

**Western Massachusetts Electric Company**

**Docket No. EFSB 08-2/D.P.U. 08-105/08-106**

**Information Request EFSB**

**SET 2**

**Dated: 06/24/2009**

**Q-EFSB-A-014**

**Page 1 of 2**

**Witness: Allen W. Scarfone, Robert E. Carberry**  
**Request from: Energy Facilities Siting Board**

**Question:**

Please explain in detail why between the Agawam Substation and South Agawam Switching Station, the southern route is designed for two 345 kV structures. Specifically, is it necessary for the southern route to continue north to the Agawam Substation, supply power to the 115 kV system at that substation, and then continue south to Connecticut; alternatively, could the southern route travel to the South Agawam Switching Station supply power to the 115 kV system at that location, and then continue south to Connecticut? Please include a discussion of the benefits and costs of continuing on to the Agawam Substation, and explain the drawbacks, if any, of extending the 345 kV line only as far north as the South Agawam Switching Station.

**Response:**

The Agawam substation is an existing substation where eight 115-kV circuits interconnect and which has many electrically desirable features for expansion to a 345/115-kV bulk power substation, such as:

- The Agawam Substation is electrically close to the Springfield load pocket with multiple 115-kV circuits interconnecting from diverse locations and can be considered a hub for the area.
- The Agawam 115-kV switchyard is already designed in a "circuit breaker-and-a-half" bus scheme, and this configuration is consistent with configuration plans for all future bulk-power substations in the ISO-NE Planning Procedure No. 9 (PP9).
- The Agawam Substation has substation facilities already in place such as control equipment, control house, grounding grids, and physical layout space to accommodate new bulk-power 345/115-kV autotransformers.
- The Agawam Substation is in the direct path of the planned Northern Route for the proposed new 345-kV circuit from the Ludlow Substation.

This information request concerns the possible use of the alternative southern route for the two new 345-kV circuits between Ludlow and North Bloomfield Substations, with each 345-kV circuit connecting at a 345/115-kV switchyard constructed next to the South Agawam Switching Station, where the 345/115-kV autotransformers would be installed. This plan would eliminate the construction of two independent 345-kV transmission circuit sections over the 3.2-mile ROW from South Agawam Switching Station to the Agawam Substation. However, a major reconfiguration would be required at the South Agawam Switching Station. The existing South Agawam Switching Station is not designed in a manner consistent with PP9. A new "circuit breaker-and-a-half" substation bus configuration scheme would have to be constructed to accommodate the existing and new 115-kV circuit and autotransformer terminations. Also, the addition of the autotransformers at this location may require building several 115-kV high capacity circuits between the new South Agawam Switching Station and the Agawam Substation. Each of the 115-kV circuits would have to be placed on independent lines of structures if reliability studies do not allow for double-circuit towers. These transmission circuits would be required to reliably transmit electric power from this bulk-power substation to the Springfield area load pocket via the 115-kV system connecting into the Agawam Substation. Right-of-way expansion may be needed along some of this route for these 115-kV circuits.

This South Agawam Switching Station is already physically challenged to accommodate the equipment there today. Siting this switching station raised environmental concerns when it was proposed for the Berkshire Power generating station in the 1990's. In addition, the cost of constructing a new bulk- power substation at a location that is less prepared than at a location that has been recognized in the past as a good and desirable site can have higher cost implications and potentially localized costs, as determined by ISO-NE under the PP4 review.

Please also see the response to Information Request EFSB-A-016.

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**Docket No. EFSB 08-2/D.P.U. 08-105/08-106**

**Information Request EFSB**

**SET 2**

**Dated: 06/24/2009**

**Q-EFSB-A-015**

**Page 1 of 1**

**Witness: John C. Case, Robert E. Carberry**  
**Request from: Energy Facilities Siting Board**

**Question:**

Conceptually, as a modification to the Southern Route would it be possible to build a 345 kV switch / ring bus at South Agawam and then construct a single 345 kV line from South Agawam to Agawam substation? Please evaluate cost, environmental impacts, and system reliability.

**Response:**

Conceptually, it would be feasible to construct a 3-breaker ring bus near the South Agawam Switching Station to act as termination point for 345-kV lines to/from Ludlow, Agawam and North Bloomfield.

However, this alternative would provide significantly less system reliability than the proposed project, or even the Noticed Alternative, since it would result in total loss of the 345-kV source at Agawam for an outage of the South Agawam to Agawam 345-kV line or any stuck circuit breaker situation.

Much of the area around South Agawam Junction, while currently under NU company ownership, is subject to a conservation easement prohibiting further development, contains a significant amount of wetlands and is also a potential habitat location for such threatened and endangered species as the Eastern Box Turtle and the Worm Snake. In the original engineering evaluation into system alternatives for Greater Springfield, this site was considered and subsequently dismissed due to the environmental issues associated with this site and difficulty in constructing a new substation or switching station.

Assuming that the environmental and easement restrictions around South Agawam Junction could be overcome, this configuration would result in impacts similar to the Noticed-Alternative Southern Route with the following exceptions:

- This would result in increased clearing and wetland impacts associated with the creation of the new South Agawam 345-kV ring bus. This is roughly estimated to be approximately a 3-acre fenced area with additional clearing to account for required site grading. This construction would involve a minimum of 0.5 to 0.7 acres of permanent wetland fill, relocation of a stream and impacts to the threatened and endangered species habitat.
- From South Agawam Junction to Agawam Substation the environmental impacts for the line work would be slightly reduced when compared to the Noticed Alternative and would be roughly equivalent in that segment for the proposed Northern Route. This would result in less vegetation removal in this section and 5.27 acres less ROW expansion from Silver Substation to Agawam Substation (2.12 acres vs 7.39 acres on the Noticed-Alternative Southern Route). This does not account for additional clearing associated with the reconfiguration of lines and right-of-ways to accommodate these new line entries.
- Costs were not evaluated for this option, but would be expected to be in the same order of magnitude as the Noticed-Alternative Southern Route option, or higher since the savings that may be associated with the line work would be offset by the construction of a completely new 345-kV ring bus switchyard at South Agawam.
- Although not studied in detail, it is assumed that Agawam Substation would still require the currently proposed scope, except that one line-terminal structure and its associated equipment would not need

to be constructed at this time. Additional 115-kV capacitors may also be required for voltage support. All 115-kV line work on the northern corridor is still expected to be required for this alternative.

