APPENDIX C
WETLANDS

C. WETLANDS

The Surface Transportation Board (SEA) independently verified the wetland identification and classifications and found them to be acceptable for the purposes of this analysis. For purposes of the wetlands evaluation, the proposed Port MacKenzie Rail Extension project area is defined as the area within 500 feet on either side of the segments for a total width of 1,000 feet (HDR, 2008; HDR, 2010). The project area is about 20 percent wetlands. About one-fourth of the project area wetlands are forested, most of which are needleleaf forested wetlands, with broadleaf and mixed forested wetlands making up less than 1 percent of the project area. More than half the wetlands in the project area are scrub/shrub wetlands (59 percent), of which 42 percent are broadleaf scrub/shrub wetlands, 9 percent are needleleaf scrub/shrub wetlands, and 49 percent are mixed and other scrub/shrub wetlands. Emergent wetlands are less common in the project area, comprising about 11 percent. Five percent of the project area wetlands are classified as other waters, of which 23 percent are riverine waters and 32 percent are palustrine waters. This appendix describes the wetland classifications or the vegetation communities, soils, and hydrology patterns for wetlands in the project area; functional capacities identified for project area wetland classes; and wetlands within the 200-foot rail line right-of-way (ROW) of segments and associated facilities.

C.1 Wetland Classifications

C.1.1 Forested Wetlands

Broadleaf forested wetlands are uncommon in the project area, occurring at only a single field point (Figure C-1). This wetland type is dominated by an overstory of paper birch (*Betula papyrifera*) and black spruce (*Picea mariana*) with a mixed understory of thin-leaf alder (*Alnus tenuifolia*), Greenland Labrador-tea (*Rhododendron groenlandicum*), and prickly rose (*Rosa acicularis*). Wetland hydrology indicators observed include water marks, saturation, and hydrogen sulfide odor within the soil profile. The soil at the site consists of a histosol (soils composed primarily of organic material).

Needleleaf evergreen forested wetlands are one of the most abundant wetland types mapped in the project area, occurring across broad flat areas and in low-lying depressions (Figure C-2). Plant community characteristics include an overstory dominated by black spruce (*Picea mariana*), with an understory of Greenland Labrador tea, mountain cranberry (*Vaccinium vitis-idaea*), field horsetail (*Equisetum arvense*), thin-leaf alder, black crowberry (*Empetrum nigrum*), narrow-leaf Labrador tea (*Rhododendron subarcticum Harmaja*), and tundra dwarf birch *(Betula glandulosa*). Most needleleaf forested wetlands are either on histosols or on mineral soils with histic epipedons. Some soil test pits exhibit a strong sulfidic odor, indicating anaerobic conditions, and all of these sites have saturated soils within the top 12 inches. Other wetland hydrology indicators include presence of a high water table, micro-topographic relief, stunted or stressed plants, and surface water.

Figure C-1. Example of a Broadleaf Forested Wetland (left) and an Aerial Plan View of Broadleaf Forested Wetland (PF01, right) in the Project Area (HDR, 2008)

Figure C-2. Example of a Needleleaf Forested Wetland (left) and an Aerial Plan View of Needleleaf Forested Wetland (PF04, right) in the Project Area (HDR, 2008)

C.1.2 Scrub/Shrub Wetlands

Broadleaf scrub/shrub wetlands are the most common wetland type in the project area, generally occurring across broad flat areas (Figure C-3). These wetlands are dominated by a canopy of swamp birch (*Betula nana*), sweetgale (*Myrica gale*), bluejoint reedgrass (*Calamagrostis canadensis*), water horsetail (*Equisetum fluviatile*), marsh cinquefoil (*Potentilla palustris*), water sedge (*Carex aquatilis*), and buckbean (*Menyanthes trifoliata*). Some areas appeared seasonally flooded or semi-permanently flooded and had a dense canopy dominated by thin-leaf alder.

