APPENDIX L

INVASIVE PLANT SPECIES CONTROL PLAN
FOR THE HUBLINE/EAST TO WEST PROJECT

Algonquin Gas Transmission, LLC

Invasive Plant Species Control Plan for the HubLine/East to West Project

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INTRODUCTION

Algonquin Gas Transmission, LLC ("Algonquin") has developed this Invasive Plant Species Control Plan to be implemented during construction and operation of the HubLine/East to West Project ("E2W Project" or "Project"). The purpose of the plan is to attempt to control the spread of two foreign and invasive wetland plant species, purple loosestrife (*Lythrum salicaria*) and common reed (*Phragmites australis*), into wetland areas along the E2W Project area where they do not currently exist. Foreign and invasive plant species are defined as those that are either intentionally or unintentionally introduced into a geographic area to which they are not native. Not all foreign plant species are classified as nuisance species. However, when their populations grow in a given area to the point where they cannot be naturally controlled and begin to out-compete indigenous plant species, they may then be considered nuisance species. Purple loosestrife and common reed have established reputations within New England as being foreign invasive plant species. This prevention and control plan focuses on these two species because they have been identified by federal and state agencies as the most prevalent nuisance species within the project area.

Purple Loosestrife

Purple loosestrife is an herbaceous exotic which is believed to have been introduced into this country from Europe sometime in the early 1800s (Stuckey, 1980). It is a perennial that can grow to heights of 6 feet and taller, and is easily recognized from a distance by its elongated spike of purple flowers blooming between July and September. Purple loosestrife prefers moist, highly organic soils but can tolerate a wide range of conditions (Urbatsch 2003). Considered a nuisance plant species, purple loosestrife is able to out-compete native species found in salt marshes, wet meadows and swamps. Due in part to the lack of natural predators (Rendall, 1989) and its ability to produce and disperse up to 2.5 million viable seeds per plant annually (Welling and Becker, 1990), it has been successful in establishing a widely distributed range across the United States.

Purple loosestrife can form monotypic stands which eliminate biodiversity. Although it is considered a minor food source for muskrats, white-tailed deer and rabbit, these mammals utilize only a portion of the stems and tend to cut back the plant to the point where it grows back with renewed vigor (Anderson, 1995). In general, purple loosestrife is considered to provide little food, poor cover, and few nesting materials for wildlife (Mann 1991). Waterfowl nesting becomes more difficult as clumps of purple loosestrife restrict access to open water and offer concealing passageways for predators such as foxes and raccoons (Mal et al. 1992).

Common Reed

Common reed is a communal perennial grass which grows up to 14 feet in height and is found in a variety of disturbed tidal and non-tidal wetlands. Common reed is especially common in alkaline and brackish (slightly saline) environments; however, common reed does not require nor even prefer these habitats to freshwater areas (Haslam 1972, 1971). Its growth is greater in fresh water but it may be outcompeted in these areas by other species that cannot tolerate brackish, alkaline or acidic waters. It is easily distinguished by its inflorescence which is 8 to 16 inches long and displays purple or white flower clusters from mid-summer to early fall (Tiner, 1987). This grass reproduces primarily through vegetative methods whereby rhizomes send up new shoots (Brown, 1979). This technique allows the plant to establish rapidly and to form dense stands (Tiner, 1987) that make it difficult for other plants to thrive. The major concern is that common reed has little wildlife value and its aggressive colonization in a community causes a decline in species diversity. Thick stands of common reed form nearly impenetrable barriers to the movement of animals and large birds such as ducks, shorebirds, and wading birds

(Capotosto et al. 2007). Common reed will grow up to twenty feet tall by raising the marsh elevation and by filling in the open water areas and brackish marshes (Capotosto et al. 2007).

Construction Phase Mitigation Measures

Both purple loosestrife and common reed are present within the majority of the wetlands along the E2W Project area and are summarized in Table 1 of Appendix A. In many cases, these species are well established and pervasive. As previously mentioned, the purpose of this invasive plant species control plan is to control the spread of invasive plants to areas where they do not presently occur. The following mitigation measures will be implemented during construction:

1) The Environmental Inspector will make every effort to ensure that prefabricated equipment mats as well as construction equipment are clean and free of excess dirt and mud prior to entering a wetland area that does not support purple loosestrife or common reed. As necessary, equipment cleaning areas will be designated to ensure that equipment is cleaned to the extent practicable.