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**Docket No. EFSB 08-2/D.P.U. 08-105/08-106**

**Information Request EFSB  
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**Dated: 06/24/2009**

**Q-EFSB-A-016**

**Page 1 of 2**

**Witness: John C. Case, Robert E. Carberry**  
**Request from: Energy Facilities Siting Board**

**Question:**

Conceptually, as a modification to the Southern Route, would it be possible to place 345/115 kV transformers at South Agawam and then construct multiple 115 kV line from South Agawam to Agawam substation? Please evaluate cost, environmental impacts, and system reliability.

**Response:**

Conceptually, it would be feasible to construct a 345/115-kV substation near the South Agawam 115-kV Switching Station to substitute for the proposed plan of constructing this transformation at the Agawam Substation. This alternative would result in significantly increased environmental impacts, higher costs than the Noticed Alternative and decreased reliability.

As stated in the response to Information Request EFSB-A-015, much of the area around South Agawam Junction, while currently under NU ownership, is subject to a conservation easement prohibiting further development, contains significant amounts of wetlands and is also a potential habitat location for such threatened and endangered species as the Eastern Box Turtle and the Worm Snake. In the original engineering evaluation into system alternatives for Greater Springfield, this site was considered and subsequently dismissed due to the environmental issues associated with this site and difficulty in constructing a new substation or switching station.

The current Proposed Plan and the Noticed Alternative each propose to construct the 345/115-kV transformation at the Agawam Substation using a pre-developed area previously planned for such an expansion during the initial substation construction in the 1970's, and it would be much easier to accommodate the construction of a new substation at this site than at one with environmental issues.

Assuming that the environmental and easement restrictions at South Agawam could be overcome, this configuration would likely satisfy System Planning requirements, but would not be as reliable as having the station at Agawam. This is primarily due to the additional 115-kV lines exiting Agawam Substation being double that of South Agawam. Although not studied in any detail by System Planning, it is assumed that this alternative would require the following:

- The South Agawam 345/115-kV Substation would be required to be a 4 position (2 bay) breaker-and-a-half design with 2 autotransformers and 2 line positions (to Ludlow and North Bloomfield) identical to the current proposal at Agawam Substation. It is assumed that this substation footprint would be approximately 3.5 to 4.0 acres with additional construction and site grading impacts beyond that amount.
- The South Agawam 115-kV Switching Station would require expansion to accommodate an additional 2 line positions for the autotransformer connections, and at least one of the line entries into the existing 115-kV switchyard must be relocated. The expansion area would be approximately an additional 0.5 acres on the north side of the existing 115-kV switchyard.
- The expansion of the existing switchyard and construction of the new 345/115-kV substation would result in increased clearing of approximately 5 acres and wetland impacts roughly estimated at a

minimum of 0.8 to 1.2 acres of permanent wetland fill in addition to the impacts to endangered species habitat.

- A minimum of two 115-kV transmission lines must be constructed from South Agawam Switching Station to Agawam Substation, replacing two existing 115-kV circuits. The new circuits would each require a bundle of 2x1272-kcmil ACSS conductors per phase, and each on independent single-circuit steel poles. Loss of the two 115-kV circuits between South Agawam and Agawam would likely result in several other system overloads, and require additional circuits in this corridor, and/or upgrading of the other two 115-kV lines coming out of South Agawam. Three 115-kV circuits could be accommodated in this corridor with no right-of-way expansion between Silver Substation and Agawam Substation (from 7.39 acres to 0 acres). Depending on the number of circuits required, this would reduce clearing impacts, roughly approximated in the order of 2-4 acres.

Costs were not evaluated for this option, but would be expected to be higher than the Noticed-Alternative Southern Route option. Any savings that may be associated with the reduced Agawam Substation scope would be offset by the construction of a completely new 345/115-kV substation at South Agawam and increased 115-kV line work in the South Agawam and Agawam areas. All 115-kV line work on the northern corridor is still expected to be required for this alternative.



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**Q-EFSB-A-017**

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**Witness: Allen W. Scarfone, Robert E. Carberry**

**Request from: Energy Facilities Siting Board**

**Question:**

Please discuss the availability of other locations to construct a 345/115 kV substation either to the south or to the west of downtown Springfield. In what ways are alternative locations superior and inferior to Agawam Substation and South Agawam for voltage transformation to supply 115 kV bulk power to the area?

**Response:**

The Agawam Substation is presently considered an electrical "hub" as multiple 115-kV transmission circuits that serve the Greater Springfield area, interconnect at a "breaker-and-one-half" substation bus configuration. It is desirable for a new substation site to be in close proximity to multiple existing transmission circuits or transmission rights-of-way. From any other potential substation site location, such as Site 5 or South Agawam Junction, new 115-kV transmission circuits would have to be constructed and/or significant upgrades made to existing 115-kV transmission circuits between this new substation and Agawam Substation. There is no perceived justification for abandoning the existing 115-kV infrastructure at Agawam Substation and replacing it with virtually identical infrastructure at an alternate substation site. Although no studies have been performed, the establishment of a new 345/115-kV substation at an alternate site is unlikely to improve the capability, operability and flexibility of the transmission system proposed under GSRP. This new alternate substation would also not have a measurable positive effect on enhancing customer service in the Greater Springfield area. The additional costs to establish a new alternate 345/115-kV substation south or west of downtown Springfield cannot be justified.