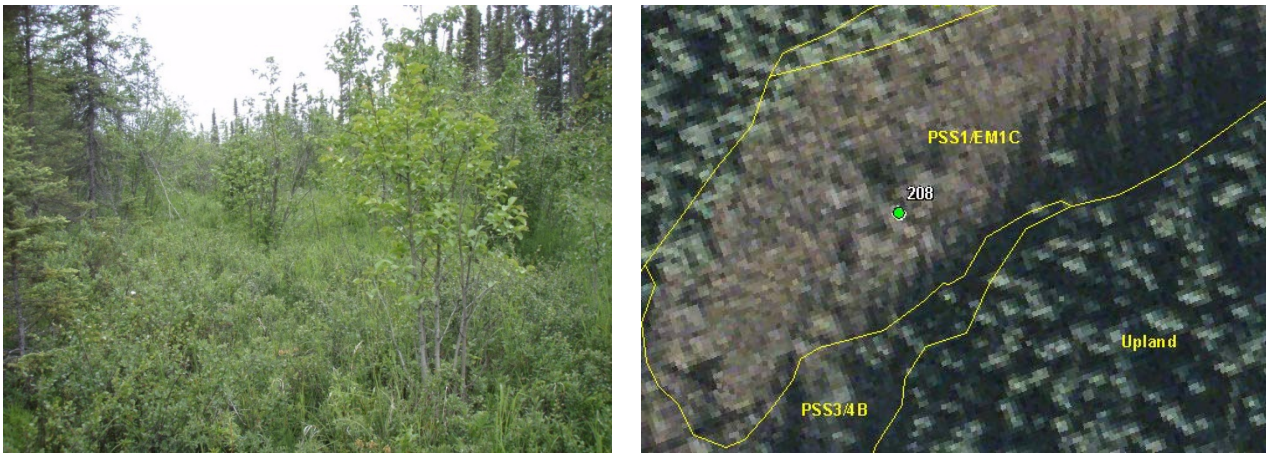

Figure C-3. Example of a Bog-type Broadleaf Scrub/Shrub Wetland (left) and an Aerial Plan View of Bog-type Broadleaf Scrub/Shrub Wetland (PSS1, right) in the Project Area (HDR, 2008)

All the broadleaf scrub/shrub wetlands sampled had either histosols or histic epipedons. Common wetland hydrology indicators include saturated soils, a high water table, surface water, microtopographic relief, iron deposits, watermarks, reduced iron, stunted or stressed plants, and drainage patterns. Areas of inundation are easily seen on aerial photography at many locations.

Needleleaf scrub/shrub wetlands are common in the project area and generally occur on broad flat expanses (Figure C-4). This wetland type includes an open or closed canopy of shrub-height stunted black spruce (less than 20 feet tall), narrow-leaf Labrador tea, cloudberry (*Rubus chamaemorus*), Scheuchzer's cotton-grass (*Eriophorum scheuchzeri*), few-flower sedge (*Carex pauciflora*), and round-fruit sedge (*Carex rotundata*). All needleleaf scrub/shrub wetlands sampled had histosols, saturated soils, and a high water table.

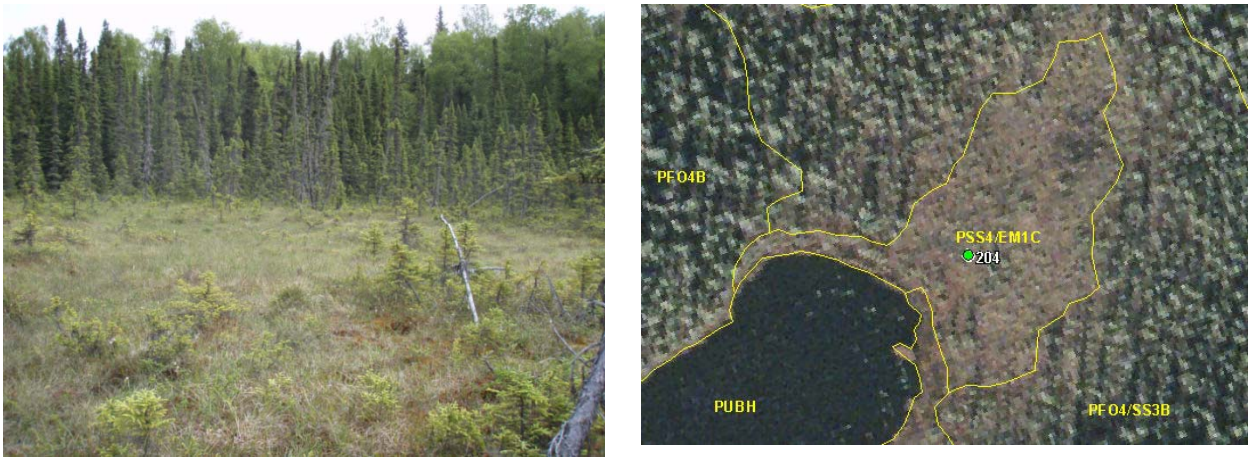

Figure C-4. Example of a Needleleaf Scrub/Shrub Wetland (left) and an Aerial Plan View of Needleleaf Scrub/Shrub Wetland (PSS4, right) in the Project Area (HDR, 2008)

Mixed scrub/shrub wetlands are common in the project area and occur generally on large flat expanses (Figure C-5). Dominant plant species in this wetland type include stunted black spruce, narrow-leaf Labrador-tea, field horsetail, few-flower sedge, and water sedge. Histosols were encountered at all sites visited within this wetland type. Hydrogen sulfide odor, an indicator of anaerobic soil conditions, and saturated soils were observed at half of the sites sampled. Other commonly observed wetland hydrology indicators include a high water table, microtopographic relief, stunted or stressed plants, water marks, the presence of surface water, and iron deposits.