2) Sediment/erosion control devices shall be installed across the pipeline right-of-way ("ROW") on slopes leading into wetlands and along the edge of the construction ROW to prevent spoil from migrating into these areas. This will also help to prevent the dispersion of seeds from invasive plant species into uninfested wetlands during construction.

3) Revegetation of wetlands shall be expedited by stripping the topsoil from over the trench, except in areas with standing water or heavily inundated soils, where no topsoil layer is evident, or where it exceeds the depth of the trench. Topsoil shall then be stockpiled separately from subsoil to ensure preservation of the native seed bank.

4) Following pipeline installation, the trench will be backfilled and the area recontoured to its original grade. Segregated topsoil shall be replaced as the surficial layer and natural drainage patterns restored to facilitate natural re-establishment of native vegetation.

5) The restored ROW will be seeded with an annual rye grass within 6 days of final regrading. Annual ryegrass will create a rapid cover over the disturbed ROW and help to prevent establishment of invasive species which typically colonize disturbed sites.

6) Expediting construction in and around wetlands and limiting the amount of equipment and construction activities within wetlands will reduce the amount and duration of disturbances. In addition, equipment used will be tracked or balloon-tired, or will be operating on top of prefabricated mats, timber riprap, or terra mats. This will minimize the amount of heavily disturbed soils in which invasive plants might colonize.

Post-Construction Monitoring for Invasive Plant Species

To ensure successful revegetation of native wetland species, wetland areas will be monitored for the first 3 to 5 years following pipeline construction and ROW restoration. Monitoring of the entire ROW promptly after construction will prevent the establishment of large populations of nuisance species, and problem areas would be quickly mitigated. During monitoring, emphasis will be placed on identifying the presence of purple loosestrife and common reed in wetlands that did not support these species prior to construction.

In the event that nuisance plant species spread into new ROW areas, Algonquin will implement removal and eradication measures. Available information suggests that control methods such as mowing, burning and flooding are largely ineffective (Urbatsch 2003). Hand removal can be effective but only for small populations or individual plants (Urbatsch 2003). Herbicides have been used with varying success on controlling purple loosestrife and with greater success at controlling common reed (Urbatsch 2003, Capotosto 2007). Accordingly, Algonquin will utilize the following measures in an effort to eradicate the invasive species:

1) Individual plants would be identified and hand pulled, including roots, before the end of the flowering season if their occurrence is no greater than 100 stems per acre. Plants will be removed from the ROW and burned or otherwise disposed of at an approved waste facility.

2) If the invasive plant species population is greater than 100 stems per acre, hand application of Glyphosate (e.g., Rodeo® or Roundup®), or a comparable herbicide, as recommended by the U.S. Army Corps of Engineers and appropriate state agencies, will be used. Application of the herbicide will only be at the approval of the landowner and appropriate state agencies.

3) Vegetation maintenance over the full width of the permanent ROW within wetlands will be prohibited. A corridor centered on the pipeline and up to 10 feet wide may be maintained as an herbaceous layer to facilitate periodic pipeline corrosion/leak surveys. Trees within 15 feet of the pipeline that are greater than 15 feet in height may also be selectively cut and removed within the permanent ROW. The restricted vegetation maintenance measures will promote the development of a dense layer of shrubs on the ROW, and will help to deter the growth of both common reed and purple loosestrife which are shade intolerant species.