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**Information Request EFSB  
SET 2**

**Dated: 06/24/2009**

**Q-EFSB-A-028**

**Page 1 of 2**

**Witness: John C. Case, Robert E. Carberry**  
**Request from: Energy Facilities Siting Board**

**Question:**

Please refer to Table 5-31. Please explain:

- a. Why the costs differ between routes for row 3 – build a new 345 kV line from Agawam Substation to North Bloomfield Substation (MA only)
- b. Why the costs for the re-build for the 1781 line from Agawam Substation to South Agawam Switching Station (row 4) is only for the northern route;
- c. Why the costs for placing the 1781 line on the Ludlow Substation to Agawam Substation structures (row 4) is only for the southern route;
- d. Why the costs differ between routes for row 9 – break three-terminal circuits 1254, 1723 into two terminal circuits creating a total of four circuits;
- e. Why the costs differ between routes for row 10 – rebuild circuit 1845 from Shawinigan Switching Station to Ludlow Substation;
- f. Why the costs differ between routes for row 12 – rebuild lines 1601, 1602, 1314 and 1230 from Agawam 16C Substation to East Springfield Junction;
- g. Please detail what miscellaneous substations refers to, and why the costs differ by route.

**Response:**

- a. The Northern Route estimate for Row 3 in Table 5-31 includes all of the corridor work (clearing, access roads, temporary line work, real estate, removals, and distribution line relocation) required for all the lines in that corridor from the CT/MA border to Agawam Substation. The Southern Route estimate only includes corridor work from the CT/MA border to South Agawam Switching Station. The corridor work from South Agawam Switching Station to Agawam Substation is included in the Ludlow – Agawam MA Only task. The same number of line structures is estimated for both the Northern Route and the Southern Route. The only difference is where the corridor costs are allocated.
- b. For the Northern Route the 1781 circuit will be on its own set of single-circuit monopole structures, so the estimate reflects structures, foundations, wire, etc... The costs for the 1781 circuit on the Southern route are shown on row 6. The proposed layout for the Southern Route places circuit 1781 (as well as circuit 1782, shown on row 7) on shared structures with a 345-kV line from South Agawam Switching Station to Agawam Substation, and those estimates reflect primarily the wire work only. Note that in that section, the cost to place a 115-kV circuit on the 345/115-kV steel-pole line structures is constant at \$1,385,000, regardless of circuit or route.
- c. See the response to (b) above. The Northern Route requires a rebuild on separate structures of the 1781 circuit; the Southern Route places that circuit on the 345/115-kV steel-pole line structures.

d. The cost for this line item is less for the Northern Route since some of the costs associated with this work is captured in the rows above, with construction of the 345-kV line. The lack of a 345-kV line from East Springfield Junction to Shawinigan Switching Station with the Southern Route Alternative requires that lines 1602 and 1603 each be constructed on single-circuit 115-kV line structures rather than having one of these circuits share structures with the 345-kV line. Additionally, all corridor costs that are typically included as part of the 345-kV line costs are here allocated to the 115-kV line tasks due to the lack of a 345-kV line.

e. The Southern Route requires circuit 1845 to be constructed on single-circuit 115-kV line structures rather than sharing structures with the 345-kV line, resulting in significantly greater costs in row 10. The Southern Route estimate for this item reflects corridor work, structures, foundations and wire work, while the Northern Route estimate for this item primarily reflects only wire work, with the bulk of costs reflected in the 345-kV line item estimate.

f. Similar to the prior responses, for the Southern Route Alternative items, the 115-kV line work required on the Northern Route must reflect the entire costs for corridor work, structures, foundations and wire work. The lack of a 345-kV line from Agawam Substation to East Springfield Junction with the Southern Route Alternative requires that circuits 1314 and 1602 each be constructed on single-circuit 115-kV line structures rather than with one of these circuits sharing structures with the 345-kV line. All corridor costs that are typically included as part of the 345-kV line costs are here allocated to the 115-kV line tasks due to the lack of a 345-kV line.

g. The Miscellaneous Substation line item is detailed in the table below. The difference between the two estimates is due to the elimination of the need for 230-kV class circuit breakers on the Fairmont - Shawinigan 1604 line (which has been considered as a separate line item, as opposed to a reduction in the costs of the Shawinigan and Fairmont Switching Stations).

Description	Preferred Northern Route	Noticed-Alternative Southern Route
South Agawam 4E 115-kV Substation	\$ 173,000	\$ 173,000
Piper 21N Substation	\$ 2,934,000	\$ 2,934,000
Shawinigan 55E Substation	\$ 3,864,000	\$ 3,864,000
Chicopee 18L Substation	\$ 2,567,000	\$ 2,567,000
Pineshed 23F Substation	\$ 1,063,000	\$ 1,063,000
Orchard 27A Substation	\$ 5,263,000	\$ 5,263,000
Breckwood 20A Substation	\$ 3,249,000	\$ 3,249,000
230-kV Breakers credit (1604 line)	\$ -	\$ (1,073,000)
<b>Subtotal Miscellaneous Substations</b>	<b>\$ 19,133,000</b>	<b>\$ 18,060,000</b>

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**Docket No. EFSB 08-2/D.P.U. 08-105/08-106**

**Information Request EFSB**

**SET 4**

**Dated: 07/31/2009**

**Q-EFSB-A-033**

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**Witness: Robert E. Carberry**  
**Request from: Energy Facilities Siting Board**

**Question:**

Please refer to page 3-4 of the redacted public version of the July 2008 NU Solution Report for the Springfield Area. In comparing options, NU notes that routes through Meekville Junction included 31.48 miles "in Connecticut, where there was the possibility of 10.56 miles of 345-kV underground cables." Was such a possibility related to Connecticut's EMF policies? To what extent was selection of the proposed project, and its route, dependent on avoiding undergrounding that might be required by Connecticut EMF policies? Please provide support for your answer.

