

<i>Location</i>	<i>Upgrade</i>	<i>Need</i>	<i>Category</i>	<i>Affected DU's</i>	<i>Lead DU</i>	<i>Reasons for selecting Affected utilities</i>	<i>Reasons for Lead DU</i>
St. Johnsbury	Construct new station with 115/34.5 kV transformer. Install capacitor banks.	Loss of transformer causes loss of load	Predominantly Bulk	CVPS and Lyndonville for station. CVPS, Lyndonville and VEC for capacitor banks	Lyndonville	For transformer: CVPS and Lyndonville are the only utilities whose load is affected by loss of the transformer due to the radial nature of the system For capacitor banks: the voltage collapse concern affects load served at St Johnsbury, Irasburg and Newport. Utilities supplied at these locations are CVPS, Lyndonville, and VEC	Lyndonville is the utility that requested the reliability improvement
Middlebury	Install 2 nd 115/46 kV transformer & rebuild to ring station	Loss of transformer and breaker failures cause voltage collapse. Timing depends on CVPS 46 kV line project.	Predominantly Bulk	CVPS	CVPS	CVPS is the only utility whose load is affected by loss of the transformer	CVPS is the only affected utility
St. Albans	Construct new ring station with two 115/34.5 kV transformers	Loss of St. Albans tap causes voltage collapse. Transformers overload for loss of either of the transformers or loss of East Fairfax transformer	Predominantly Bulk	CVPS, VEC	CVPS	The voltage collapse concern affects load served at St Albans and East Fairfax. Utilities supplied at these locations are CVPS and VEC.	CVPS is directly supplied from St Albans and has the highest amount of load affected
Georgia	Rebuild to ring station	Breaker failures cause voltage collapse	Predominantly Bulk	CVPS, VEC	VEC	The voltage collapse concern affects load served at St Albans and East Fairfax. Utilities supplied at these locations are CVPS and VEC.	CVPS is directly supplied from St Albans and has the highest amount of load affected
Georgia-St. Albans	Construct new Georgia-St. Albans 115 kV line	Voltage instability with the Georgia-St. Albans line section opened	Bulk	CVPS, VEC, Swanton	VEC	The voltage instability concern affects load served at Highgate, St Albans and East Fairfax. Utilities supplied at these locations are CVPS, VEC and Swanton. The Newport, Irasburg and St Johnsbury station may also be affected. Additional studies are needed to determine how much wider is the affected area.	VEC has, potentially, the highest amount of load affected
South Rutland	Construct new station with a 115/46 kV transformer	Loss of North Rutland or Cold River transformer causes sub-transmission and transformer overloads, which will result in loss of load	Predominantly Bulk	CVPS	CVPS	CVPS is the only utility whose load is affected by loss of either transformer	CVPS is the only affected utility
Blissville	Install 2 nd 115/46 kV transformer & Rebuild to ring station. Install capacitor bank	Loss of transformer causes low voltages and overloads, which will result in loss of load. Loss of 350 causes low 115 kV voltage	Predominantly Bulk	CVPS	CVPS	CVPS is the only utility whose load is affected by loss of the transformer	CVPS is the only affected utility
Hartford	Install 2 nd 115/46 kV transformer & Rebuild to ring station	Loss of transformer causes low voltages and overloads, which will result in loss of load. Breaker failures cause voltage collapse.	Predominantly Bulk	CVPS, GMP	CVPS	The low voltage concern affects load served from Hartford. The utilities supplied at that location are CVPS and GMP (Norwich load).	CVPS is directly supplied from Hartford and has the highest amount of load affected
Newport	Install capacitor bank	Loss of K-60 line causes voltage collapse	Bulk	VEC, CVPS, Lyndonville	VEC	The voltage collapse concern affects load served at St Johnsbury, Irasburg and Newport. Utilities supplied at these locations are CVPS, Lyndonville, and VEC	VEC is directly supplied from Newport and has the highest amount of load affected