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APPENDIX A

Table 1: Summary of Wetland Supporting Invasive Plant Species Along the E2W Project

TABLE 1

Summary of Wetlands Supporting Invasive Plant Species along the E2W Project

State/Facility	Wetland I.D.	NWI Classification a/	Enter MP	Exit MP	Common Reed (*Phragmites australis*)	Purple Loosestrife (*Lythrum salicaria*)	Comments
Massachusetts							
I-10 Extension							
	I10-W51	EEM	0.7	1.1	Yes	Yes	
	I10-W1	PEM	1.1	1.1	Yes	Yes	
	I10-W2	PEM/PFO	1.3	1.3	Yes	Yes	
	I10-W3	PSS/PFO	1.4	1.4		Yes	Contains Japanese knotweed
	I10-W4	PSS/PFO	1.6	1.9		Yes	Contains Japanese knotweed
	I10-W5	PSS	2.0	2.0	Yes	Yes	Contains Japanese knotweed
	I10-W48	PSS/PFO	2.1	2.2	Yes	Yes	
	I10-W46	PSS/PFO	2.2	2.2	Yes	Yes	
	I10-W45	PEM/PSS	2.2	2.3	Yes	Yes	
	I10-W6	PEM/PFO	2.4	2.4	Yes		Contains Japanese knotweed
	I10-W7	PEM	2.9	2.9		Yes	
	I10-W8	PFO	3.0	3.1		Yes	
	I10-W49	PFO	3.9	4.0	Yes	Yes	
	I10-W50	PEM/PFO	4.4	4.4	Yes	Yes	
	I10-W50A	PFO/PSS	4.4	4.5			
	I10-W50B	PSS	4.5	4.6	Yes		
	I10-W50C	PFO/PSS	4.7	4.7			
	I10-W50D	PFO	4.9	4.9			
	I10-W23	PFO/PEM/PSS	5.2	5.3	Yes	Yes	
	I10-W21	PEM/PSS/PFO	5.5	5.5			
	I10-W20	PSS/PFO	5.6	5.7			
	I10-W19	PFO/PSS	5.8	5.9	Yes	Yes	
	I10-W25	PFO	6.0	6.1	Yes	Yes	

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State/Facility	Wetland I.D.	NWI Classification a/	Enter MP	Exit MP	Common Reed (*Phragmites australis*)	Purple Loosestrife (*Lythrum salicaria*)	Comments
	I10-W24	PFO	6.1	6.4	Yes	Yes	
	I10-W26	PFO/PSS	6.5	6.6	Yes	Yes	
	I10-W27	PEM	6.7	6.8			
	I10-W27A	PFO	6.8	6.9	Yes	Yes	
	I10-W28	PFO/PEM	7.0	7.0		Yes	
	I10-W31	PSS/PFO	7.2	7.4	Yes	Yes	
	I10-W32	PSS/PFO	7.7	7.8			Glossy buckthorn
	I10-W33	R/PSS/PFO	7.9	7.9		Yes	
	I10-W34	PSS/PFO	8.1	8.1		Yes	
	I10-W35	PSS/PFO	8.2	8.3		Yes	
	I10-W36	PSS/PFO	8.4	8.5	Yes	Yes	
	I10-W37	PEM	8.9	8.9	Yes	Yes	
	I10-W37A	PSS	9.1	9.2			Glossy buckthorn
	I10-W38	PSS/PFO	9.5	9.7	Yes	Yes	
	I10-W38B	PSS	10.0	10.0	Yes		
	I10-W38D	PSS/PEM	10.2	10.2		Yes	
	I10-WCC1	PFO	10.8	10.8	Yes	Yes	
	I10-WCC2	PSS/PFO	10.9	10.9		Yes	
	I10-WCC2A	PSS/PFO	10.9	10.9		Yes	
	I10-WCC11	PFO	11.0	11.1		Yes	
	I10-WCC10	PFO	11.1	11.1			
	I10-WCC8	PSS/PFO	11.3	11.4		Yes	
	I10-DEP11	PFO	11.6	11.7			Not field delineated yet due to access restrictions
	I10-WCC13	PEM/PFO	12.5	12.5			
	QB-1-31	PFO	12.9	12.9	Yes	Yes	