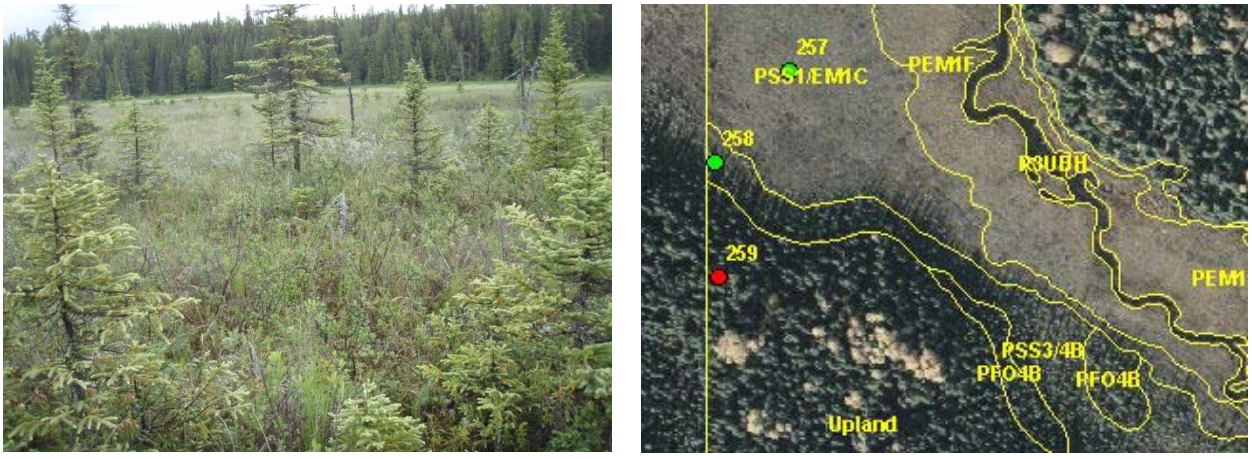

Figure C-5. Example of a Mixed Broadleaf-Needleleaf Scrub/Shrub Wetland (left) and Aerial Plan View of Mixed Broadleaf-Needleleaf Scrub/Shrub Wetland (PSS1, right) in the Project Area (HDR, 2008)

C.1.3 Emergent Wetlands

Emergent wetlands are common throughout the project area and extend across broad, flat areas, low-lying depressions, and riverine corridors (Figure C-6). Most of these wetlands are dominated only by graminoids and forbs; however, some patterned bogs that contained higher mounds of shrubby vegetation were included in this wetland type when emergent vegetation dominated the wetland complex. Common plant species were creeping sedge (*Carex chordorrhiza*), water sedge, bluejoint reedgrass, livid sedge (*Carex livida*), bog cranberry (*Vaccinium oxycoccos*), and sweetgale. Histosols or histic epipedons are seen in most mapped emergent wetlands. Hydrogen sulfide odor, saturated soils, a high water table, and areas of surface water were also frequently observed. Drainage patterns and inundation are visible on aerial photography in many areas mapped as emergent wetlands. Extensive areas of patterned bog, characterized by a series of alternating low ridges and shallow inundated areas, are a dominant landscape feature across many of the larger emergent wetland complexes.

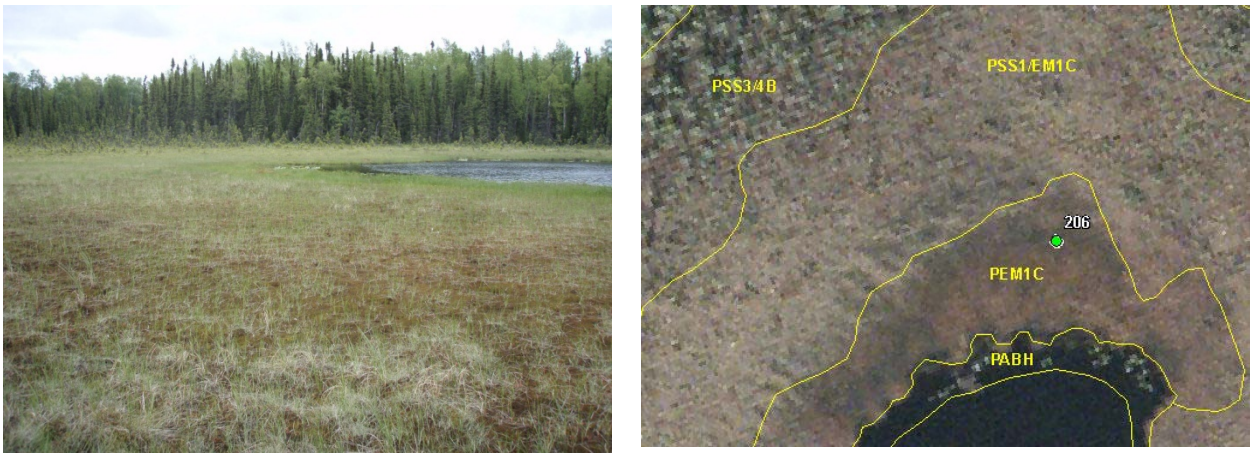

Figure C-6. Example of an Emergent Wetland (left) and Aerial Plan View of Emergent Wetland (PEM1C, right) in the Project Area (HDR, 2008)