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Queen City	Install capacitor bank	Loss of K-25 causes low voltage	Bulk	GMP, BED, VEC, CVPS, Vermont Marble, NGRID	GMP	The low voltage concern affects load served from East Avenue, Gorge, Tafts Corner, Queen City, Shelburne, Charlotte, North Ferrisburg, Vergennes, New Haven, Middlebury, Florence, Blissville, North Rutland, Cold River, and New York. The utilities supplied at these locations are BED, GMP, VEC, CVPS, Vermont Marble, and National Grid NY.	GMP is directly supplied from Queen City and has the highest amount of load affected near Queen City
West Rutland	Install capacitor banks and shunt reactor	Loss of 350 or 370 causes low voltage. High voltages during low load levels.	Bulk	GMP, CVPS, Vermont Marble, NGRID	CVPS	The low voltage concern affects load served from Shelburne, Charlotte, North Ferrisburg, Vergennes, New Haven, Middlebury, Florence, Blissville, North Rutland, Cold River, and New York. The utilities supplied at these locations are GMP, CVPS, Vermont Marble, and National Grid NY.	CVPS has the largest amount of load affected
Coolidge-Ascutney 115 kV K-31 line	Rebuild to higher rating	Line overloaded with the F-206 line out of service and for loss of I135N/J135N DCT	Bulk	CVPS, Ludlow, GMP, NU, NGRID	GMP	This overload is caused mostly by regional transfers and New Hampshire load. A reduction of 50 MW in Vermont west of Ascutney does not reduce the flow on the line. Disconnecting the GMP load (about 9 MW) fed out of Bellows Falls eliminated the overload at the 2009 load level. Therefore, the affected utilities are GMP and those that are in the vicinity of the 115 kV line (CVPS and Ludlow), and mostly NU and NGRID whose load affects the violation. Ludlow and CVPS will also be affected during the rebuild of the line because the 46 kV line that connects to Ludlow and CVPS will be overloaded.	Of the Vermont utilities, only GMP load can affect this overload
VY to Vernon Road 115 kV K-186 line	Rebuild to higher rating	Line overloaded for loss of Fitzwilliam transformer and breaker failures at Fitzwilliam	Bulk	CVPS, GMP, NU, NGRID	CVPS	This overload is caused mostly by regional transfers and New Hampshire load. A reduction of 50 MW in Vermont west of Ascutney does not reduce the flow on the line. Disconnecting the GMP load (about 9 MW) fed out of Bellows Falls reduced the overload by 0.6% at the 2009 load level. Comparatively, reducing the Vernon Road load by 9 MW reduced the line flow by 2.9%, which eliminated the overload at the 2009 load level. Therefore, the affected utilities are CVPS, GMP, and mostly NU and NGRID whose load affects the violation.	CVPS has the highest amount of load affected

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Vernon	Install 2 nd 345/115 kV transformer	Loss of VT Yankee transformer overloads T-198 line with Vernon transformer out of service	Bulk	CVPS, NU, NGRID	CVPS	This overload is caused mostly by regional transfers and New Hampshire load. A reduction of 50 MW in Vermont west of Ascutney does not reduce the flow on the line. Disconnecting the GMP load (about 9 MW) fed out of Bellows Falls does not reduce the overload. Reducing the Vernon Road load by 11 MW reduced the overload by 2.2%. Therefore, the affected utilities are CVPS, and mostly NU and NGRID whose load affects the violation.	CVPS is the only affected utility
Ascutney-Ascutney Tap 115kV K-149 line	Rebuild to higher rating	Line overloaded with the F-206 line out of service and for loss of I135N/J135N DCT	Bulk	CVPS, GMP, NU, NGRID	GMP	This overload is caused mostly by regional transfers and New Hampshire load. A reduction of 10 MW in Vermont west of Ascutney reduced the flow on the line by 0.5%. Disconnecting the GMP load (about 9 MW) fed out of Bellows Falls reduced the flow by 4.7%, which eliminated the overload at the 2013 load level. Therefore, the affected utilities are CVPS, GMP, and mostly NU and NGRID whose load affects the violation.	GMP load is more effective at reducing the overload
Coolidge-Cold River 115 kV K-32 line	Rebuild to higher rating	Line overloaded with the 350 line out of service and for loss of K-31	Bulk	NY, All DUs except Jacksonville & Readsboro	CVPS	Moving the Newport Block load into Vermont advanced the timing of this violation. A reduction of 10 MW in the Burlington area reduced the flow on the line by 1.5% of the normal rating. A reduction of 10 MW at Ludlow does not reduce the flow on the line. However, Ludlow and CVPS will be affected during the rebuild of the line because the 46 kV line that connects to Ludlow and CVPS will be overloaded.	CVPS has the highest amount of load affected
Bennington	Rebuild to Ring station	Breaker failures cause voltage collapse	Predominantly Bulk	CVPS, NGRID	CVPS	The voltage collapse concern affects load served on the 46 kV system between Bennington and Newfane. GMP load will be served by a radial connection to the NGRID Harriman station with acceptable voltage. Ties to NGRID in MA and NY will be disconnected.	CVPS is the only affected utility
Ascutney	Install 2 nd 115/46 kV transformer & Rebuild to breaker-and-a-half station	Loss of transformer causes low voltages and overloads, which will result in loss of load. Breaker failures cause voltage collapse. Loss of K-31 or 350 causes low voltage	Predominantly Bulk	CVPS, Ludlow	CVPS	The voltage collapse concern affects load served on the 46 kV system between Cold River, Windsor, and Bellows Falls. Utilities served from this system are CVPS and Ludlow.	CVPS has the highest amount of load affected