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Massachusetts							
Q-1 System							
	QB-1-1	PEM/PFO	12.2	12.2			
	QB-1-2	PEM	13.0	13.0		Yes	
	QB-1-3	PFO	13.1	13.1		Yes	
	QB-1-4	PEM	13.3	13.3			
	QB-1-6	PFO/PEM/PSS	13.6	13.6	Yes	Yes	
	QB-1-7	PFO/PEM	13.6	14.0	Yes		
	QB-1-8	PSS	14.1	14.1	Yes		
	QB-1-9	PEM	14.5	14.5		Yes	
	QB-1-10	PEM	14.9	15.0		Yes	
	QB-1-11	PEM/PFO	15.4	15.6	Yes	Yes	
	QB-1-12	PEM/PFO	15.6	16.4	Yes	Yes	
	QB-1-13	PEM/PFO	16.5	16.6	Yes	Yes	
	QB-1-15	PEM/PFO	16.9	17.3	Yes	Yes	
	QB-1-15A	R	17.4	17.4			
	QB-1-17	PEM/PFO	17.3	17.9	Yes	Yes	
	QB-1-18	PEM/PFO	18.1	18.1	Yes	Yes	
	QB-1-19	PEM/PFO	18.5	18.7		Yes	
	QB-1-25	PFO/PEM	18.8	18.8	Yes	Yes	
	QB-1-26	PFO/PEM	18.9	19.0	Yes	Yes	
	QB-1-29	PFO	19.1	19.2	Yes	Yes	
	QB-1-28	PEM/PFO	19.1	19.2	Yes	Yes	
	QB-1-30	PFO	19.3	19.4	Yes	Yes	
	QB-1-31	PFO	19.5	19.6	Yes	Yes	

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State/Facility	Wetland I.D.	NWI Classification a/	Enter MP	Exit MP	Common Reed (*Phragmites australis*)	Purple Loosestrife (*Lythrum salicaria*)	Comments
Connecticut							
E-3 System							
	E3-W1	PFO/PEM	0.09	0.14			
	E3-W2	PFO/PSS	0.30	0.36	Yes	Yes	
	E3-W3	PFO/PSS	0.45	0.59			
	E3-W4	PFO/PEM	0.63	0.63			
	E3-W5	PFO/PSS	0.66	0.68			
	E3-W6	PFO/PSS	0.85	0.91			
	E3-W7	PEM	1.00	1.02			
	E3-W8	PFO/PEM	1.18	1.26			
	E3-W9	PFO	1.43	1.44			
	E3-W11	PFO/PEM	1.50	1.51			
	E3-W12	PFO/PEM	1.61	1.64			
	E3-W13	PFO/PEM	2.11	2.14			
	E3-W14	PFO/PEM	2.25	2.29	Yes		
	E3-W15	PFO/PEM	2.72	2.78			
	E3-W16	PFO/PEM	2.82	2.89	Yes		
	E3-W50	PFO/PSS	3.32	3.34		Yes	
	E3-W19 (new ROW)	PFO/PEM	4.12	4.15	Yes	Yes	
	E3-W19 (existing ROW)	PFO/PSS	4.09	4.15	Yes	Yes	
	E3-W20	PFO/PEM	4.42	4.55	Yes	Yes	
	E3-W21	PFO/PEM	4.70	4.84			
	E3-W22	POW/PEM	4.86	4.90			
	E3-W23	PFO/PSS	5.10	5.27	Yes		

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	E3-W24	PFO/PSS	5.30	5.41	Yes	Yes	
	E3-W25	PFO/PSS	5.79	5.81			
	E3-W26	PFO/PSS	6.24	6.27			
	E3-W29	PFO/PSS	6.63	7.32	Yes		
	E3-W28	PFO/PSS	7.38	7.42			
	E3-W30	PFO/PSS	7.52	7.53	Yes		
	E3-W31	PFO/PEM	7.59	7.60			
	E3-W33	PFO/PEM	7.81	7.86			
	E3-W34	PFO/PSS	8.16	8.19			
	E3-W35	PFO/PSS	8.46	8.66	Yes		
	E3-W37	PFO/PSS	8.81	9.03	Yes		
	E3-W38	PFO/PSS	9.23	9.34			
	E3-W40	PFO	9.78	9.79			
	E3-W41	PFO	9.95	9.96			
	E3-W42	PFO	10.47	10.48			
	E3-W44	PFO/PSS	10.88	10.99			

a/ NWI Classifications
- PEM - Palustrine emergent wetland
- PSS - Palustrine scrub shrub wetland
- PFO – Palustrine forested wetland
- POW – Palustrine open water (pond)
- EEM – Estuarine emergent wetland
- R – Riverine, without significant wetland fringe