C.1.4 Other Wetlands and Waters

Other waters of the U.S. present in the project area include ponds, lakes, and streams (Figure C-7). Pond designation includes all open water habitats in the study area smaller than 20 acres (Cowardin *et al.*, 1979). Ponds with aquatic beds are generally shallower than unvegetated ponds and were also included in this category. Lakes designation includes all open water habitats in the study area larger than 20 acres (Cowardin *et al*., 1979). There are five major streams in the project area – the Susitna River, the Little Susitna River, Willow Creek, Fish Creek, and an unnamed creek. Streams and their unvegetated floodplains were mapped in the project area (Figure C-7). Both intermittent streams and perennial streams were identified. Some perennial and all intermittent streams are mapped as linear features because they are too narrow to map effectively using polygonal regions.

C.2 Wetland Functions and Values

Table C-1 lists the functional values of each vegetated wetland type within 500 feet of the proposed rail line. Functional capacities are evaluated on a scale of 0 to 1, with 0 equivalent to providing no function and 1 providing full function. The functional capacity values were calculated for a portion of the field sites, and extrapolated for the remaining wetlands. The values were grouped into categories based on their functional capacity value. Low includes functional capacity values 0.33 and lower, moderate includes functional capacity values above 0.33 and below 0.66, and high includes functional capacity values of 0.66 or higher. If a mapped wetland type did not have corresponding field data, the functional capacity was extrapolated from known functional capacity values. The eight functions for wetlands in the project area that would most likely be affected by proposed rail line construction and operations are:

- High functional capacity of all wetlands to modify groundwater discharge
- High functional capacity of permanently and semi-permanently flooded emergent wetlands to perform groundwater discharge