**Response:**

Yes, the possibility of 10.56 miles of underground cables refers to the fact that two different sections of the Connecticut portion of the overhead line route between Hampden Junction and North Bloomfield Substation, sections totaling 10.56 miles, might have been considered to be "adjacent to" public playgrounds and day-care facilities. Thus, there was a possibility that the provisions of Conn. Gen. Stats. §16-50p(i) could have required that the new 345-kV line not be built overhead along the existing ROW for this length. Evaluation of that possibility would have required an analysis of the technical limitations of this length of underground line construction in those areas, as part of an otherwise overhead 345-kV line, and an analysis of whether the cost of the underground line construction would impose an unreasonable burden on ratepayers. In turn, the latter evaluation would have required not just a cost comparison, but also an evaluation of the changes in magnetic field (MF) levels that would be associated with overhead line construction in accordance with the Connecticut Siting Council's Best Management Practices, as compared to the changes in MF levels on and off the ROW if sections of the new line were constructed underground.

No such analyses were performed. Rather, for the purpose of comparing the costs of the Option B route through Meekville Junction with the other Option B routes, all-overhead line construction was assumed for all routes. The cost of the Option B route via Meekville Junction was higher than that of the other Option B routes on this basis, because the route via Meekville Junction was longer. Accordingly, while the possibility that some underground line construction might have been required for the route via Meekville Junction was noted as a risk factor, those routes would have been dropped whether or not the risk existed.

Please note that, in any case, all of the Option B solutions were thereafter found to be inferior to a 345-kV solution and route that included a connection to the Agawam Substation, on the basis of both reliability benefits and costs. See, Section 3.6 of the Solution Report. Once again, for the purpose of this comparison, all-overhead lines were assumed for all routes.



**Western Massachusetts Electric Company**

**Docket No. EFSB 08-2/D.P.U. 08-105/08-106**

**Information Request EFSB  
SET 2**

**Dated: 06/24/2009**

**Q-EFSB-RS-001**

**Page 1 of 1**

**Witness: Scott Newland, Robert E. Carberry**

**Request from: Energy Facilities Siting Board**

**Question:**

Please discuss whether it is likely the southern route could be constructed if approved by the Siting Board, in light of the possibility that the CT Siting Council might not approve the portion that is located in Connecticut. Please discuss how the location of a portion of the southern route in another state – outside of the Siting Board's jurisdiction, was incorporated into the site selection process.

**Response:**

The southern route was selected as the geographically distinct alternate route because it was the only alternative location where the new 345-kV line could be constructed generally within an existing right-of-way that provides a reasonably direct path between the Agawam and Ludlow Substations. Any other alternative would have required the acquisition of greenfield right-of-way or extensive underground line construction.

In considering their route selection options, in cases like this, as well as in wholly in-state cases, transmission owners have little choice but to rely on the fact that licensing agencies will act in accordance with their governing statutory and regulatory authority, as well as consistently with their applicable precedents. In this regard, while there are never guarantees of any specific result in a licensing proceeding, if petitions are submitted for licenses that conform to all applicable requirements, transmission owners hope that reliance will be well placed. As indicated, due to federal licensing requirements for most, if not all, projects, such owners face the issue of agencies outside the Siting Board's jurisdiction even when facilities are wholly in-state. Other approaches to site selection, such as those which might try to quantify and assign risk factors to agency approvals which are outside the Siting Board's ultimate jurisdiction, do not seem to be useful alternative approaches. Accordingly, WMECO did not consider the fact that a portion of the southern route would be located in Connecticut to disqualify it from consideration as a geographically distinct alternative. Without federal siting, it is not practical to site projects required to address related problems in more than one state without coordinated multi-state siting approvals. ( For instance, the proposed new 345-kV line from North Bloomfield Substation to Agawam Substation cannot be built without approvals from both the Board and the Connecticut Siting Council (Council); and the configuration of the Interstate Reliability Project currently under consideration would require coordinated approvals from the Board, the Council, and the Rhode Island EFSB.)

WMECO believes that the Board would not choose the southern route over the northern route unless there was a strong factual basis for concluding that the southern route would have fewer environmental impacts, cost less, and/or provide greater reliability benefits. In that case, the Council would be likely to approve the Connecticut portion of the route as well. The Council's governing legislation recognizes that Connecticut has an interest in the reliability and economy of "the electric power grid serving the state and interconnected utility systems." (Conn. Gen. Stats. §16-50(a)(1)(A)).

However, at the present time, and after extensive investigation, WMECO submits that for the reasons discussed in its application and in the Solution Report, there is an insufficient basis for either agency to choose the southern route over the northern route.



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**Docket No. EFSB 08-2/D.P.U. 08-105/08-106**

**Information Request EFSB**

**SET 2**

**Dated: 06/24/2009**

**Q-EFSB-RS-002**

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**Witness: Scott Newland, Timothy Barton**

**Request from: Energy Facilities Siting Board**

**Question:**

Please refer to the Petition at 4-8. Please list the different factors that would have been considered in evaluating the feasibility of each type of line configuration and associated routing for the potential underground options in comparison to potential overhead options.

