Appendix C

Existing Infrastructure

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Existing Infrastructure. Water is supplied to managed units via a water conveyance system, Crissafulli pump, and two stationary diesel pumps. The stationary pumps pull water from Bryants Creek and are located in a pump station house midway along the southern boundary of the refuge. Numerous water control structures are located within the project area. Short descriptions of the existing infrastructures used to actively manage the water within the refuge are provided below. Several culverts are also located throughout the refuge, however they are not explicitly described here. See Exhibit A for location of the culverts.

Spillway. Since the establishment of the refuge in 1964, flood waters have overtopped the exterior berm and inundated the refuge in 1973, 1983, 1986, and 1993. The 800-foot sheet pile and gabion basket spillway was constructed in 1996 to an original elevation of 452.21 NGVD (at Lock & Dam 24 Tailwater gauge), which was then raised to 453.31 NGVD in 2003. Since the spillway construction the refuge flooded in 1996, 1998, 2001, 2002, 2008, 2011, and 2013.

Mississippi River Large Screw Gate. A large screw gate comprised of 5 small screw gates together is located just upstream of the spillway on the exterior berm. This structure was installed in 1995. It is gravity fed to either let water in or out of the refuge from the Mississippi River, and is used to drain water after an overtopping flood event.

Exterior Berm. The 12-foot tall exterior berm was constructed in 1917 (DOI 1976). The original purpose of this berm was for agricultural protection which allowed the wetlands to be drained and cleared for cropland (approximately 2770 acres was farmed). Currently, the exterior berm is crucial to allow site staff to mimic historic water regime which native species are adapted to. Without the berm, the area would flood more frequently than historic conditions due to increased water table caused by the lock and dam, floodplain development, and increase in run-off due to impervious surfaces and agricultural causing native vegetation to transition to more common, less valuable flood-tolerant species. Seepage through this berm along the Mississippi River has been noted in the annual narratives starting in 1974 (DOI 1974-1975).

Access Roads. Gravel roads provide access to the area for the public as well as for operation and maintenance of the units and other structures. A main gravel road runs east-west from MSU 5 east to the large screw gate on the exterior berm. Another road runs north from MSU 2 to Goose Pasture provides a required access to the adjacent private property to the north, and this access has to be through the refuge. This road also provides access to the nature trail. A road runs south from the eastern side of MSU 11 to the south end of Big Pond. Another road follows the western side of MSU 2 to the pump station.

Water Channels. The main water channels were present at refuge establishment. Since then, siltation within the channels continues to be a problem leading to the need to excavate the channels on a regular basis. In 1980, channels were excavated along the exterior berm to increase ability to drain off seepage

water (DOI 1980). The main water channels run through the central area of the refuge and are used to drain and deliver water to all managed units.

Pump Station. The existing pump station was built shortly after the refuge was established and became fully operational by 1971. The pump station consists of two stationary pumps (Caterpiller 3304 4-cylinder 425 cubic inches diesel engines) with capacity to pump 20,000 gallons per minute each from or into Bryants Creek. This structure is the main source of pumping water in and off the refuge.

Small Screw Gates. In 1968, a 42" culvert with a 42" gate was placed in the main conveyance channel (DOI 1968). Other screw gates were installed throughout the 1980 and 1990s. Currently, eight small screw gates are located within the refuge to move water from individual units into an adjacent water channel for water conveyance (Exhibit A).

Stop-log Structures. Beginning in the late 1960s, stop-log structures were installed to aid in water level management. These varied in size from 5 × 5 to 5 × 8 foot stop log structures with 24-36" corrugated metal pipe (DOI 1968, 1970). Nineteen stop-log structures are located within the refuge to move water from individual units into and out of adjacent channels for water conveyance (Exhibit A).

Interior Berms. Numerous small berms are found throughout the refuge which effectively disconnect adjacent areas and fragment habitat. The majority were constructed prior to refuge establishment when the area was heavily farmed. Since refuge establishment, some berms have naturally degraded while others have been maintained. Starting in 2008, several berms were removed to create the large MSU 7 unit in the northwest corner of the refuge (Exhibit A).

