or immediately adjacent to the railroad ROW. Even if these utilities were relocated, relocation of some businesses and residences would be required. Limited access highways also had constraints similar to those of railroad corridors because of the amount of residential and commercial development located immediately adjacent to the ROW. When these options were reviewed, relocation of residences and businesses would be required to install an overhead or underground transmission line paralleling the edge of the ROW.

Due to these reasons and because WMECO has numerous transmission line ROWs in the Project area, such corridors became the focus of alternative route evaluations. The use of overhead transmission lines allows flexibility, provided that a continuous ROW of adequate width is available. Individual line structures can often be located to avoid, or span conductors over sensitive environmental areas (e.g., wetlands, streams, steep slopes). However, overhead lines require relatively wide ROWs within which certain land uses and vegetation are not allowed to be in the ROW. Potential locations where ROW expansion areas would be needed also were determined based on the additional ROW required for the new 345-kV transmission line. Figure 4-4 illustrates the routes that were identified and evaluated for the GSRP.

4.6 CRITERIA ANALYSIS OF THE FEASIBLE ROUTE OPTIONS

WMECO used the following criteria in evaluating the selection of potential overhead transmission line routes for the new GSRP 345-kV facilities:

- **Availability of Existing ROW for the New Lines to Follow.** The potential collocation of the 345-kV transmission facilities along existing ROWs (e.g., transmission lines, highways, railroads, pipelines), where linear uses are already established, was a primary routing consideration. In accordance with WMECO design standards, an entirely new 345-kV overhead line would require a minimum 100-foot-wide ROW, based on a steel-monopole design with vertically arranged line conductors. The alignment of the same 345-kV facilities on an existing corridor (parallel to existing transmission lines) may entail a lesser expansion of an existing ROW or may not require any additional ROW at all.
- **Engineering Considerations.** Whether on existing or new ROWs, the length of the route and constructability issues must be considered. These include the ability to avoid or minimize the location of structures along steep slopes or embankments, in areas of rock outcroppings, or within environmentally sensitive areas, such as wetlands. Engineering requirements for crossing

streams, railroads, and other facilities also must be assessed. These considerations are important determinants of cost and, in many cases, environmental effects as well.

- **Avoidance of Conflicts with Developed Areas.** Where possible, it is preferable to avoid conflicts with residential, commercial, and industrial land uses such as homes, businesses, and airport approach zones.
- **Consideration of Visual Impacts.** Structure visibility is a significant public concern. It is desirable to avoid areas of visual or historic sensitivity, to identify line designs for minimizing structure height, and to consider the potential impacts associated with having to remove mature trees that currently serve as visual buffers.
- **Avoidance or Minimization of Impacts to Environmental Resources.** WMECO aims to minimize impacts to sensitive environmental resources, including inland and tidal wetlands, steep slopes, erodible soils, parks, watercourses, and vegetation/wildlife/fisheries resources of concern.
- **Accessibility.** An overhead line route must also be accessible to both construction and maintenance equipment. Although access to all locations along an overhead line route is typically not required, vehicular access to each structure location from some access point is required.

4.6.1 Route Evaluation Criteria and Scoring

To facilitate the assessment of the transmission line-route alternatives, WMECO conducted alternatives evaluations using qualitative and quantitative criteria, following the EFSB approach. WMECO developed Project-specific evaluation criteria that address environmental, human and social, land use, and engineering/technical factors. Table 4-1 lists these evaluation criteria, the data metric (or measuring standard) for each criterion, and the source for the applicable data for the 345-kV overhead line.

Table 4-1: Project Evaluation Criteria and Associated Data Metrics

Type	Evaluation Criteria	Data Metric	Available Data Source
Engineering/ Technical	Total route length	Miles	GIS analysis
	Railroad crossings	Number	MassGIS infrastructure Desktop visual review using aerial photography in a GIS
	Stream crossings	Number	Desktop visual review using aerial photography in a GIS Field reconnaissance
Human/Social	Length NOT paralleling existing linear facilities	Feet	Mass GIS infrastructure Desktop visual review using aerial photography in a GIS
	Length through private easement	Feet	Parcel data
	Length of ROW expansion	Miles	Parcel data
	Area of ROW Expansion	Acres	Parcel data
	Residences within ROW	Number	Desktop visual review using aerial photography in a GIS
	Residences within 100 feet of edge of ROW	Number	Desktop visual review using aerial photography in a GIS
	Residences within 101 to 300 feet of edge of ROW	Number	Desktop visual review using aerial photography in a GIS
	Businesses within ROW	Number	Desktop visual review using aerial photography in a GIS
	Businesses within 100 feet of edge of ROW or centerline	Number	Desktop visual review using aerial photography in a GIS
	Businesses within 101 to 300 feet of edge of ROW	Number	Desktop visual review using aerial photography in a GIS
	Public Facilities within 300 feet of edge of ROW	Number	MassGIS infrastructure Desktop visual review using aerial photography in a GIS
	Public Facilities within 301 to 1,200 feet of edge of ROW	Number	MassGIS infrastructure Visual review using aerial photography in GIS
	Length by land use (Commercial/Industrial)	Miles	MassGIS land use Desktop visual review using aerial photography in a GIS
	Length by land use (Residential)	Miles	MassGIS land use Desktop visual review using aerial photography in a GIS
	Length by land use (Undeveloped Land)	Miles	MassGIS land use Desktop visual review using aerial photography in a GIS
	Length by land use (Park/School/Open Space)	Miles	MassGIS Protected and Recreational Open Space Parcel data
	Visibility	Rating	Desktop visual review using aerial photography in GIS Field reconnaissance
Environmental/ Cultural	Length through stream or wetland	Miles	Wetlands and streams field data
	Length through environmentally sensitive area	Miles	NHESP priority habitats of protected species
	Potential impact on cultural resources	Qualitative rating	Cultural resources reports

Based on WMECO's route selection objectives, two potentially viable route alternatives were identified for the location of the 345-kV lines. Since both routes could be constructed along existing ROW, these routes were determined to be the best available options for location of the new lines. For both of the potentially viable Project route alternatives, WMECO applied numeric data metrics that were as objective as possible to obtain a numerical score (or ranking) for each alignment based on the evaluation criteria. The routes were divided into four segments for evaluation purposes which allowed the data to be summed together for an overall total for each route. As shown in Figure 4-6:

- Segment 1 extends from North Bloomfield Substation to South Agawam Switching Station.
- Segment 2A and 2B both extend from South Agawam Switching Station to Agawam Substation and are used to denote the different ROW expansions required for either the Northern or Southern Route options.
- Segment 3 extends from Agawam Substation to Ludlow Substation for the Northern Route option.
- Segment 4 extends from South Agawam Junction to Ludlow Substation for the Southern Route option.

Figure 4-6: Potential 345-kV Route Segments