**Response:**

The route selection objectives that WMECO used to determine the potential overhead transmission line-route corridors are represented on page 4-8 of the Petition. The evaluation criteria used for underground transmission line routes is presented in Table 6-3 of the Petition. The objectives are the same when identifying potential overhead and underground transmission line-route corridors. However, making a direct comparison of an overhead transmission line route with an underground transmission line route is difficult because there are differences in engineering, environmental and social considerations between the two types of transmission lines. The factors used for comparison of an underground route to an overhead route include reliability, cost, environmental and social impacts. (See section 5.6 and Section 7.0 for the comparison factors for an underground line route to an overhead line route.)



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**Docket No. EFSB 08-2/D.P.U. 08-105/08-106**

**Information Request EFSB**

**SET 2**

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**Q-EFSB-RS-003**

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**Witness: Scott Newland, Timothy Barton**

**Request from: Energy Facilities Siting Board**

**Question:**

Please refer to the Petition at Table 4-4 Project Evaluation Criteria Metrics. Please provide a table similar to Table 4-4 but with 3 columns: (1) northern route 345 kV only; (2) southern route 345 kV only; and (3) 115 kV route only, with spurs.

**Response:**

See EFSB-RS-003 Attachment 1 - Table 4.4(REVISED).



**Table 4-4 REVISED: Project Evaluation Criteria Metrics**

<b>Evaluation Criteria Metrics</b>	<b>Northern Route 345-kV only<sup>5</sup></b>	<b>Southern Route 345-kV only<sup>5</sup></b>	<b>115-kV Route with spurs<sup>6</sup></b>
Total Length (Miles)	35 miles	41 miles	27 miles
Railroad Crossings (Number)	2	3	2
Stream Crossings (Number)	41	44	34
Length NOT paralleling existing linear facilities	0 feet	0 feet	0 feet
Length through private easement	0 feet	0 feet	0 feet
Length of ROW expansion	4.3 miles	4.5 miles	0.0 miles
Area of ROW expansion	12.0 acres	12.2 acres	0.0 acres
Residences within ROW (Number) <sup>1</sup>	11	5	10
Residences within 100 feet of edge of ROW (Number)	316	179	341
Residences within 101 to 300 feet of edge of ROW (Number)	754	525	793
Businesses within ROW (Number)	0	2	0
Businesses within 100 feet of edge of ROW or centerline (Number)	46	22	51
Businesses within 101 to 300 feet of edge of ROW (Number)	42	28	48
Public Facilities within 300 feet of edge of ROW (Number)	2	1	3
Public Facilities within 301 to 1,200 feet of edge of ROW (Number)	9	11	8
Length by land use (Commercial/Industrial)	6.8 miles	6.1 miles	7.5 miles
Length by land use (Residential)	13.1 miles	11.8 miles	9.4 miles
Length by land use (Undeveloped Land)	11.3 miles	19.9 miles	7.8 miles
Length by land use (Park/School/Open Space)	3.3 miles	2.5 miles	1.7 miles
Visibility (Rating) <sup>2</sup>	50.7	52.5	28.0
Length through stream or wetland	6.2 miles	10.0 miles	4.7 miles
Length through environmentally sensitive area <sup>3</sup>	7.8 miles	19.0 miles	2.8 miles
Potential impact on cultural resources (Rating) <sup>4</sup>	39.2	48.6	30.7

*Notes:*

1. Residences or businesses considered to be located within the ROW does not necessarily mean they would need to be relocated.
2. The visibility rating is a subjective rating and was assigned to portions of the segment based on the length of the line that was considered to have a high (5), medium-high (4), medium (3), medium-low (2), or low (1) impact. These ratings were determined by the presence of residences, businesses, and roads within a 1/4-mile of the line and described further below. Portions of the segment where the 345-kV structures would be significantly taller than the existing structures in the corridor were multiplied 1.5 times the visibility rating.
3. Environmentally sensitive areas are locations identified in Massachusetts by the Natural Heritage and Endangered Species Program as Priority Habitats of Protected Species and in Connecticut as the Natural Diversity Database Endangered Species locations.
4. The cultural resources rating is a rating that was assigned to portions of the segment based on the length of the line that was considered to have a High (3), Medium (2), No /Low (1) predicted sensitivity for archaeological resources and described further below.
5. Data present in this column includes the portion of the line-route from North Bloomfield S/S in CT to the CT/MA border.
6. Data present in this column is for the 115-kV route that includes the improvements from CT/MA border to Agawam S/S, Agawam S/S to Ludlow S/S and spurs from East Springfield Junction to Fairmont S/S, Exit 6/Shawinigan Junction to Cadwell S/S and Orchard Junction to Orchard S/S.



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**Information Request EFSB**

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**Dated: 06/24/2009**

**Q-EFSB-RS-004**

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**Witness: Scott Newland, Timothy Barton**

**Request from: Energy Facilities Siting Board**

**Question:**

Please refer to the Petition at Table 4-6. Please provide a table similar to Table 4-6 but with 3 columns: (1) northern route 345 kV only; (2) southern route 345 kV only; and (3) 115 kV route only, with spurs.

**Response:**

As requested, EFSB-RS-004 Table 4-6A REVISED Attachment 1 provides a revised Table 4-6A. Please note that to facilitate the evaluation of the Northern Route 345-kV only and the Southern Route 345-kV only, a Table 4-6B was also created. See EFSB-RS-004 Table 4-6B Attachment 1 for this table, and note that the ratio-score information for the 115-kV Route with spurs has been excluded. The reason the ratio-scores change between Table 4-6A and 4-6B is because the 115-kV route only (with spurs) data is no longer being compared with the 345-kV portions of the project, which changes the results.