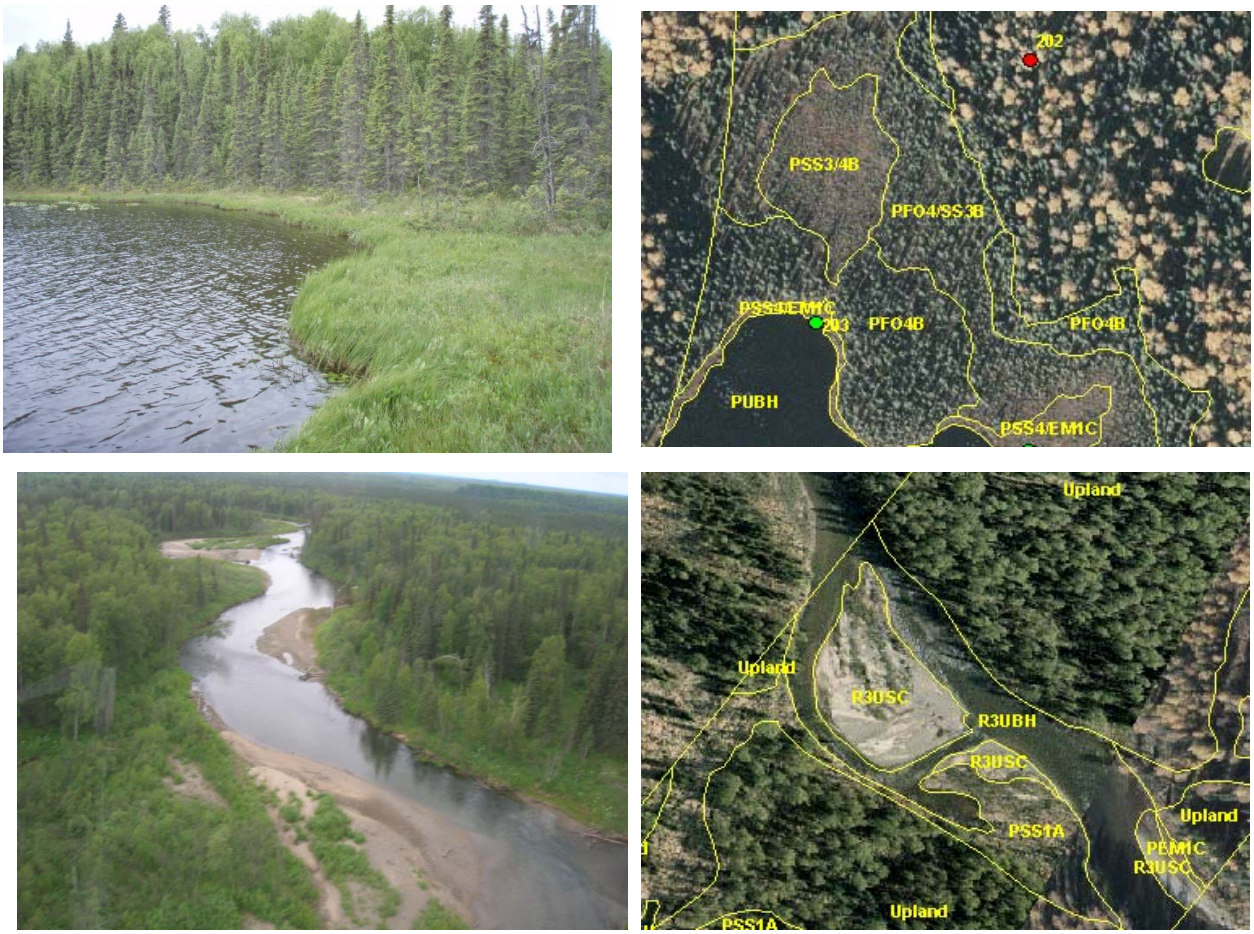

Figure C-7. Examples of Pond Wetland (top left), Aerial Plan of Pond Wetland (PSS4, top right), Stream Wetland (above left), and Stream Wetland Distribution (R3UBH, above right) in the Project Area (HDR, 2008)

- Moderate functional capacity of wetlands with an outlet to store storm and floodwaters
- Moderate functional capacity of wetlands with an outlet to modify stream flow
- High functional capacity of all wetlands to contribute to the abundance and diversity of wetland fauna
- High functional capacity of all wetlands to modify water quality
- High functional capacity of wetlands with an outlet to export detritus
- High functional capacity of all wetlands to contribute to the abundance and diversity of wetland vegetation

Table C-1
Average Functional Capacities for Project Area Wetlands by Hydrologic Regime[a] (page 1 of 2)

				Functional Capacity							
Hydrologic Regime	**Hydrogeomorphic Class**	**Outlet**	**Area[b] (acres)**	**Export of Detritus**	**Groundwater Discharge**	**Groundwater Recharge**	**Streamflow Moderation**	**Contribution to Abundance and Diversity of Wetland Fauna**	**Storm Water and Floodwater Storage**	**Modification of Water Quality**	**Contribution to Abundance and Diversity of Wetland Vegetation**
Saturated	Depression	No	44.4	Low	Moderate	Moderate	Low	High	High	High	High
		Yes	39.4	High	Moderate	Moderate	High	High	Moderate	High	High
	Flat	No	5.8	Low	Moderate	Moderate	Low	High	High	High	High
		Yes	1,767.6	High	High	Low	Moderate	High	Moderate	High	High
	Lacustrine Fringe	Yes	13.5	High[c]	Low[c]	Moderate[c]	Low[c]	High[c]	Moderate[c]	High[c]	High[c]
	Riverine	Yes	20.6	High	High	Moderate	High	High	High	High	High
	Slope	No	18.2	Low	Moderate	Low[c]	Low	High	High	High	High
		Yes	126.0	High[c]	High[c]	Low[c]	Moderate[c]	High[c]	Moderate[c]	High[c]	High[c]
Seasonally Flooded	Depression	No	26.2	Low	Moderate	Moderate	Low	Moderate	High	High	Moderate
		Yes	32.6	High	High	Moderate	Moderate	High	Moderate	High	High
	Flat	No	0.6	Low	Moderate	Moderate	Low	High	High	High	High
		Yes	572.4	High	High	Moderate	Moderate	High	Moderate	High	High
	Lacustrine Fringe	Yes	14.6	High	High	Moderate	Low[c]	Moderate	Moderate	High	High
	Riverine	Yes	128.3	High	Low[c]	Moderate	High	High	High	High	High
	Slope	No	4.7	Low	High[c]	Low[c]	Low	High	High	High	Moderate
		Yes	11.0	High[c]	Low[c]	Low[c]	Moderate[c]	High[c]	Moderate[c]	High[c]	High[c]

Table C-1
Average Functional Capacities for Project Area Wetlands by Hydrologic Regime[a] (page 2 of 2)