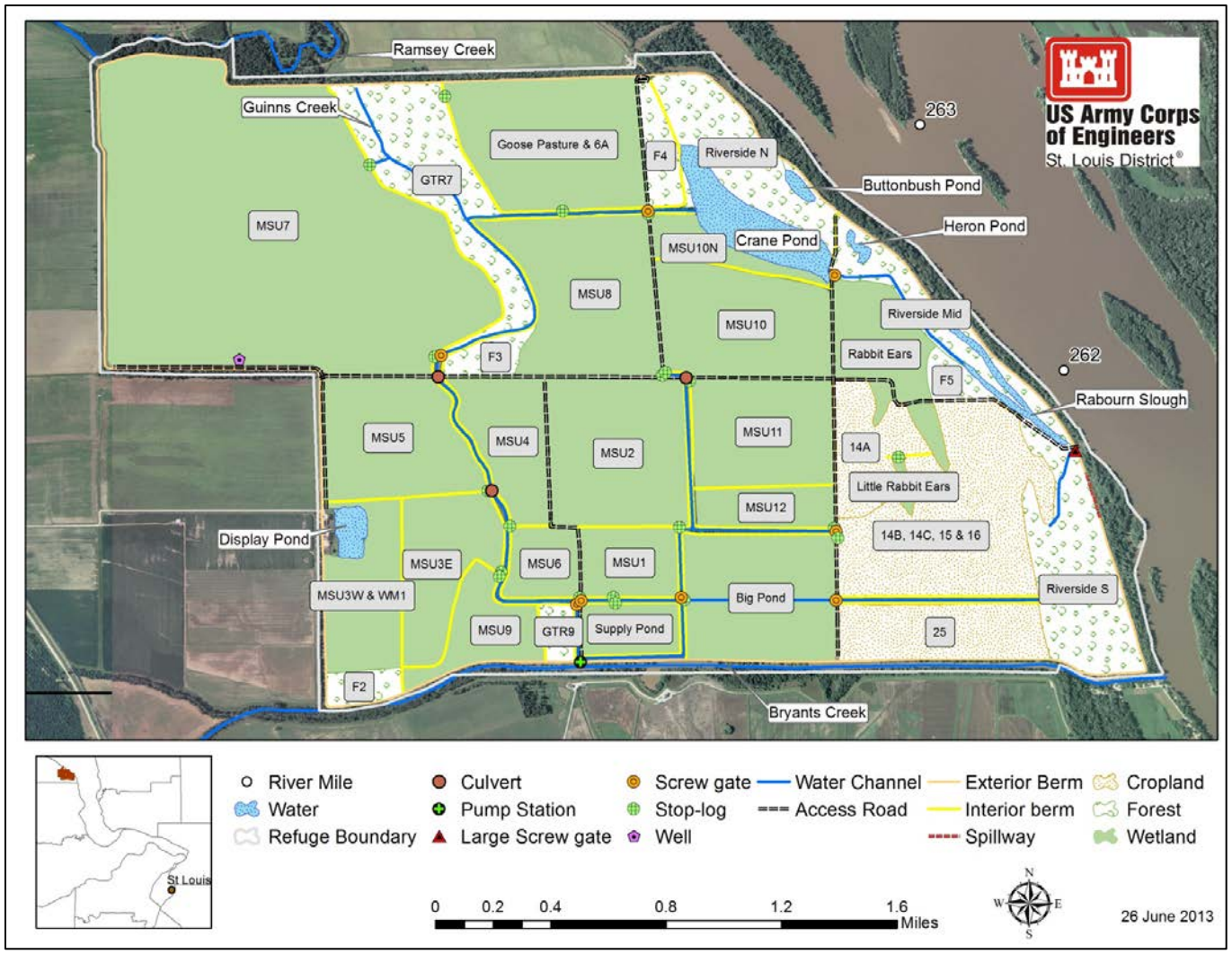

Exhibit A. Depiction of existing infrastructure at CCNWR in relation to the existing management units. MSU = Moist soil unit; F = forest; GTR = Greentree Reservoir.