<b>Table 4-6A(REVISED): Weighted Common Data Range Ratio-Scoring for 345/115-kV Line Routes</b>				
<b>Evaluation Criteria Metrics</b>	<b>Weight</b>	<b>Northern<sup>1</sup>Route 345-kV only</b>	<b>Southern<sup>1</sup> Route 345-kV only</b>	<b>115-kV Route with spurs</b>
Total Length (Miles)	5	4.27	5.00	3.27
Railroad Crossings (Number)	2	1.33	2.00	1.33
Stream Crossings (Number)	1	0.93	1.00	0.77
Length NOT paralleling existing linear facilities	4	n/a	n/a	n/a
Length through private easement	4	n/a	n/a	n/a
Length of ROW expansion	4	3.81	4.00	0.00
Area of ROW expansion	4	3.95	4.00	0.00
Residences within ROW (Number)	4	4.00	1.82	3.64
Residences within 100 feet of edge of ROW (Number)	3	2.78	1.57	3.00
Residences within 101 to 300 feet of edge of ROW (Number)	2	1.90	1.32	2.00
Businesses within ROW (Number)	3	0.00	3.00	0.00
Businesses within 100 feet of edge of ROW or centerline (Number)	2	1.80	0.86	2.00
Businesses within 101 to 300 feet of edge of ROW (Number)	1	0.88	0.58	1.00
Public Facilities within 300 feet of edge of ROW (Number)	4	2.67	1.33	4.00
Public Facilities within 301 to 1,200 feet of edge of ROW (Number)	3	2.45	3.00	2.18
Length by land use (Commercial/Industrial)	1	0.91	0.82	1.00
Length by land use (Residential)	4	4.00	3.60	2.86
Length by land use (Undeveloped Land)	3	1.69	3.00	1.18
Length by land use (Park/School/Open Space)	5	5.00	3.78	2.60
Visibility (Rating)	2	1.93	2.00	1.07
Length through stream or wetland	3	1.87	3.00	1.42
Length through environmentally sensitive area	3	1.23	3.00	0.44
Cultural resources predictive modeling analysis (Rating)	2	1.61	2.00	1.26
<b>TOTAL</b>		<b>49.01</b>	<b>50.68</b>	<b>35.02</b>

<sup>1</sup>: Data present in this column includes the portion of the line route from North Bloomfield Substation in CT to CT/MA border.

<b>Table 4-6B: Weighted Common Data Range Ratio-Scoring for 345-kV Only Line Routes</b>			
<b>Evaluation Criteria Metrics</b>	<b>Weight</b>	<b>Northern<sup>1</sup> Route 345-kV only</b>	<b>Southern<sup>1</sup> Route 345-kV only</b>
Total Length (Miles)	5	4.27	5.00
Railroad Crossings (Number)	2	1.33	2.00
Stream Crossings (Number)	1	0.93	1.00
Length NOT paralleling existing linear facilities	4	n/a	n/a
Length through private easement	4	n/a	n/a
Length of ROW expansion	4	3.81	4.00
Area of ROW expansion	4	3.95	4.00
Residences within ROW (Number)	4	4.00	1.82
Residences within 100 feet of edge of ROW (Number)	3	3.00	1.70
Residences within 101 to 300 feet of edge of ROW (Number)	2	2.00	1.39
Businesses within ROW (Number)	3	0.00	3.00
Businesses within 100 feet of edge of ROW or centerline (Number)	2	2.00	0.96
Businesses within 101 to 300 feet of edge of ROW (Number)	1	1.00	0.67
Public Facilities within 300 feet of edge of ROW (Number)	4	4.00	2.00
Public Facilities within 301 to 1,200 feet of edge of ROW (Number)	3	2.45	3.00
Length by land use (Commercial/Industrial)	1	1.00	0.89
Length by land use (Residential)	4	4.00	3.60
Length by land use (Undeveloped Land)	3	1.69	3.00
Length by land use (Park/School/Open Space)	5	5.00	3.78
Visibility (Rating)	2	1.93	2.00
Length through stream or wetland	3	1.87	3.00
Length through environmentally sensitive area	3	1.23	3.00
Cultural resources predictive modeling analysis (Rating)	2	1.61	2.00
<b>TOTAL</b>		<b>51.07</b>	<b>51.81</b>

<sup>1</sup>: Data present in this column includes the portion of the line route from North Bloomfield Substation in CT to CT/MA border.

**Western Massachusetts Electric Company**  
**Docket No. EFSB 08-2/D.P.U. 08-105/08-106**

**Information Request EFSB**  
**SET 2**  
**Dated: 06/24/2009**  
**Q-EFSB-RS-005**  
**Page 1 of 1**

**Witness: Allen W. Scarfone, Timothy F. Laskowski**  
**Request from: Energy Facilities Siting Board**

**Question:**

Please refer to the Petition at 4-33. Please discuss in more detail how the three primary reliability differences identified between the northern route and the southern route affect reliability, specifically:

- a. The 345 kV line is longer for the southern route;
- b. The 345 kV line shares a structure with a 115 kV line along the northern route, while the 345 kV line is on a single pole for the southern route; and
- c. The existing 345 kV circuit and the new 345 kV circuit would share a common ROW for 3.3 miles on the southern route.

**Response:**

a. A longer line means more facilities are exposed to a risk of failure - a longer length of line is exposed to more lightning strikes, more insulators are used and therefore more of them may potentially fail, etc. Thus, a longer line length means more potential for outages and thus ever so slightly reduced reliability.

b. The company does not have data to show whether a 345-kV circuit on single-circuit monopole structures is any more likely to be outaged than a 345-kV circuit on the proposed double-circuit line structures. However, the higher insulation level of the 345-kV circuit, as compared to the 115-kV circuit's insulation, will tend to protect the 345-kV circuit in the event of lightning strike to the line, so that the 115-kV circuit may experience a fault while the 345-kV circuit remains in service. The expectation therefore is that the 345-kV circuit on the double-circuit line structures should be somewhat more resistant to lightning-initiated outages than a 345-kV circuit on its own set of structures.

c. The company does not have data to determine the change of reliability due to two 345-kV circuits sharing a common ROW. However, circuits sharing a common ROW could both suffer simultaneous outages due to rare events such as a tornado, a major fire, or an airplane crash on the ROW. If one circuit crosses over the other at any point on the shared ROW, there is also a potential that a wire break in the crossing span will cause an outage to both circuits.