				Functional Capacity							
Hydrologic Regime	**Hydrogeomorphic Class**	**Outlet**	**Area[b] (acres)**	**Export of Detritus**	**Groundwater Discharge**	**Groundwater Recharge**	**Streamflow Moderation**	**Contribution to Abundance and Diversity of Wetland Fauna**	**Storm Water and Floodwater Storage**	**Modification of Water Quality**	**Contribution to Abundance and Diversity of Wetland Vegetation**
Semi-permanently Flooded	Depression	No	3.2	Low	High[c]	Moderate	Low	High	High	High	High
		Yes	23.2	High[c]	High[c]	Moderate[c]	Low	High[c]	Moderate[c]	High[c]	High[c]
	Flat	Yes	57.9	High[c]	Moderate	Moderate[c]	Moderate[c]	High[c]	Moderate[c]	High[c]	High[c]
	Lacustrine Fringe	Yes	3.0	Moderate	High	Low	Low[c]	High	Moderate	High	High
	Riverine	Yes	27.4	High	High[c]	Moderate	High	High	Moderate	High	High
Temporarily Flooded	Riverine	Yes	5.0	High[c]	Moderate[c]	Moderate[c]	High[c]	High[c]	Moderate[c]	High[c]	High[c]
Permanently Flooded	Depression	Yes	11.3	High[c]	High[c]	Moderate[c]	Low[c]	High[c]	Moderate[c]	High[c]	High[c]
	Flat	Yes	5.8	High[c]	High[c]	Moderate[c]	Moderate[c]	High[c]	Moderate[c]	High[c]	High[c]
	Lacustrine Fringe	Yes	0.2	High[c]	High[c]	Low[c]	Low[c]	High[c]	Moderate[c]	High[c]	High[c]
	Riverine	Yes	1.5	High	High	Moderate	High	High	Moderate	High	Moderate
	N/A	Yes	0.3	Low[c]	Low[c]	Moderate[c]	Moderate[c]	Moderate[c]	Moderate[c]	High[c]	Moderate[c]
		Yes	34.8	Low[c]	Low[c]	Moderate[c]	Moderate[c]	Moderate[c]	Moderate[c]	High[c]	Moderate[c]
		Total	**2,999.5**								

[a] Sources: Magee and Hollands, 1998; HDR, 2008.

[b] Area within 500 feet of all segments, collectively. If the Surface Transportation Board authorized proposed rail line construction and operations, that authority would only extend to a subset of the segments. Therefore, the acreages listed do not represent a range or even maximum value of potential impacts to wetlands. Furthermore, the proposed right-of-way would be 200-feet wide and the wetland acreages listed are for a 1,000-foot wide project area defined for the purposes of wetland delineation.

[c] No data available; functional capacity was extrapolated.

C.3 Wetland Assessment Methodology

From July 7 through 11, 2008, ARRC used the U.S. Army Corps of Engineers wetlands jurisdictional determination methodology to identify wetland types and areas within 500 feet of the segments (HDR, 2008). The U.S. Army Corps of Engineers Wetlands Delineation Manual (Environmental Laboratory, 1987) and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual Alaska Region (USACE, 2007) provide the methodology for establishing wetland boundaries and types. The Corps of Engineers is reviewing and would have to approve the wetland boundaries and types described herein before initiating a wetland permit process for the project.

SEA used Geographic Information System analysis of delineated wetland areas within the 200-foot wide ROW to calculate the areal extent of wetlands the proposed rail line would directly affect. Tables C-2 and C-3 list the results of this analysis for the southern and northern segments by individual wetland class. Chapter 4, Section 4.5, summarizes wetland classification data by categories of needleleaf forested wetlands, broadleaf forested wetlands, mixed forested wetlands, broadleaf scrub/shrub wetlands, needleleaf scrub/shrub wetlands, mixed and other scrub/shrub wetlands, emergent wetlands, and other waters. SEA independently reviewed the wetland identification and classifications and found them to be acceptable for the purposes of this analysis.

Table C-2
Wetlands within 200-Foot Right-of-Way of the Southern Segment Combinations[a] (page 1 of 2)

National Wetland Inventory Code	Description	Mac West-Connector 1		Mac West-Connector 2		Mac East-Connector 3		Mac East	
		Area (acres)	Wetland Proportion (percent)	Area (acres)	Wetland Proportion (percent)	Area (acres)	Wetland Proportion (percent)	Area (acres)	Wetland Proportion (percent)
PFO1/SS1B	Saturated broadleaved deciduous forest with broadleaf scrub/shrub understory	25	8.9	25	10.5	23	22.2	23	23.3
PFO4/EM1B	Saturated broadleaved deciduous forest with persistent emergent understory	0	0	0	0	1	1.4	1	1.5
PFO4/SS1B	Saturated needleleaf evergreen forest with broadleaf scrub/shrub understory	2	0.6	2	0.7	7	6.6	7	6.9
PFO4/SS3B	Saturated needleleaf evergreen forest with broadleaved evergreen scrub/shrub understory	25	9.0	25	10.7	19	18.5	19	18.9
PFO4/SS3C	Seasonally flooded needleleaf evergreen forest with broadleaved evergreen scrub/shrub understory	4	1.6	4	1.9	3	2.4	2	2.5
PFO4/SS4B	Saturated needleleaf evergreen forest with needleleaf evergreen scrub/shrub understory	2	0.9	2	0.7	5	4.7	5	5.0
PFO4B	Saturated needleleaf evergreen forest	60	21.5	52	22.1	13	12.3	12	12.0
PFO1/4B	Saturated broadleaved deciduous/needleleaf evergreen forest	2	0.5	2	0.6	3	3.3	3	3.5
PFO4/1B	Saturated needleleaf evergreen/broadleaved deciduous forest	7	2.6	7	3.1	0	0	0	0
PSS1/EM1B	Saturated broadleaf deciduous scrub/shrub with persistent emergent understory	6	2.1	5	2.2	2	2.3	3	2.4
PSS1/EM1C	Seasonally flooded broadleaf deciduous scrub/shrub with persistent emergent understory	8	2.9	6	2.6	2	1.6	1	1.4
PSS1/EM1F	Semipermanently flooded broadleaf deciduous scrub/shrub with persistent emergent understory	9	3.4	10	4.0	1	1.0	1	1.1
PSS1B	Saturated broadleaf deciduous scrub/shrub	<1[b]	0.0	<1	0.0	<1	0.2	<1	0.2
PSS1C	Seasonally flooded broadleaf deciduous scrub/shrub	1	0.4	1	0.5	2	1.5	0	0
PSS4/EM1B	Saturated needleleaved evergreen with persistent emergent understory	2	0.7	<1	0.2	0	0	0	0
PSS4/EM1C	Seasonally flooded needleleaved evergreen with persistent emergent understory	1	0.2	<1	0.1	0	0	0	0
PSS4B	Saturated needleleaved evergreen scrub/shrub	6	2.2	5	2.1	1	1.2	1	1.3

