sustained transmission line outages caused by vegetation: (1) Vegetation related	**Periodic Data Submittal:** The Transmission Owner will submit a quarterly report to its Regional Entity, or the Regional Entity's designee, identifying all Sustained Outages of applicable lines operated within their Rating and all Rated Electrical Operating Conditions as determined by the Transmission Owner to have been caused by vegetation, except as excluded in footnote 2, and including as a minimum the following: o The name of the circuit(s), the date, time and duration of the outage; the voltage of the circuit; a description of the cause of the outage; the category associated with the Sustained	Moved to compliance section of standard.

outages that result from vegetation falling into lines from outside the ROW that result from natural disasters shall not be considered reportable (examples of disasters that could create non-reportable outages include, but are not limited to, earthquakes, fires, tornados, hurricanes, landslides, wind shear, major storms as defined either by the Transmission Owner or an applicable regulatory body, ice storms, and floods), and (2) Vegetation-related outages due to human or animal activity shall not be considered reportable (examples of human or animal activity that could cause a non-reportable outage include, but are not limited to, logging, animal severing tree, vehicle contact with tree, arboricultural activities or horticultural or agricultural activities, or removal or digging of vegetation). **R3.3.** The outage information provided by the Transmission Owner to the RRO, or the RRO's designee, shall include at a minimum: the name of the circuit(s) outaged, the date, time and duration of the outage; a description of the cause of the outage; other pertinent comments; and any countermeasures taken by the Transmission Owner. **R3.4.** An outage shall be categorized as one of the following: **R3.4.1.** Category 1 — Grow-ins: Outages caused by vegetation growing into lines from vegetation inside and/or outside of the ROW; **R3.4.2.** Category 2 — Fall-ins: Outages caused by vegetation falling into lines from inside the ROW; **R3.4.3.** Category 3 — Fall-ins: Outages caused by vegetation falling into lines from	Outage; other pertinent comments; and any countermeasures taken by the Transmission Owner. A Sustained Outage is to be categorized as one of the following: o Category 1A — Grow-ins: Sustained Outages caused by vegetation growing into applicable lines, that are identified as an element of an IROL or Major WECC Transfer Path, by vegetation inside and/or outside of the ROW; o Category 1B — Grow-ins: Sustained Outages caused by vegetation growing into applicable lines, but are not identified as an element of an IROL or Major WECC Transfer Path, by vegetation inside and/or outside of the ROW; o Category 2A — Fall-ins: Sustained Outages caused by vegetation falling into applicable lines that are identified as an element of an IROL or Major WECC Transfer Path, from within the ROW; o Category 2B — Fall-ins: Sustained Outages caused by vegetation falling into applicable lines, but are not identified as an element of an IROL or Major WECC Transfer Path, from within the ROW; o Category 3 — Fall-ins: Sustained Outages caused by vegetation falling into applicable lines from outside the ROW; o Category 4A — Blowing together: Sustained Outages caused by vegetation and applicable lines that are identified as an element of an IROL or Major WECC Transfer Path, blowing together from within the ROW. o Category 4B — Blowing together: Sustained	

outside the ROW. **R4.** The RRO shall report the outage information provided to it by Transmission Owner's, as required by Requirement 3, quarterly to NERC, as well as any actions taken by the RRO as a result of any of the reported outages.	Outages caused by vegetation and applicable lines, but are not identified as an element of an IROL or Major WECC Transfer Path, blowing together from within the ROW. The Regional Entity will report the outage information provided by Transmission Owners, as per the above, quarterly to NERC, as well as any actions taken by the Regional Entity as a result of any of the reported Sustained Outages.	
	R1. Each Transmission Owner shall manage vegetation to prevent encroachments into the MVCD of its applicable line(s) which are either an element of an IROL, or an element of a Major WECC Transfer Path; operating within their Rating and all Rated Electrical Operating Conditions of the types shown below[2]: 1. An encroachment into the MVCD as shown in FAC-003-Table 2, observed in Real-time, absent a Sustained Outage[3] , 2. An encroachment due to a fall-in from inside the ROW that caused a vegetation-related Sustained Outage[4] , 3. An encroachment due to the blowing together of applicable lines and vegetation located inside the ROW that caused a vegetation-related Sustained Outage[4], 4. An encroachment due to vegetation growth into the MVCD that caused a vegetation-related Sustained Outage[4].	New requirement.

	Rationale Lines with the highest significance to reliability are covered in R1; all other lines are covered in R2. Rationale for the types of failure to manage vegetation which are listed in order of increasing degrees of severity in non-compliant performance as it relates to a failure of a Transmission Owner's vegetation maintenance program: 1. This management failure is found by routine inspection or Fault event investigation, and is normally symptomatic of unusual conditions in an otherwise sound program. 2. This management failure occurs when the height and location of a side tree within the ROW is not adequately addressed by the program. 3. This management failure occurs when side growth is not adequately addressed and may be indicative of an unsound program. 4. This management failure is usually indicative of a program that is not addressing the most fundamental dynamic of vegetation management, (i.e. a grow-in under the line). If this type of failure is pervasive on multiple	
	R2. Each Transmission Owner shall manage	New requirement.

	vegetation to prevent encroachments into the MVCD of its applicable line(s) which are not either an element of an IROL, or an element of a Major WECC Transfer Path; operating within its Rating and all Rated Electrical Operating Conditions of the types shown below[2] [Violation Risk Factor: Medium] [Time Horizon: Real-time]: 1. An encroachment into the MVCD, observed in Real-time, absent a Sustained Outage[3], 2. An encroachment due to a fall-in from inside the ROW that caused a vegetation-related Sustained Outage[4], 3. An encroachment due to blowing together of applicable lines and vegetation located inside the ROW that caused a vegetation-related Sustained Outage[4], 4. An encroachment due to vegetation growth into the MVCD that caused a vegetation-related Sustained Outage[4]	

	Rationale Lines with the highest significance to reliability are covered in R1; all other lines are covered in R2. Rationale for the types of failure to manage vegetation which are listed in order of increasing degrees of severity in non-compliant performance as it relates to a failure of a Transmission Owner's vegetation maintenance program: 1. This management failure is found by routine inspection or Fault event investigation, and is normally symptomatic of unusual conditions in an otherwise sound program. 2. This management failure occurs when the height and location of a side tree within the ROW is not adequately addressed by the program. 3. This management failure occurs when side growth is not adequately addressed and may be indicative of an unsound program. 4. This management failure is usually indicative of a program that is not addressing the most fundamental dynamic of vegetation management, (i.e. a grow-in under the line). If this type of failure is pervasive on multiple lines, it provides a mechanism for a Cascade.	

[2] This requirement does not apply to circumstances that are beyond the control of a Transmission Owner subject to this reliability standard, including natural disasters such as earthquakes, fires, tornados, hurricanes, landslides, wind shear, fresh gale, major storms as defined either by the Transmission Owner or an applicable regulatory body, ice storms, and floods; human or animal activity such as logging, animal severing tree, vehicle contact with tree, or installation, removal, or digging of vegetation. Nothing in this footnote should be construed to limit the Transmission Owner's right to exercise its full legal rights on the ROW.

[3] If a later confirmation of a Fault by the Transmission Owner shows that a vegetation encroachment within the MVCD has occurred from vegetation within the ROW, this shall be considered the equivalent of a Real-time observation.

[4] Multiple Sustained Outages on an individual line, if caused by the same vegetation, will be reported as one outage regardless of the actual number of outages within a 24-hour period.