As stated at page 4-33 of the Petition, both options were treated as having comparable reliability in the Options Report (see: EFSB-N-040 Attachment 1) and are viewed by the company in the same way.



**Western Massachusetts Electric Company**

**Docket No. EFSB 08-2/D.P.U. 08-105/08-106**

**Information Request EFSB**

**SET 2**

**Dated: 06/24/2009**

**Q-EFSB-RS-006**

**Page 1 of 1**

**Witness: Scott Newland, Timothy Barton**

**Request from: Energy Facilities Siting Board**

**Question:**

Please refer to Table 5-31. Given the breakdown of the costs for both the northern and southern route, please identify and calculate those costs, for each route, which would be associated with: (1) Massachusetts only; and (2) Connecticut only.

**Response:**

See EFSB-RS-006 Attachment 1 which contains the table for the breakdowns requested.



Description	State	Preferred Northern Route	Noticed-Alternative Southern Route
Build a new 345-kV line from Agawam Substation to North Bloomfield Substation	CT	\$41,290,000	\$41,290,000
Build a new 345-kV line from Ludlow Substation to Agawam Substation	CT		\$21,363,000
North Bloomfield 2A Substation	CT	\$92,080,000	\$92,080,000
<b>Sub-total Connecticut Project Cost</b>	-	<b>\$133,370,000</b>	<b>\$154,733,000</b>
Build a new 345-kV line from Ludlow Substation to Agawam Substation	MA	\$151,871,000	\$109,483,000
Build a new 345-kV line from Agawam Substation to North Bloomfield Substation	MA	\$57,288,000	\$47,583,000
Re-build the 1781 line from Agawam Substation to South Agawam Switching Station	MA	\$10,702,000	
Place 1781 line on the Ludlow Substation to Agawam Substation 345/115-kV double circuit structures	MA		\$1,385,000
Place 1782 line on the Agawam Substation to North Bloomfield Substation 345/115-kV double circuit structures	MA	\$1,385,000	\$1,385,000
Reconfigure the existing 115-kV system (1768/1836/1821)	MA	\$2,543,000	\$2,543,000
Break three-terminal circuits 1254/1723 into two-terminal circuits creating a total of four (4) circuits (1601-1604)	MA	\$40,796,000	\$56,387,000
Re-build circuit 1845 from Shawinigan Switching Station to Ludlow Substation	MA	\$3,875,000	\$37,411,000
Re-build lines 1481, 1426, and 1552 from Cadwell 50F Substation to Ludlow 19S Substation	MA	\$49,462,000	\$49,462,000
Re-build lines 1601, 1602, 1314, and 1230 from Agawam 16C Substation to E. Springfield Junction.	MA	\$28,432,000	\$72,282,000
Ludlow 19S Substation	MA	\$67,500,000	\$67,500,000
Agawam 16C Substation	MA	\$77,743,000	\$77,743,000
Fairmont 16H Substation (Greenfield)	MA	\$49,111,000	\$49,111,000
Cadwell 50F Substation	MA	\$21,013,000	\$21,013,000
Miscellaneous Substations	MA	\$19,133,000	\$18,060,000
<b>Sub-total Massachusetts Project Cost</b>	-	<b>\$580,854,000</b>	<b>\$611,348,000</b>
<b>Total Project Cost</b>	-	<b>\$714,224,000</b>	<b>\$766,081,000</b>



**Western Massachusetts Electric Company**

**Docket No. EFSB 08-2/D.P.U. 08-105/08-106**

**Information Request EFSB**

**SET 2**

**Dated: 06/24/2009**

**Q-EFSB-RS-007**

**Page 1 of 1**

**Witness: Scott Newland, Timothy Barton**

**Request from: Energy Facilities Siting Board**

**Question:**

Please refer to Table 5-31. Please provide a breakdown of the costs for: (1) the northern route, 345 kV only; (2) the southern route, 345 kV only; and the (3) 115 kV upgrades (if they differ by 345 kV routes please provide both sets of costs).

**Response:**

See EFSB-RS-007 Attachment 1 for the breakdowns requested. The 345-kV only costs on each route are detailed in the top rows of the attachment. Certain 115-kV line upgrades that utilize double-circuit 345/115-kV structures will differ depending on the 345-kV line route; thus both sets of costs are included.