Table C-2
Wetlands Within 200-Foot Right-of-Way of the Southern Segment Combinations[a] (page 2 of 2)

National Wetland Inventory Code	Description	Mac West-Connector 1		Mac West-Connector 2		Mac East-Connector 3		Mac East	
		Area (acres)	Wetland Proportion (percent)	Area (acres)	Wetland Proportion (percent)	Area (acres)	Wetland Proportion (percent)	Area (acres)	Wetland Proportion (percent)
PSS1/3B	Saturated broadleaved deciduous/broadleaved evergreen scrub/shrub	0	0	0	0	<1	0.0	<1	0.0
PSS1/4B	Saturated broadleaved deciduous/needleleaved evergreen scrub/shrub	14	4.9	14	5.8	6	5.8	6	5.8
PSS1/4C	Seasonally flooded broadleaved deciduous/needleleaved evergreen scrub/shrub	0	0	0	0	2	1.9	2	2.0
PSS3/1B	Saturated broadleaved evergreen/broadleaved deciduous scrub/shrub	12	4.2	3	1.3	<1	0.0	<1	0.0
PSS3/1C	Seasonally flooded broadleaved evergreen/broadleaved deciduous scrub/shrub	<1	0.2	1	0.2	0	0	0	0
PSS3/4B	Saturated broadleaved evergreen/needleleaved evergreen scrub/shrub	47	16.7	39	16.6	11	11.0	10	10.7
PSS4/1B	Saturated needleleaved evergreen/broadleaved deciduous scrub/shrub	8	3.1	8	3.4	1	0.8	1	0.9
PSS4/3B	Saturated needleleaved evergreen/broadleaved evergreen scrub/shrub	15	5.3	8	3.6	0	0	0	0
PEM1B	Saturated persistent emergent	9	3.2	8	3.5	0	0	0	0
PEM1C	Seasonally flooded persistent emergent	5	1.6	2	1.0	1	0.7	<1	0.1
PEM1F	Semi-permanently flooded persistent emergent	8	2.9	6	2.3	<1	0.4	1	0.4
L2UBH	Permanently flooded unconsolidated bottom littoral	1	0.2	1	0.2	0	0	0	0
PABH	Aquatic bed pond	<1	0.0	0	0	0	0	0	0
PUBH	Pond	<1	0.1	0	0	0	0	0	0
R3UBH	Upper perennial stream – unconsolidated bottom	<1	0.1	0	0	<1	0.1	<1	0.1
Wetland[c]		279		236		103		98	
Upland		327		347		489		371	

[a] Source: HDR, 2008; HDR, 2010.
[b] < = less than.
[c] Totals might not equal sums of values due to rounding.

Table C-3
Wetlands within 200-Foot Right-of-Way of the Northern Segments and Segment Combinations[a] (page 1 of 2)

