APPENDIX A

WETLAND DELINEATION METHODOLOGY

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The triple-parameter approach, as required in the *Corps of Engineers Wetland Delineation Manual* (March 1987), was used to identify and delineate the wetlands on the site described in this report. Under this methodology, vegetation, soils, and hydrology are each evaluated to determine the presence or absence of wetlands. Based on the use of this method, an area is considered to be a wetland if each of the following is met: (1) dominant hydrophytic vegetation is present in the area, (2) the soils in the area are hydric, and (3) the necessary hydrologic conditions within the area are met. Corresponding upland and wetland plots were recorded to determine more accurately the boundaries of on-site wetlands.

A.1 WETLAND VEGETATION

Hydrophytic plants are plant species specially adapted for saturated and/or anaerobic conditions. These species can be found in areas where there is a significant duration and frequency of inundation, which produces permanently or periodically saturated soils. Hydrophytic species, due to morphological, physiological, and reproductive adaptations, have the ability to grow, effectively compete, reproduce, and thrive in anaerobic soil. The U.S. Army Corps of Engineers (Corps) and the U.S. Fish and Wildlife Service (USFWS) has assigned indicator status to many plant species, based on the estimated probability of the species' existing under wetland conditions. Plants are categorized as Obligate (OBL), Facultative Wetland (FACW), Facultative (FAC), Facultative Upland (FACU), and Upland (UPL). Species with an indicator status of OBL, FACW, or FAC are considered to be adaptive to saturated and/or anaerobic (i.e., wetland) conditions and are referred to as hydrophytic vegetation (Table A-1).

TABLE A-1
DEFINITIONS OF PLANT INDICATOR STATUS

Plant Indicator Status Categories
Obligate Wetland Plants (OBL) – Plants that occur in wetlands, under natural conditions, approximately 99 percent of the time.
Facultative Wetland Plants (FACW) – Plants that occur in wetlands approximately 67 to 99 percent of the time.
Facultative (FAC) – Plants that are as likely to be found in wetlands as in non-wetlands; approximately 34 to 66 percent of the time in either.
Facultative Upland Plants (FACU) – Plants that occur in non-wetlands approximately 1 to 33 percent of the time.
Obligate Upland Plants (UPL) – Plants that occur in non-wetlands, under natural conditions, approximately 99 percent of the time.
No Indicator (NI) – Species that have not been given an indicator status.

Source: National List Of Plant Species That Occur in Wetlands. U.S. Fish and Wildlife Service Biological Report 88(26.9). (Revised 1993) 89 p.

Trees within a 30-foot radius, shrubs within a 15-foot radius, and herbs within a 5-foot radius of each data point were identified and noted. The approximate percentage of cover for each of the different plant species occurring within the tree, shrub, and herb strata were determined. Dominant plant species are considered to be those that, when cumulatively totaled in descending order of abundance, exceed 50 percent of the aerial cover for each vegetative stratum. Any additional species individually representing 20 percent or greater of the total aerial cover for each vegetative strata are also considered dominant.

The indicator status of the dominant plant species within each of the vegetative strata is used to determine the presence of hydrophytic vegetation near each data point. A data point was considered to have hydrophytic vegetation if greater than 50 percent of the dominant plant species within the area had an indicator statue of OBL, FACW or FAC.

A.2 HYDRIC SOILS

Hydric soils are defined as those that are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions that favor the growth and regeneration of hydrophytic vegetation. As a result of anaerobic conditions, hydric soils exhibit characteristics directly observable in the field, including high organic matter content, greenish or bluish gray color (gley formation), accumulation of sulfidic material, spots of orange or yellow color (mottling), and dark soil colors (low chromas), Table A-2.

TABLE A-2
HYDRIC SOIL INDICATORS

Hydric Indicator	Diagnostic Criteria
Organic Content	>50 percent by volume (constitutes organic soil)
Sulfidic Material	"Rotten egg" odor
Soil Color	Matrix Chroma of 2 or less in mottled soils
	Matrix Chroma of 1 or less in unmottled soils
	Gleyed colors
Water Saturation	Soil saturated at 0.5, 1.0, or 1.5 feet from the surface (depending on the soil drainage class and permeability) for a significant period during the growing season.
Soil Color Definitions	Hue: Indicates the dominant spectral color (i.e., red, yellow, green, blue, and purple).
	Value: Measure of degree of darkness or lightness of the color.
	Chroma: Measure of the purity or strength of the color.

Source: Environmental Laboratory, 1987, Corps of Engineers Wetlands Delineation Manual Technical Report Y-87-1, U.S. Army Waterways Experiment Station, Vicksburg, Mississippi.

Throughout a large portion of the area delineated as wetland, identification of hydric soils was aided through observation of surface hydrologic characteristics and indicators of wetland hydrology (e.g., drainage patterns). The extent of hydric soils was defined through direct soil observation within several data points, placed both inside and outside the wetland. Soil observations were completed within soil holes dug with a shovel to a depth of at least 18 inches below the existing ground surface. Soil organic content was estimated visually and texturally. Soil colors were determined through analysis of the hue, value, and chroma best represented in the Munsell Soil Color Chart. A soil chroma of 2 in combination with soil mottling, or a soil chroma of 1 without mottling, typically indicates a hydric soil if within 10 inches of the surface, or directly below the A horizon.

A.3 WETLAND HYDROLOGY

Soils were examined for the presence of hydrology. Wetland hydrologic characteristics develop during periods when the soils are inundated permanently or periodically, or when the soil is continuously saturated to the surface for sufficient duration to develop hydric soils and support vegetation typically adapted for life in periodically anaerobic conditions. Wetland hydrology criteria were considered to be satisfied if it appeared that wetland hydrology was present for at least 5 to 12 percent of the growing season. The growing season begins when the soil reaches a temperature of 5 degrees Celsius at 19.7 inches below the soil surface.

The hydrology was evaluated by direct visual observation of surface inundation or soil saturation within 18 inches below the existing ground surface in test plots. According to the 1987 Manual, ..."for soil saturation to impact vegetation, it must occur within a major portion of the root zone (usually within 12 inches of the surface) of the prevalent vegetation." Therefore, if saturated soils or indicators were observed within 12 inches of the surface, positive indicators of wetland hydrology were noted.

The area near each data point was examined for indicators of wetland hydrology. These indicators include dried watermarks, drift lines, sediment deposits, and drainage patterns. Areas where positive indicators of hydrology were noted were assumed to contain wetland hydrology.