Description	State	Preferred Northern Route	Noticed-Alternative Southern Route
Build a new 345-kV line from Agawam Substation to North Bloomfield Substation	CT	\$41,290,000	\$41,290,000
Build a new 345-kV line from Ludlow Substation to Agawam Substation	CT		\$21,363,000
North Bloomfield 2A Substation	CT	\$92,080,000	\$92,080,000
Build a new 345-kV line from Ludlow Substation to Agawam Substation	MA	\$151,871,000	\$109,483,000
Build a new 345-kV line from Agawam Substation to North Bloomfield Substation	MA	\$57,288,000	\$47,583,000
Ludlow 19S Substation	MA	\$67,500,000	\$67,500,000
Agawam 16C Substation	MA	\$77,743,000	\$77,743,000
<b>Sub-Total 345-kV Only Project Cost</b>	-	<b>\$487,772,000</b>	<b>\$457,042,000</b>
Re-build the 1781 line from Agawam Substation to South Agawam Switching Station	MA	\$10,702,000	
Place 1781 line on the Ludlow Substation to Agawam Substation 345/115-kV double circuit structures	MA		\$1,385,000
Place 1782 line on the Agawam Substation to North Bloomfield Substation 345/115-kV double circuit structures	MA	\$1,385,000	\$1,385,000
Reconfigure the existing 115-kV system (1768/1836/1821)	MA	\$2,543,000	\$2,543,000
Break three-terminal circuits 1254/1723 into two-terminal circuits creating a total of four (4) circuits (1601-1604)	MA	\$40,796,000	\$56,387,000
Re-build circuit 1845 from Shawinigan Switching Station to Ludlow Substation	MA	\$3,875,000	\$37,411,000
Re-build lines 1481, 1426, and 1552 from Cadwell 50F Substation to Ludlow 19S Substation	MA	\$49,462,000	\$49,462,000
Re-build lines 1601, 1602, 1314, and 1230 from Agawam 16C Substation to E. Springfield Junction.	MA	\$28,432,000	\$72,282,000
Fairmont 16H Substation (Greenfield)	MA	\$49,111,000	\$49,111,000
Cadwell 50F Substation	MA	\$21,013,000	\$21,013,000
Miscellaneous Substations	MA	\$19,133,000	\$18,060,000
<b>Sub-Total 115-kV Project Cost</b>	-	<b>\$226,452,000</b>	<b>\$309,039,000</b>
<b>Total Project Cost</b>	-	<b>\$714,224,000</b>	<b>\$766,081,000</b>



**Western Massachusetts Electric Company**

**Docket No. EFSB 08-2/D.P.U. 08-105/08-106**

**Information Request EFSB**

**SET 4**

**Dated: 07/31/2009**

**Q-EFSB-RS-008**

**Page 1 of 1**

**Witness: Allen W. Scarfone, Timothy F. Laskowski**  
**Request from: Energy Facilities Siting Board**

**Question:**

Please refer to page 3-18 of the redacted public version of the July 2008 NU Solution Report for the Springfield Area. NU lists proximity to the Fairmont Switching Station, allowing future connection between the 345 kV system and up to nine 115 kV lines, as a feature of the Northern Route. Does WMECO continue to consider this an advantage of the Northern Route? Are there other such long-range advantages or disadvantages of the Proposed Project, the Southern Route, or other project approaches that could be considered?

**Response:**

Yes. The Fairmont Switching Station has many 115-kV transmission circuits connected to its busses and is a hub for transmission service to loads located north and west of the downtown Springfield area. The station is also close to generating station sites at Mount Tom and Stony Brook, which would facilitate future interconnections. The Southern Route would provide proximity to a single generating site (Berkshire Power) but would not provide comparable proximity to high load areas and to significant and more densely networked transmission facilities west of Springfield. The Solutions Report provides additional information on the benefits of the Northern Route versus the Southern Route.



**Western Massachusetts Electric Company**

**Docket No. EFSB 08-2/D.P.U. 08-105/08-106**

**Information Request EFSB**

**SET 4**

**Dated: 07/31/2009**

**Q-EFSB-RS-010**

**Page 1 of 1**

**Witness: Allen W. Scarfone, Timothy F. Laskowski**  
**Request from: Energy Facilities Siting Board**

**Question:**

Please refer to the response to EFSB-RS-5. Please address the reliability differences between the 345 kV sharing a structure with the 115 kV on the northern line, versus the 345 kV being separate from the 115 kV line, using the southern route. The discussion should focus on operation of the two lines rather than how the 345 kV is outaged on a single versus double line.

**Response:**

From a real-time operations standpoint including maintenance, there is no significant difference in these two alternatives as long as the design of the overall system meets national and regional reliability standards. Sections of six 115-kV circuits (1845, 1603, 1602, 1314, 1781 and 1768) would share structures with a 345-kV circuit along the Northern Route, and sections of three 115-kV circuits (1781, 1782 and 1768) would share structures with a 345-kV circuit along the Southern Route. In both alternatives, there are 115-kV circuits between the Ludlow Substation and Cadwell Switching Station that share a common row of structures. In these cases there are one or more additional 115-kV circuits connecting the 115-kV substations.



**Western Massachusetts Electric Company**

**Docket No. EFSB 08-2/D.P.U. 08-105/08-106**

**Information Request EFSB  
SET 4**

**Dated: 07/31/2009**

**Q-EFSB-RS-011**

**Page 1 of 1**

**Witness: John C. Case**  
**Request from: Energy Facilities Siting Board**

**Question:**

Please refer to the response to EFSB-RS-7. Would the figure of \$309 million, the subtotal of the 115 kV line costs for the southern route, be the cost of upgrading the Springfield area 115 kV system if the project only consisted of 115 kV upgrades? Is this the cost of Expansion Plan 4a or 4b (see response to EFSB-N-46). If not, please explain how the costs differ and under what assumptions.

**Response:**

No. If the project could only consist of 115-kV system upgrades, the cost of those 115-kV upgrades would certainly be substantially more than the \$309 million referenced in the response to Information Request EFSB-RS-007. This is not Expansion Plan 4a or 4b. The \$309 million cost is only for the 115-kV portion of a comprehensive solution to the problems. This is not a solution unto itself and cannot be compared to any of the other solutions considered previously.

A study of an all-115-kV solution was never advanced to the point where a detailed estimate could be established. The Company expects there would be no opportunity for double-circuit lines with any such solution, and that extensive rebuilding of the Springfield underground 115-kV cables system would be required, at very substantial additional cost. Moreover, the all-115-kV solution was dropped due to right-of-way limitations that made it impractical. See the response to Information Request EFSB-A-029. Even if rights-of-way were available, the significant 115-kV upgrades in Connecticut would add even more to the overall cost.