National Wetland Inventory Code	Description	Willow		Big Lake		Houston-Houston North		Houston-Houston South	
		Area (acres)	Wetland Proportion (percent)	Area (acres)	Wetland Proportion (percent)	Area (acres)	Wetland Proportion (percent)	Area (acres)	Wetland Proportion (percent)
PFO4/EM1B	Saturated needleleaved evergreen forest with persistent emergent understory	1	1.0	0	0	0	0	0	0
PFO4/SS1B	Saturated needleleaf evergreen forest with broadleaf deciduous scrub/shrub understory	2	1.9	1	0.4	6	3.3	<1	0.0
PFO4/SS1C	Seasonally flooded needleleaf evergreen forest with broadleaved deciduous scrub/ shrub understory	<1	0.2	0	0	0	0	0	0
PFO4/SS3B	Saturated needleleaf evergreen forest with broadleaved evergreen scrub/shrub understory	4	4.4	2	2.2	6	2.9	3	1.9
PFO4/SS4B	Saturated needleleaf evergreen forest with needleleaved evergreen scrub/shrub understory	3	3.8	5	4.7	11	5.6	11	7.5
PFO4B	Saturated needleleaf evergreen forest	11	12.9	8	6.9	19	9.3	12	8.4
PSS1/EM1B	Saturated broadleaf deciduous scrub/shrub with persistent emergent understory	13	15.1	2	2.1	18	8.9	4	2.6
PSS1/EM1C	Seasonally flooded broadleaf deciduous scrub/shrub with persistent emergent understory	17	19.8	30	27.1	30	14.9	22	15.4
PSS1/EM1F	Semi-permanently flooded broadleaf deciduous scrub/shrub with persistent emergent understory	0	0	0	0	<1	0.3	1	0.4
PSS1A	Temporarily flooded broadleaf deciduous scrub/shrub	1	1.0	0	0	0	0	0	0
PSS1B	Saturated broadleaf deciduous scrub/shrub	2	2.7	7	6.1	0	0	2	1.7
PSS1C	Seasonally flooded broadleaved deciduous scrub/shrub	2	2.6	5	4.0	1	0.6	1	0.5
PSS4/EM1B	Saturated needleleaved evergreen scrub/ shrub with persistent emergent understory	2	1.8	8	7.7	5	2.5	3	2.4
PSS4/EM1C	Seasonally flooded needleleaved evergreen scrub/shrub with persistent emergent understory	<1	0.0	2	1.5	1	0.5	1	0.7
PSS4B	Saturated needleleaved evergreen scrub/ shrub	<1	0.5	4	3.5	3	1.3	3	1.9
PSS3/1B	Saturated broadleaved evergreen/broad-leaved deciduous scrub/shrub	1	0.8	3	3.0	3	1.4	10	6.9
PSS3/4B	Saturated broadleaved evergreen/ needleleaved evergreen scrub/shrub	4	5.3	4	3.2	32	16.0	28	19.2

Table C-3
Wetlands within 200-Foot Right-of-Way of the Northern Segments and Segment Combinations[a] (page 2 of 2)

National Wetland Inventory Code	Description	Willow		Big Lake		Houston-Houston North		Houston-Houston South	
		Area (acre)	Wetland Proportion (percent)	Area (acre)	Wetland Proportion (percent)	Area (acre)	Wetland Proportion (percent)	Area (acre)	Wetland Proportion (percent)
PSS3/4C	Seasonally flooded broadleaved evergreen/ needleleaved evergreen scrub/shrub	<1	0.5	0	0	<1	0.0	<1	0.0
PSS3/EM1B	Saturated broadleaved evergreen with persistent emergent understory	0	0	0	0	<1	0.1	<1	0.2
PSS1/3B	Saturated broadleaved deciduous/ broadleaved evergreen scrub/shrub	3	3.6	0	0	<1	0.3	<1	0.4
PSS1/3C	Seasonally flooded broadleaved deciduous/ broadleaved evergreen scrub/shrub	0	0	2	1.5	0	0	0	0
PSS1/4B	Saturated broadleaved deciduous/ needleleaved evergreen scrub/shrub	1	0.8	<1	0.0	5	2.6	1	0.5
PSS4/1B	Saturated needleleaved evergreen/ broadleaved deciduous scrub/shrub	2	2.0	13	11.6	3	1.5	0	0
PSS4/1C	Seasonally flooded needleleaved evergreen/broadleaved deciduous scrub/ shrub	0	0	<1	0.3	0	0	0	0
PSS4/3B	Saturated needleleaved evergreen/ broadleaved evergreen scrub/shrub	2	2.0	7	6.7	22	11.1	20	13.8
PEM1B	Saturated persistent emergent	3	3.8	1	1.1	2	1.1	1	0.9
PEM1C	Seasonally flooded persistent emergent	6	7.6	6	5.4	15	7.7	11	7.4
PEM1F	Semi-permanently flooded persistent emergent	2	2.4	<1	0.3	12	5.7	8	5.3
L2UBH	Permanently flooded unconsolidated bottom littoral	0	0	<1	0.3	0	0	0	0
PABH	Aquatic bed pond	<1	0.0	0	0	2	1.3	1	0.5
PUBH	Pond	1	0.9	0	0	1	0.6	1	1.1
R3ABH	Upper perennial stream – aquatic bed	<1	0.3	0	0	0	0	0	0
R3UBH	Upper perennial stream – unconsolidated bottom	2	2.0	1	0.4	1	0.4	1	0.5
R3USC/R3USA	Seasonally/temporarily flooded upper perennial stream – unconsolidated shore	<1	0.3	0	0	0	0	0	0
Wetland		85		111		198		145	
Upland		630		410		250		316	

[a] Source: HDR, 2008; HDR, 2010.
[b] < = less than.
[c] Totals might not equal sums of values due to rounding.

C.4 References

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