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	Install capacitor banks					115 kV voltage levels affect imports into central and northern Vermont. Therefore all Utilities are affected by Ascutney voltage violations, except for utilities supplied from the Southern loop connected to Bennington and Brattleboro.	
Coolidge	Install 2 nd 345/115 kV transformer. Install shunt reactor.	Loss of transformer causes low voltages and overloads. High voltages during low load levels.	Bulk	NU, NGRID, NY, ALL DUs except Jacksonville & Readsboro	CVPS	Moving the Newport Block load into Vermont advanced the timing of this violation. A reduction of 10 MW in the Burlington area or in NH reduced the flow on the transformer by 0.4%. A reduction of 10 MW at Ludlow reduced the flow on the transformer by 0.3%. All Utilities are affected by Ascutney voltage violations, except for utilities supplied from the Southern loop connected to Bennington and Brattleboro.	CVPS has the highest amount of load affected
Barre	Install 2 nd 115/34.5 kV transformer & rebuild to ring station	Loss of transformer causes low voltages and overloads, which will result in loss of load.	Predominantly Bulk	GMP, WEC	GMP	The low voltage and overload concerns affect load served on the 34.5 kV system between Berlin, Marshfield, Websterville, and McIndoes Falls. Utilities served from this system are GMP and WEC.	GMP is directly supplied from Barre and has the highest amount of load affected
Chelsea	Install 2 nd 115/46 kV transformer & Rebuild to ring station	Loss of transformer causes low voltages. Loss of line causes voltage collapse.	Predominantly Bulk	CVPS, WEC	CVPS	The low voltage concern affects load served on the 46 kV system between Silverlake, Chelsea and Taftsville. Utilities served from this system are CVPS and WEC.	CVPS is directly supplied from Chelsea and has the highest amount of load affected
Plattsburgh to Essex	Construct 230 kV line from Plattsburgh to Essex in parallel with 115 kV line	Severe voltage concerns and multiple overloads beyond 10-yr horizon. Severe voltage concerns and multiple overloads with Highgate removed within 10-yr horizon.	Bulk	All except Jacksonville & Readsboro	GMP	The overload and voltage concerns are systemwide, except for the southern Loop system connected to Bennington and Brattleboro.	GMP has the highest amount of load in the area where this upgrade would be constructed.

MOU Definitions

Affected DU:

- a. "Affected DU" means an Affected Utility that is a DU.
- b. "Affected Utility" means:
 - i. During Steps 1 through 6, above, a Vermont Utility, the facilities or load of which cause, contribute to, or would experience an impact from, a Reliability Deficiency, and
 - ii. During Steps 7 through 9, above, a Vermont Utility, the facilities or load of which cause, contribute to, or would experience an impact from, a Reliability Deficiency, or in whose territory a proposed solution to a Reliability Deficiency would be implemented.

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Lead DU: v. "Lead DU" means an Affected DU selected by agreement of the Affected Utilities, or in accordance with paragraph 70.h, above, absent such agreement, in order to serve the functions of coordination, ensuring performance of NTA Analysis and facilitating necessary decision-making, and primary contact point for the Reliability Deficiency for which the Lead DU has been selected. Nothing in the selection or activities of a Lead DU shall be deemed to lessen the rights or responsibilities of any other DU under applicable law or this MOU.

Predominantly Bulk: ee. "Predominantly Bulk System" means a set of additions or modifications to the Transmission system to address a Reliability Deficiency, at least 50 percent of the elements of which are Bulk Transmission System, when examined on a forecasted cost basis. For the purpose of determining the design and specification for transformers that connect to the Bulk Transmission System, and not for the purpose of determining ownership or cost allocation, such transformers will be considered part of the Bulk Transmission System. Where a transformer steps down to a distribution voltage, VELCO shall consult with the Affected DU or DUs to determine the applicable reliability criteria.